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Post-Graduate Studies
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Published Research Articles in International Journals

Suez Canal University
(Abstracts)

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جامعة قناة السويس

قطاع الدراسات العليا والبحوث

ملخص الابحاث العلمية المنشورة بالدوريات العلمية العالمية

جامعة قناة السويس

٢٠١٦-٢٠١٧

كلمة السيد الاستاذ الدكتور رئيس جامعة قناة السويس

يعد البحث العلمى أداة الأمم للتقدم وصناعة الحضارة والارتقاء بالشعوب وتحقيق رفاهيتها ، ويعد ما تمتلكه أى أمة من أبحاث علمية متقدمة وما تمتلكه من تراث علمى دقيق أحد المعايير المهمة للحكم على تقدم الأمة ، ولذا يشهد العالم سباقا وتعاونا فى هذا المجال حتى يستطيع الانسان تسخير قوى الطبيعة وثرواتها لراحته وسعادته .

كما يعد البحث العلمى الدعامة الاساسية للاقتصاد والتطور وقناة مهمة لاثراء المعرفة الانسانية فى ميادينها كافة ، لذا فإن ما تمتلكه الأمة من علماء يعتبر ثروة تفوق كل الثروات الطبيعية .

ولذلك تحرص جامعة قناة السويس على تشجيع النشر الدولى الذى سيضع الجامعة فى موقع لائق ضمن التصنيف العالمى للجامعات ، والذى يعتمد من بين معاييره على عدد الابحاث العلمية المنشورة بالدوريات العلمية العالمية ، وتنتهج الجامعة طريقا لتنمية الابداع والتفكير العلمى لدى الشباب حتى يمكن تحقيق التقدم وبناء مستقبل مشرق .

وفقنا الله لما فيه الخير لمصرنا الحبيبة

أ.د/ عاطف محمد محمد ابو النور

رئيس جامعة قناة السويس

أصبح البحث العلمى واحد من المجالات الهامة التى تجعل الدول تتطور بسرعة هائلة وتتغلب على المشكلات التى تواجهها بطرق علمية حيث ان البحث العلمى فى حياة الانسان ينبع من مصدرين هامين وهما :
المصدر الاول:- يتمثل فى الانتفاع بفوائد تطبيقية حيث تقوم الجهات المسئولة بتطبيق هذه الفوائد التى نجمت عن الابحاث. المصدر الثانى:- يتمثل فى الاسلوب العلمى فى البحث الذى يبنى عليه جميع المكتشفات والاختراعات .

ويعتبر النشر الدولى منتج اساسى للبحث العلمى الجيد لما له من اهمية كبيرة لدى الجامعات والمراكز البحثية على مستوى العالم، والنشر الدولى هو نشر نتائج الابحاث العلمية فى الدوريات العلمية العالمية المحكمة من قبل اساتذة متخصصين فى فروع العلوم والآداب المختلفة بينما المدلول الفعلى والاكثر اهمية للنشر الدولى من وجه نظر الباحثين والعلماء على مستوى العالم هو وصول نتائج الابحاث لكافة المتخصصين والباحثين والعلماء فى ذلك الفرع من العلم .

كما اصبح تمويل المشروعات البحثية فى معظم انحاء العالم يعتمد ايضا على عدد الابحاث الدولية المنشورة للباحثين والمجموعات البحثية ولذلك اتجهت الجامعات المصرية فى الآونة الاخيرة الى تحفيز باحثيها وعلمائها للنشر الدولى بمنح جوائز مالية تعتمد على تصنيف الدوريات العلمية ومعامل تأثير Impact Factor لكل مجلة مما ادى الى زيادة واضحة فى معدل النشر الدولى للباحثين بالجامعات المصرية ، كذلك ومنذ عام ٢٠٠٩ اصبح النشر الدولى فى الدوريات العلمية المحكمة من اهم عوامل تقييم المتقدمين لجوائز الدولة المختلفة (تشجيعية – تفوق – تقديرية) .

ونظرا لموقع جامعة قناة السويس الذى يعتبر الركيزة العلمية الاساسية فى المنطقة والتى تعتبر من اهم المناطق التنموية فى الوقت الحالى ونظرا للخبرات المتعددة للسادة الاساتذة اعضاء هيئة التدريس بالجامعة فى الكثير من المجالات لذا تشجع الجامعة وخاصة قطاع الدراسات العليا والبحوث السادة الباحثين من الشباب على النشر بالطريقة السليمة وذلك من خلال عمل دورات متخصصة فى الموضوعات الاتية :

- طرق الكتابة العلمية المتخصصة
- كيفية النشر العلمى بالطريقة الصحيحة
- كيفية كتابة المشروعات
- اخلاقيات البحث العلمى

ولذا فان الهدف الاساسى للجامعة هو بناء مجتمع مبتكر يمتاز بالقدرات العلمية والتكنولوجية وتوجيه شباب الباحثين الى التطور والابتكار لتحقيق اعظم النتائج .

ا.د/ ماجدة محمد هجرس

نائب رئيس الجامعة للدراسات العليا والبحوث

A Word
by
Suez Canal University President

Scientific Research is considered the tool for achieving progress, making civilization and elevating nations. For that reason, what each nation what each nation gains from advanced scientific research and scientific legacy is one of the important criterions to judge its progress. That is why the world today is witnessing a scientific race, as well as scientific cooperation, so that humans can employ the forces and wealth of nature for both comfort and happiness.

Scientific research is also considered the main pillar for economy and development and an important channel to enrich human knowledge in all its fields.

That is why the Suez Canal University is keen to encourage international publication to have a prestigious position at the international ranking of universities, based on the number of scientific Publications in international peer-reviewed journals, books and conferences, Suez Canal University is well on its way to promote creativity and scientific thinking in the youth, so they can achieve progress and build a bright future.

May Allah guide us to the welfare of our beloved Egypt

Prof .Atef Mohamed Mohamed Abo Elnoor
Suez Canal University President

The scientific research has become one of the main fields that make the countries develop rapidly and scientifically overcome problems that face them. The scientific research in human life comes from two main resources: -
First resource: - is to benefit from the applied outcomes, and the responsible agencies to apply those resulted benefits.
Second resource: - is the scientific approach in research, upon which all discoveries and inventions are depending.
And the international publication is considered a main production of the good scientific research. Also for the great importance it holds at universities and the research centers all around the world. The international publication is to publish the scientific research in international scientific periodicals, which is being judged by special professors in different science and arts fields. But the main contribution for the international publication, from the scientists and researchers point of view, is to reach all the results of the latest researches for all the specialists, scientists, and researchers all around the globe.
Also the scientific projects finance, everywhere around the world, is depending on the number of published scientific researches for researchers and research groups. And so, recently, the Egyptian universities started to encourage their own researchers and scientists to internationally publish by giving financial awards depending on the periodicals rating and the Impact Factor for each one, which lead to a great increase to the international publication rate for the Egyptian universities researchers. Also since the year 2009, the international publication in judged scientific periodicals has become one of the main qualifications for candidates for different state awards (encouragement – excellence - discretionary).
And for the important position of the Suez Canal university, which is the main educational pillar for a whole region being considered one of the most important development regions in the present, and for the different experiences of the faculty's professors in all different fields, the university, and especially the researches and graduate studies sector, encourages the youth researchers to publish in the right way. And that will be through holding specialized courses in the following subjects: -
- specialized scientific writing methods
- how to correctly publish a scientific research
- how to write projects
- scientific research ethics
And so the main goal for the university is to build an innovative society with scientific and technological capabilities and to direct young researchers to develop and innovate to achieve the greatest results.

Prof. Magda Mohamed Hagras
Vice-President for Postgraduate Studies and Research Suez Canal University

List of Content

Faculty of Medicine

Journal of Infection and Public Health
2017
(10) 761–765

Impact of schistosomiasis on increase incidence of occult hepatitis B in chronic hepatitis C patients in Egypt .

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Abstract

Co-infection of schistosomiasis, HBV and HCV is common in countries where schistosomiasis is endemic. Occult hepatitis B occurs in patients at high risk for HBV infection (e.g., patients on hemodialysis, patients receiving blood transfusions). Schistosomal infection is a risk factor of HBV infection that can increase the incidence of occult hepatitis B. We aimed to determine the prevalence of occult hepatitis B in chronic hepatitis C patients with and without schistosomiasis and to assess the effect of schistosomal infection on the increased risk of exposure to HBV infection and to occult hepatitis B. Two hundred chronic hepatitis C patients who were negative for HBsAg participated. All patients were tested for the following: Anti schistosome antibodies, Anti-HBc, serum HBV DNA, CBC and liver function. The prevalence of occult hepatitis B in CHC patients with/without schistosomiasis were 12.8% and 8.5% (P = 0.042), respectively. Next, 63.8% of CHC patients with schistosomiasis were exposed to HBV infection (Anti-HBc +ve) during their lifetime. In conclusion, the prevalence of occult hepatitis B is higher in CHC patients with schistosomiasis compared to those without schistosomiasis. Periodic laboratory investigations of Schistosoma mansoni, HBV and HCV are recommended for the early detection of the infection and, especially in endemic areas, to avoid infection complications.

Clinical Rheumatology
2017
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CD5+ B lymphocytes in systemic lupus erythematosus patients: relation to disease activity.

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Abstract

B cells are essential players in the pathogenic mechanisms of systemic lupus erythematosus (SLE). Although CD5+ B cells have been considered to play a paradoxical role in preventing, rather than inducing autoimmunity, there is no consensus agreement about the proportions of CD5+ B cells population in SLE patients. So, the aim of the present study was to assess blood concentration of CD5+ B cells in patients with SLE and to evaluate their relationship with disease activity and organ damage. We recruited 100 SLE patients and 100 healthy control subjects. Based on SLE disease activity index (SLEDAI), patients were divided into two groups: active SLE (n = 50) and inactive SLE (n=50). SLE wasactivewhenSLEDAIwas≥4.Theexpression of CD5+ B cells was evaluated using flow cytometry to measure the proportions and absolute numbers of the cells. The proportions of CD5+ B cells of total lymphocytes were significantly lower in SLE patients versus controls (4.1 ± 3.9 vs10.8± 5.2%, P=<0.001).CD5+B cells were significantly decreased in active SLE patients (3.1 ± 2.7%) in comparison to inactive patients (5.2 ± 3.7%) (P = 0.013). CD5+ B cells correlated positively with C3 (r = 0.328, P = 0.020) and C4 (r = 0.355, P = 0.011). CD5+ B cells were significantly decreased in SLE patients compared to healthy controls and they were significantly decreased in active SLE patients in comparison to inactive ones.

International Journal of Rheumatic Diseases
2017
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Serum Interleukin-37: a new player in Lupus Nephritis?

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Abstract

Introduction: Interleukin-37 (IL-37) has been proved to be a fundamental natural suppressor of innate immunity and inflammatory responses in autoimmune diseases such as systemic lupus erythematous (SLE). The purpose of this study was to assess serum IL-37 level in SLE patients and its correlation with disease activity and clinical and laboratory manifestations of SLE patients. **Patients/methods:** The serum level of IL-37 was assessed and analyzed in 100 SLE patients and 50 healthy controls by using enzyme-linked immunosorbent assay (ELISA). Clinical and laboratory manifestations and disease activity using SLE Disease Activity Index (SLEDAI) were also assessed. **Results:** IL-37 serum level was significantly higher among SLE patients than controls. It has statistically significant correlation with disease activity, renal and mucocutaneous involvement in SLE patients. **Conclusion:** IL-37 level is elevated in SLE patients in comparison to healthy controls and is correlated to high disease activity, mucocutaneous and renal involvement.

Acta Pediatrica
2016
(2):154-8

Term neonates with infection and shock display high cortisol precursors despite low levels of normal cortisol .

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Abstract

Background: Neonatal therapy-resistant septic shock is a common problem in middle and low-income countries. We investigated whether newborn infants with infection and therapy-resistant hypotension showed evidence of abnormal levels of cortisol or cortisol precursors.
Methods: A total of 60 term or near term neonates with evidence of infection were enrolled after informed consent. Of these, 30 had an infection and refractory shock and 30 had an infection without shock. There were no detectable differences between the groups in the length of gestation, birth weight or gender distribution. Serum was obtained during days four and 14 after birth. Cortisol and cortisol precursor concentrations were analysed using liquid chromatography-tandem mass spectrometry.
Results: The cortisol concentrations were low considering the expected responses to stress and they did not differ between the groups. The infants with infection and shock had higher serum dehydroepiandrosterone (DHEA) levels than those without shock (319.0 ± 110.3 µg/dL, versus 22.3 ± 18.3 µg/dL; $p < 0.0001$) and they also had higher 17-hydroxy-pregnenolone, pregnenolone and progesterone concentrations. There were no detectable differences in the levels of 17-hydroxy-progesterone, 11-deoxy-cortisol, cortisol or cortisone.
Conclusion: Septic newborn infants with therapy-resistant hypotension had very high DHEA levels, suggesting that 3-beta-hydroxysteroid dehydrogenase activity limited the rate of cortisol synthesis.

Jornal de pediatria
2016
(5):486-92

Fecal calprotectin levels in preterm infants with and without feeding intolerance.

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Abstract

Background: To assess the level of fecal calprotectin in preterm neonates with feeding intolerance, as well as to evaluate it as a marker of feeding intolerance and to determine a cut-off level of fecal calprotectin in feeding intolerance.
Methods: Analytical, multicenter, case–control study, which was carried out in neonatal intensive care units in Egypt, in a period from August 1, 2014 to March 1, 2015 on 52 preterm neonates. Neonates were classified into two groups; a study group including 26 neonates who met inclusion criteria and a control group including 26 neonates for comparison.
Results: Fecal calprotectin levels ranged from 3.9 µg/g to 971.8 µg/g, and there was a significant increase in fecal calprotectin in the study group when compared to the control group (334.3 ± 236.6 µg/g *vs.* 42.0 ± 38.2 µg/g, respectively) with moderate inverse significant correlation between fecal calprotectin and birth weight. Furthermore, there was moderate, significant correlation between fecal calprotectin and duration of breastfeeding range. On the other hand, there was no correlation between fecal calprotectin and post-natal age, gestational age, or volume of feeding. A cut-off at the 67.0 µg/g level, with 100.0% sensitivity and 76.9% specificity, was considered.
Conclusion: Fecal calprotectin level increased significantly in neonates with feeding intolerance; it can be used to detect early cases with necrotizing enterocolitis in neonates, but this subject still needs more investigations on more patients.

Microchimica Acta
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Fluorescent gold nanoclusters as pH sensors for the pH 5 to 9 range and for imaging of blood cell pH values.

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Abstract

The authors describe the use of gold nanoclusters (AuNCs) with a diameter of ~2 nm for fluorescent sensing of pH values in the range from 5 to 9. The AuNCs were synthesized in the presence of bovine serum albumin (BSA) which acts as both a reducing agent and capping agent. The resulting AuNCs were characterized in terms of size and surface chemistry using TEM and FTIR. The BSA-capped AuNCs display red luminescence, with excitation/emission peaks at 470/640 nm, which is strongly modulated by the pH indicator bromothymol blue (BTB). The effect depends mainly on an inner filter effect due to spectral overlap between the absorption BTB and the emission of the AuNCs. The pH nanosensor responds to pH values in the range from 5 to 9 which is the so-called physiological pH range. The method was applied to detect changes in the pH values that occur after the death of red blood cells. Such pH changes are considered as a potential forensic marker for estimating the time passed since death. The results show the BTB-BSA-AuNC system to be capable of detecting respective intracellular pH changes.

TUMOR BIOL
2017
1–22

MicroRNA–target cross-talks: Key players in glioblastoma multiforme

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Abstract

The role of microRNAs in brain cancer is still naive. Some act as oncogene and others as tumor suppressors. Discovery of efficient biomarkers is mandatory to debate that aggressive disease. Bioinformatically selected microRNAs and their targets were investigated to evaluate their putative signature as diagnostic and prognostic biomarkers in primary glioblastoma multiforme. Expression of a panel of seven microRNAs (hsa-miR-34a, hsa-miR-16, hsa-miR-17, hsa-miR-21, hsa-miR-221, hsa-miR-326, and hsa-miR-375) and seven target genes (E2F3, PI3KCA, TOM34, WNT5A, PDCD4, DFFA, and EGFR) in 43 glioblastoma multiforme specimens were profiled compared to non-cancer tissues via quantitative reverse transcription–polymerase chain reaction. Immunohistochemistry staining for three proteins (VEGFA, BAX, and BCL2) was performed. Gene enrichment analysis identified the biological regulatory functions of the gene panel in glioma pathway. MGMT (O-6-methylguanine-DNA methyltransferase) promoter methylation was analyzed for molecular subtyping of tumor specimens. Our data demonstrated a significant upregulation of five microRNAs (hsa-miR-16, hsa-miR-17, hsa-miR-21, hsa-miR-221, and hsa-miR-375), three genes (E2F3, PI3KCA, and Wnt5a), two proteins (VEGFA and BCL2), and downregulation of hsa-miR-34a and three other genes (DFFA, PDCD4, and EGFR) in brain cancer tissues. Receiver operating characteristic analysis revealed that miR-34a (area under the curve = 0.927) and miR-17 (area under the curve = 0.900) had the highest diagnostic performance, followed by miR-221 (area under the curve = 0.845), miR-21 (area under the curve = 0.836), WNT5A (area under the curve = 0.809), PDCD4 (area under the curve = 0.809), and PI3KCA (area under the curve = 0.800). MGMT promoter methylation status was associated with high miR-221 levels. Moreover, patients with VEGFA overexpression and downregulation of TOM34 and BAX had poor overall survival. Nevertheless, miR-17, miR-221, and miR-326 downregulation were significantly associated with high recurrence rate. Multivariate analysis by hierarchical clustering classified patients into four distinct groups based on gene panel signature. In conclusion, the explored microRNA–target dysregulation could pave the road toward developing potential therapeutic strategies for glioblastoma multiforme. Future translational and functional studies are highly recommended to better understand the complex bio-molecular signature of this difficult-to-treat tumor.

Molecular Medicine
2016
22:653-663

Stemness-related transcriptional factors and homing gene expression profiles in hepatic differentiation and cancer.

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Abstract

Stem cell transcriptional signature activation is an essential event in the development of cancer. This study aimed to investigate the differential expression profile of three pluripotency-associated genes (*OCT4*, *NANOG*, and *SOX2*), G-protein-coupled chemokine receptor 4 (*CXCR4*) and the ligand (*CXCL2*), and alpha feto-protein (*AFP*) in hepatogenic differentiated stem cells and in sera of hepatitis C virus (HCV) and HCV-induced hepatocellular carcinoma (HCC) patients. Mesenchymal stem cells derived from umbilical cord blood were differentiated using hepatogenic differentiation media. Serum specimens were collected from 96 patients (32 cirrhotic HCV, 32 early HCC, and 32 late HCC) and 96 controls. Real-time quantitative reverse transcription polymerase chain reaction was performed for relative quantification of the 6 target genes using LIVAC method. *In silico* network analysis was also executed to explore the pluripotency and tumorigenic regulatory circuits in liver cancer .The expression levels of all genes declined gradually during the stages of stem cell differentiation. On univariate and multivariate analyses, *NANOG, CXCR4* and *AFP* were significantly up-regulated in HCC patients with late clinical stage. In contrast, *SOX2* and *CXCL2* were markedly over-expressed in cirrhotic patients and could be used for clear demarcation between cirrhotic and HCC patients in our cases. In conclusion, our data highlight the potential role of *SOX2* stem cell marker and *CXCL2* chemokine in liver cell degeneration and fibrogenesis in HCV-induced hepatic cirrhosis in our sample of the Egyptian population. In addition, the significant association of *NANOG* and *CXCR4* high-expression with late HCC, could contribute to the acquisition of stem cell-like properties in hepatic cancer and dissemination in late stages, respectively. Taken together, our results could have a potential application in HCC prognosis and treatment.

Respiratory Research
2017
18:169

Structure and functional impact of seed region variant in miR-499 gene family in bronchial asthma .

Eman A Toraih[1], Mohammad H Hussein, Essam Al Ageeli, Eman Riad[2], Nouran B. AbdAllah[3], Ghada M Helal, Manal Said Fawzy[4].

Departments of Histology and Cell Biology[1], Department of Chest Diseases and Tuberculosis[2], Medical Biochemistry[3], Department of Pediatrics[3], Faculty of Medicine, Suez Canal University, Egypt

Abstract

Small non-coding RNAs (microRNAs) have been evolved to master numerous cellular processes. Genetic variants within microRNA seed region might influence microRNA biogenesis and function. The study aimed at determining the role of microRNA-499 (MIR-499) gene family polymorphism as a marker for susceptibility and progression of bronchial asthma and to analyze the structural and functional impact of rs3746444 within the seed region. Genotyping for 192 participants (96 patients and 96 controls) in the discovery phase and 319 subjects (115 patients and 204 controls) in the replication phase was performed via Real Time-Polymerase Chain Reaction technology. Patients underwent the methacholine challenge test and biochemical analysis. Gene structural and functional analysis, target prediction, annotation clustering, and pathway enrichment analysis were executed. Predicted functional effect of rs37464443 SNP was analyzed. MiR-499 gene family is highly implicated in inflammation-related signaling pathways. Rs374644 (A > G) in MIR499A and MIR499B within the seed region could disrupt target genes and create new genes. The G variant was associated with high risk of developing asthma under all genetic association models (G versus A: OR = 3.27, 95% CI = 2.53-4.22; GG versus AA: OR = 9.52, 95% CI = 5.61-16.5; AG versus AA: OR = 2.13, 95% CI = 1.24-3.46; GG + AG versus AA: OR = 4.43, 95% CI = 2.88-6.82). GG genotype was associated with poor pre-bronchodilator FEV1 (p = 0.047) and the worst bronchodilator response after Salbutamol inhalation, represented in low peaked expiratory flow rate (p = 0.035). In conclusion, miR-499 rs3746444 (A > G) polymorphism was associated with asthma susceptibility and bronchodilator response in Egyptian children and adolescents. Further functional analysis is warranted to develop more specific theranostic agents for selecting targeted therapy.

Oxidative Medicine
and Cellular longevity
2017
21 pages

MicroRNA-34a: a key regulator in the hallmarks of renal cell carcinoma.

Eman Ali Toraih[1], Afaf T Ibrahiem, Manal Said Fawzy[2], Mohammad H Hussein, Saeed Awad M Al-Qahtani, Aly A.M. Shaalan [1]

Departments of Histology and Cell Biology[1], Medical Biochemistry[2], Faculty of Medicine, Suez Canal University, Egypt

Abstract

Renal cell carcinoma (RCC) incidence has increased over the past two decades. Recent studies reported microRNAs as promising biomarkers for early cancer detection, accurate prognosis, and molecular targets for future treatment. This study aimed to evaluate the expression levels of miR-34a and 11 of its bioinformatically selected target genes and proteins to test their potential dysregulation in RCC. Quantitative real-time PCR for miR-34a and its targets; MET oncogene; gene-regulating apoptosis (TP53INP2 and DFFA); cell proliferation (E2F3); and cell differentiation (SOX2 and TGFB3) as well as immunohistochemical assay for VEGFA, TP53, Bcl2, TGFB1, and Ki67 protein expression have been performed in 85 FFPE RCC tumor specimens. Clinicopathological parameter correlation and in silico network analysis have also implicated. We found RCC tissues displayed significantly higher miR-34a expression level than their corresponding noncancerous tissues, particularly in chromophobic subtype. MET and E2F3 were significantly upregulated, while TP53INP2 and SOX2 were downregulated. ROC analysis showed high diagnostic performance of miR-34a (AUC = 0.854), MET (AUC = 0.765), and E2F3 (AUC = 0.761). The advanced pathological grade was associated with strong TGFB1, VEGFA, and Ki67 protein expression and absent Tp53 staining. These findings indicate miR-34a along with its putative target genes could play a role in RCC tumorigenesis and progression.

The Clinical Respiratory Journal
2017
1644-1650

Salivary C-reactive protein and mean platelet volume in diagnosis of late-onset neonatal pneumonia .

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Abstract

Background: Neonatal pneumonia is an important and major cause of neonatal morbidity and mortality worldwide therefore; its early detection plays a crucial role in successful therapy.
Analysis of saliva as a non-invasive method for detection of neonatal diseases holds great promise for improving health care. Till now, salivary C-reactive protein (CRP), mean platelet volume (MPV), neutrophil / lymphocyte ratio (NLR) and platelets /lymphocytes ratio (PLR) have not been studied as markers of diagnosis in neonatal pneumonia.
Objective: To assess the applicability of salivary CRP, MPV, NLR and PLR as diagnostic markers in late onset neonatal pneumonia.
Methods: Prospective case control study of 70 full term neonates, 35 with late onset neonatal pneumonia and 35 healthy controls were enrolled. Serum and salivary CRP concentrations were measured by ELISA, while MPV, NLR and PLR were measured by automated blood cell counter.
Results: This study showed a statistically significant difference between salivary CRP means in neonates with late onset neonatal pneumonia versus control neonates (6.2 ± 4.6 ng/L and 2.8±1.9 ng/L) respectively. At the cut-off point 3.8 ng/L, salivary CRP showed 91.4% sensitivity and 80.9% specificity. Salivary CRP also showed accuracy in predicting elevated serum CRP in neonates with pneumonia. MPV showed a significant difference between pneumonia and controls (mean = 10.2±0.7, 8±0.5) respectively. At cut-off point 9.0 it has 80 % sensitivity and specificity.
Conclusion: The present study showed for the first time that both salivary CRP and MPV are suitable as diagnostic markers in late onset neonatal pneumonia.

Faculty of Vet.Medicine

Brain Structure and Function
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Immunohistochemical and biochemical evidence for the presence of serotonin-containing neurons and nerve fibers in the octopus arm.

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Abstract

We report firstly the occurrence of serotonin (5-HT) in the octopus arm that possesses highly sophisticated sensory and motor nervous systems. The identification and localization of 5-HT were studied by high performance liquid chromatography (HPLC) and immunohistochemistry using antiserum against 5-HT, respectively. Our HPLC analysis confirmed the presence of 5-HT in the octopus arm. The specificity of the antiserum used was validated by absorption tests with 5-HT and its related compounds. 5-HT-like immunoreactive (5-HT-lir) staining occurred exclusively in neuronal structures. The level of 5-HT contents assayed by HPLC in various arm regions matched well with the richness of stained structures by immunohistochemistry. 5-HT-lir nerve cell bodies were scattered only in the cellular layer of the brachial ganglia. 5-HT-lir smooth or varicose nerve fibers were observed in various tissues of the arm including the skin, the wall of blood vessels, the cerebrobrachial tract and nerve roots between the brachial ganglia and peripheral nerve centers. When compared with immunostaining for peripheral choline acetyltransferase, a marker of sensory epithelial cells of the sucker, 5-HT-lir nerve fibers were seen in close apposition to such sensory cells. As these fibers are likely emitted from 5-HT-lir cells in brachial ganglia, it is suggested that intrinsic 5-HT-lir nerves of the arm participate in sensory transmission. We here provided a detailed map of 5-HT-lir neuronal structures in the octopus arm.

Biochemical and Biophysical Research Communications
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Superior angiogenesis facilitates digit regrowth in MRL/ MpJ mice compared to C57BL/6 mice.

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Abstract

Previous studies indicated that the fast-healer strain of MRL/MpJ-Faslpr/J (MRL) mice demonstrated superior regenerative capabilities for digit wound healing and/or regeneration compared with the nonhealer strain of C57BL/6 (C57) mice. These reports, however, mainly focused on morphological observations and analysis of gene expression with little attention on the role of angiogenesis in the amputated digits. By taking advantage of Laser Doppler Imaging and histological analysis, we examined the potential role(s) of angiogenesis in facilitating tissue regrowth/regeneration by comparing two strains of mice (MRL versus C57). The three middle digits on the mouse's right foot (RF) were amputated at the middle level of phalanx 2 (P2) on postnatal day 2 (Day 0), while the left foot (LF) remained intact and served as a control. Laser Doppler images and digital photographs were taken of both feet before, immediately after surgery, and on Day 7, 14, 21, and 28 to evaluate blood flow and overall length of digit regrowth. All measurements from the amputated digits of the RF were divided by those of the control LF to obtain normalized ratios for statistical comparisons between groups. It was found that MRL mice demonstrated an approximately 220% increase in regrowth ratios over that of C57 mice from Day 21e28 ($p < 0.01$, n ¼ 13), while blood-flow increased by about 25% on Day 21 ($p < 0.01$, n ¼ 13) compared to that in C57 mice. Histological analysis of both control and amputated limbs indicated an approximately 70% increase in the number of vessels (both arterial and venous) in MRL mice over that of the C57 mice ($p < 0.05$, n ¼ 3). We conclude that higher blood flow and angiogenesis may play an important role in facilitating the fast regrowth ratios of amputated digits in MRL mice compared to C57 mice.

Toxicology Mechanisms and Methods
2017
(1):36-44

Characterization of Tilapia (Oreochromis niloticus) aldehyde reductase (AKR1A1) gene, promoter and expression pattern in benzo-a-pyrene exposed fish.

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Abstract

This study planned to isolation and characterization of AKR1A1 cDNA from Bap injected nile tilapia (Oreochromis niloticus), comparison of its characteristic structures with those of other species, characterization of AKR1A1 gene and promoter, and investigation of AKR1A1 mRNA expression in various organs of Bap injected tilapia. The cDNA was 1172 bp long which includes an open reading frame of 975 bp encoding a 324 amino acids protein and a stop codon. The sequence showed 3' and 5' non-coding regions of 179 and 18 bp. The amino acid sequence of O. niloticus AKR1A1 shows similarities of 60, 60, 60.6, 61.2 62.2, and 57.8% with mouse AKR1A1, Norway rat AKR1A1, zebrafish AKR1A1, African clawed frog AKR1A1, human, and yellow perch AKR1A1, respectively. Nucleotide sequence investigation of AKR1A1 gene and 5'-flanking region showed that the structural gene and the 5'-flanking region were approximately 2975 bp and 4006 bp in length, respectively. The protein-coding region contained eight exons, and one additional upstream exon. Real-time polymerase chain reaction (PCR) results showed that the highest level of AKR1A1 expression was found in bile (108.7), followed by kidney (77.9), muscles (37.3), and liver (24.7). mRNA levels of AKR1A1 were almost negligible in gills (0.6) while no detectable (ND) constitutive expression was detected in gut. In conclusion, our results concluded that tilapia AKR1A1 is inducible by BaP and have a significant function in the metabolism of xenobiotics and, therefore, may used as biomarker in fish.

Biomedicine & Pharmacotherapy
2016
(77): 79-85

Antagonistic effects of Spirulina platensis against sub-acute deltamethrin toxicity in mice: Biochemical and histopathological studies.

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Abstract

Spirulina platensis (SP); a microalga with high antioxidant and anti-inflammatory activities, acts as a food supplement in human and as many animal species. Deltamethrin (DLM) is a synthetic pyrethroid with broad spectrum activities against acaricides and insects and widely used for veterinary and agricultural purposes. Exposure to DLM leads to hepatotoxic, nephrotoxic and neurotoxic side effects for human and many species, including birds and fish. The present study was undertaken to examine the potential hepatoprotective, nephroprotective, neuroprotective and antioxidant effects of SP against sub-acute DLM toxicity in male mice. DLM intoxicated animals revealed a significant increase in serum hepatic and renal injury biomarkers as well as TNF-a level and AChE activity. Moreover, liver, kidney and brain lipid peroxidation and oxidative stress markers were altered due to DLM toxicity. Spirulina normalized the altered serum levels of AST, ALT, APL, LDH, g-GT, cholesterol, uric acid, urea, creatinine AChE and TNF-a. Furthermore, it reduced DLM-induced tissue lipid peroxidation, nitric oxide and oxidative stress in a dose-dependent manner. Collectively, that Spirulina supplementation could overcome DLM-induced hepatotoxicty, nephrotoxicity and neurotoxicity by abolishing oxidative tissue injuries.

Brain Research
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Neural cell proliferation and survival in the hippocampus of adult CaV 2.1 calcium ion channel mutant mice.

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Abstract

Tottering mutant mice carry a mutation in the pore-forming subunit (α1A) of Ca V 2.1 (P/Q-type) voltage-gated calcium ion (Ca 2 þ) channels resulting in reduced neuronal Ca 2 þ current density. We assessed male tottering mice for spatial learning using the Morris water maze. Tottering mice performed worse than wild type mice, suggesting abnormal hippocampal function. Because Ca 2 þ in fl ux via voltage-dependent Ca 2 þ channels regulates neuronal survival and function, we assessed hippocampus volume and cell density using hematoxylin and eosin stained serial sections. Adult hippocampal neurogenesis was assessed using 5-bromo-2′-deoxyuridine (BrdU) labeling with fl uorescent immunohistochemistry (IHC) and proliferating cell nuclear antigen (PCNA) with diaminobenzidine IHC. We double-labeled neurons using fl uorescence IHC with BrdU -neuronal nuclei (Neu-N) or double labeling of astrocytes using BrdU- glial fi brillary protein, respectively, to assess cell proliferation and survival. We assessed numbers of dying cells using fl uoro-Jade histochemistry. Decreased hippocampal volume, increased dentate hilar and hippocampal CA1 cell densities were observed in tottering mice compared to wild type mice. Cell proliferation was increased in the hilus and CA2 region of tottering mice compared to wild type mice. Dendritic intersections in Sholl analysis were decreased for tottering mouse CA1 pyramidal neurons compared to wild type mice. The increased regional cell density coincides with increases in cell proliferation in similar, non-neurogenic areas of the hippocampus of tottering mice. Thus, hippocampal alterations observed in adult tottering mice appear to result from changes in neuronal morphology and proliferation in non neurogenic areas of the hippocampus, and less through altered adult hippocampal neurogenesis or cell death.

Life Sciences
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α-Lipoic acid ameliorates oral mucositis and oxidative stress induced by methotrexate in rats. Histological and immunohistochemical study.

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Abstract

Aim: Oral mucositis is a common adverse effect of Methotrexate (MTX) that may limit its clinical use. Oxidative stress and apoptosis have been proposed to mediateMTX toxicity. The current studywas conducted to assess the conceivable protective effect of α-lipoic acid (LA) against MTX induced toxicity on both buccal and lingual mucosae.

Mainmethods: Thirty male Wistar ratswere allocated into three groups; control,MTX- reated group subjected to single intraperitoneal injection of MTX (20 mg/kg, i.p.) and LA- treated group treated with daily intraperitoneal injection of LA (10 mg/kg, i.p.) for 5weeks before MTX injection (20mg/kg, i.p.). Ratswere then sacrificed under anesthesia then their buccal and lingual mucosae were dissected out and processed for biochemical and histopathological studies. Biomarkers of oxidative stress and integrity of nuclear DNA (nDNA)were estimated. Immunostaining was used to determine Bax and PCNA localization.

Key findings: MTX-treated rats showed increased levels of MDA and fragmentation of DNA in addition to reduction of GSH levels and activities of catalase and SOD. Histological examination ofMTX-treated rats demonstrated degenerative changes that involved the surface epithelium and lamina propria of their buccal and lingual mucosae.

Immunohistochemical results of MTX-treated rats revealed strongly positive Bax and weakly positive PCNA staining reactivity of the nuclei of the basal and parabasal cells of the surface epithelium.However, LA significantly attenuated MTX-evoked alterations in the previous-stated parameters highlighting its antioxidant and antiapoptotic potential.

Significance: LA may be suggested to be a prospective candidate to ameliorate MTX-induced oral mucositis.

Aging and Disease
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(2): 149–161

Shining the Light on Senescence Associated LncRNAs

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Abstract

Cellular senescence can be described as a complex stress response that leads to irreversible cell cycle arrest. This process was originally described as an event that primary cells go through after many passages of cells during cell culture. More recently, cellular senescence is viewed as a programmed process by which the cell displays a senescence phenotype when exposed to a variety of stresses. Cellular senescence has been implicated in tumor suppression and aging such that senescence may contribute to both tumor progression and normal tissue repair. Here, we review different forms of cellular senescence, as well as current biomarkers used to identify senescent cells in vitro and in vivo. Additionally, we highlight the role of senescence-associated long noncoding RNAs (lncRNAs

Environmental Toxicology and Pharmacology
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Protective role of dietary Spirulina platensis against diazinon-induced Oxidative damage in Nile tilapia; Oreochromis niloticus.

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Abstract

The current study was performed to investigate the ameliorating effect of dietary supplementation of 0.5 and 1% *Spiurolina platensis* (SP) diet against the sub-acute toxicity of diazinon (DZN) 0.28 mg/L in Nile tilapia. At the end of experiment after 28 days, hepatic and renal damage markers (aspartate transaminase, alanine transaminase, alkaline phosphatase, urea, uric acid and creatinine), serum biochemical parameters (total proteins, albumin, cholesterol and glucose) and tissue antioxidant status (superoxide dismutase, catalase, glutathione peroxidase, reduced glutathione and malondialdehyde) were detesrmined. The results of the current study revealed significant improvement in hepatic and renal damage markers after SP supplementation in fish exposed to DZN toxicity. Moreover, SP improved serum biochemical markers through increasing serum albumin and globulins with a significant decrease in serum glucose and cholesterol. In addition, liver, kidneys and gills antioxidant status showed a significant improvement after SP supplemented to fish exposed to DZN where a significant increase in tissue antioxidant activity were observed with a significant decline in lipid peroxidation levels. It can be concluded that, SP supplementation attenuated the toxic effect of DZN toxicity in Nile tilapia through improving liver and kidney functions with a significant enhancement of tissue antioxidant status.

Cancer Chemother Pharmacol
2017
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Allicin ameliorates doxorubicin-induced cardiotoxicity in rats via suppression of oxidative stress, inflammation and apoptosis.

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Abstract

Purpose **Doxorubicin (DOX) is a highly active antineoplastic agent; however, its clinical use is limited due to associated cardiotoxicity. This study was performed to evaluate the beneficial effects of allicin, a dietary garlic active constituent against DOX-induced cardiotoxicity.** ***Methods*** **Forty male Swiss albino mice were divided into five groups, which received normal saline, oral allicin (20 mg kg−1 once daily), intraperitoneal DOX (on the 7, 9 and 11th day of the experiment), or DOX plus once daily allicin at 10 or 20 mg kg−1. Sera were collected for evaluation of cardiac injury markers and proinflammatory cytokines. Additionally, heart tissue spacemen were harvested for determination of oxidative stress markers, as well as for histopathological examination and immunohistochemical analysis.** ***Results*** **DOX administration induced significant ($p < 0.05$) reductions in cardiac tissue level of reduced glutathione and activities of antioxidant enzymes (catalase, superoxide dismutase, and glutathione peroxidase). Moreover, it induced significant ($p < 0.05$) elevations in cardiac tissue concentrations of nitric oxide and malondialdehyde as well as serum levels of cardiac injury biomarkers creatine kinase, and creatine kinase-MB) and proinflammatory cytokines (interleukin-1β, and tumor necrosis factoralpha).The histopathological examination showed necrotic and degenerative changes in the cardiac tissue, while immunohistochemical analysis revealed marked myocardial expression of activated caspase-3 and cyclooxygenase-2, following DOX adminstration. Allicin pretreatment significantly improved ($p < 0.05$) all examined parameters, and restored the cardiac architecture.*** ***Conclusion*** **The current study demonstrated that allicin effectively mitigates cardiac oxidative damage, apoptosis and inflammation, induced by acute DOX intoxication. Therefore, allicin could be a promising cytoprotective agent against DOX cardiotoxicity.**

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Serologic evidence and risk factors for Helicobacter pylori infection in animals and humans

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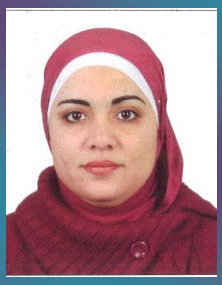
Abstract

Introduction: Helicobacter pylori (H. pylori) is one of the most common bacterial infections among humans worldwide. Although many records imply its interfamilial acquisition, the role of animals remains poorly understood. This study was undertaken to investigate the seroprevalence of H. pylori in animals and their human contacts in Cairo and Giza governorates, Egypt.

Methodology: Commercial enzyme-linked immunosorbent assay (ELISA) kits were used to detect IgG antibodies to H. pylori in dogs, cattle, and humans.

Results: Seropositive dogs (35/94; 37.2%), cattle (24/80; 30%) and humans (40/90; 44.4%) were found. Seroprevalence in animals significantly varied in different areas of sample collection, but there was no association with sex or age. Human seropositivity rates were associated with increasing age; moreover, seropositive dog owners (51.7%; 15/29), had seropositive dogs. However, infection was not associated with subject's sex, occupation, or history of animal contact.

Conclusions: Our findings indicate H. pylori is widely distributed in cattle and dogs and their human contacts in Cairo and Giza, Egypt. Further studies to determine infection in other occupational groups are needed. This study provides baseline information on the seroprevalence of H. pylori, which may be required to begin prevention control programs in our area.



Frontiers in Microbiology
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8: 1588

In Vitro Evaluation of the Impact of the Probiotic E. coli Nissle 1917 on Campylobacter jejuni's Invasion and Intracellular Survival in Human Colonic Cells.

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Abstract

Campylobacter jejuni is a leading cause of bacterial food poisoning in humans. Due to the rise in antibiotic-resistant Campylobacter, there exists a need to develop antibiotic-independent interventions to control infections in humans. Here, we evaluated the impact of Escherichia coli Nissle 1917 (EcN), a probiotic strain, on C. jejuni's invasion and intracellular survival in polarized human colonic cells (HT-29). To further understand how EcN mediates its impact, the expression of 84 genes associated with tight junctions and cell adhesion was profiled in HT-29 cells after treatment with EcN and challenge with C. jejuni. The pre-treatment of polarized HT-29 cells with EcN for 4 h showed a significant effect on C. jejuni's invasion (_2 log reduction) of the colonic cells. Furthermore, no intracellular C. jejuni were recovered from EcN pre-treated HT-29 cells at 24 h post-infection. Other probiotic strains tested had no significant impact on C. jejuni invasion and intracellular survival. C. jejuni decreased the expression of genes associated with epithelial cells permeability and barrier function in untreated HT-29 cells. However, EcN positively affected the expression of genes that are involved in enhanced intestinal barrier function, decreased cell permeability, and increased tight junction integrity. The results suggest that EcN impedes C. jejuni invasion and subsequent intracellular survival by affecting HT-29 cells barrier function and tight junction integrity.
We conclude that EcN might be a viable alternative for controlling C. jejuni infections.

International Immunopharmacology Journal
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Metformin enhancing the antitumor efficacy of carboplatin against Ehrlich solid carcinoma grown in diabetic mice: Effect on IGF-1 and tumoral expression of IGF-1 receptors

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Abstract

Diabetes has been listed as a risk factor for various types of cancer. Cancer cell development can be promoted by increased levels of IGF-1 and hyperinsulinemia that are associated with diabetes type II. Metformin is an anti-diabetic agent and its potential antitumor impact has become the objective of numerous studies. In this vein, we hypothesize that using metformin in diabetes type II mice may synergistic with carboplatin for reducing the risk of cancer. Therefore, the study aimed to evaluate the in vivo antitumor activity of metformin against solid EAC tumor growth in female diabetic mice and its potential pro-apoptotic and anti-proliferative effects with clarification of its inconclusive biological mechanisms. Mice were assigned into nine groups; normal control, diabetic control, diabetic plus EAC control, EAC control, and treated groups received carboplatin and/or metformin (100, 200 mg/kg). Metformin administration especially with high dose potentiated the antitumor activity of carboplatin displayed by increased pro-apoptotic activators "caspase-3 and bax" and reduced anti-apoptotic protein bcl-2. This was confirmed by the histopathological scores. Moreover, the combination therapy was effective in attenuating the expression of the pro-angiogenic mediator "VEGF" and the microvessel density as revealed by the CD34. Additionally, this combination down-regulated the high levels of the mutagenic element "IGF-1" and its receptor expression, and attenuated the intensity of inflammatory mediators. In conclusion, it was found that metformin therapy could enhance apoptotic marker, and suppress the neovascularization and proliferation process. This clarified the ability of metformin to support carboplatin activity in reducing tumor progression in type II diabetes.

Reviews in Aquaculture
2017
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Disease reduction in aquaculture with genetic and genomic technology: current and future approaches

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Abstract

Reduction in the occurrence and severity of disease in aquaculture would improve the productivity, profitability, efficiency and welfare of aquacultural fish. Genetic approaches that have been successfully implemented in aquaculture to enhance disease resistance and reduce disease incidence include classical selection, genetic marker-assisted selection, intraspecific crossbreeding, interspecific hybridization and transgenesis. The rate and speed of improvement in disease resistance varies from one genetic enhancement programme to another. Genome editing with zinc finger nucleases (ZFNs), transcription activator-like effector nucleases (TALENs) and clustered regularly interspaced short palindromic repeats (CRISPRs)-CRISPR-associated protein 9 (Cas9) opens avenues for targeted genome modifications. This technology can be applied in aquaculture to manipulate disease- resistance genes by means of gene knock-in, gene knockout and regulation of gene expression. The maximum rate of improvement can be achieved by combining different genetic enhancement programmes. Here, we present a review for the current and future prospect of disease reduction in aquaculture with genetic and genomic technologies.

BMC Complementary and Alternative Medicine
2017
17:423

Wound healing effect of *Euphorbia hirta linn.*(Euphorbiaceae) in alloxan induced diabetic rats.

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Abstract

Background: *Euphorbia hirta linn.*, is a species of Euphorbiaceae family. They are known as asthma plant, barokhervi. The plant *E. hirta* is famous for its medicinal importance among the tribal population. It is a common practice to use the whole to heal wounds. Several pharmacological properties including antiseptic, anti-inflammatory, antidibetic, antispasmodic, antibacterial, antiviral, antifungal, anticonvulsant, nootropic, antifertility and aphrodisiac properties have already been reported for this plant. The aim of present work was to evaluate the wound healing property in diabetic animals by oral and topical administration of ethanolic extract of *E. hirta* whole plant.

Methods: The ethanolic extract of *E. hirta* was subjected to determine the total phenolic content and total flavonoid content using galic acid and quercetin, respectively as standard. A single injection of alloxan monohydrate (120 mg/kg, i.p.) prepared in normal saline was administered to produce diabetes in rats, after overnight fasting. For analyzing the rate of contraction of wound, excision wounds sized 4.90cm^2 and of 2 mm depth were used. Oral (100, 200 and 400 mg/kg/day; p.o.) and topical treatment with the extract (5% and 10% ointment 50 mg/kg/day) and standard (5% povidone iodine ointment 50 mg/kg/day) was started on the day of induction of wound and continued up to 16 days. The means of wound area measurement between groups at different time intervals were compared using ANOVA and Dunnet's test. The diabetic wound healing mechanism was studied by measuring the plasma level of glucose, malondialdehyde (MDA) and nitric oxide (NO) in both control and treated groups. For the confirmation of activity, histopathology of the wounds tissues from excision wound model was performed.

Results: Phytochemical investigations showed the presence of various phytoconstituents (carbohydrates, saponins, alkaloids, glycosides, steroids, flavonoids, tannins). In the ethanolic extract of *E. hirta* the total phenol content was 285 ± 3.22 mg/g whereas the total flavonoid content was 118.46 ± 1.85 mg/g. In the present study, *E. hirta* caused significant wound closer both orally (35.92%, 44.69% and 61.42% at the doses of 100, 200 and 400, respectively) and topically (32.86% and 36.32% at the doses of 5% and 10%) treated groups as compared to diabetic control. However, the orally treated groups showed more significant effect than the topically treated groups. Moreover, oral administration of *E.* hirta ethanolic extract significantly reduced the blood glucose levels in diabetic wound rats ($p < 0.01$) on day 8 and day 16 as compared to the diabetic wound control ($p < 0.01$). On the other hand, topical application of *E. hirta* did not influence the blood glucose levels in diabetic rats ($p > 0.05$). It also demonstrated a significant decrease in the plasma levels of lipid malondialdehyde and nitric oxide. The results of biochemical parameters were further supported by the histopathological changes of different organs (liver, pancrease, kidney, heart and skin from wound area) which were evidenced through a decrease in inflammatory cell infiltration.

Conclusion: The present study demonstrates that *E. hirta* whole plant extract promotes healing of wounds more significantly as compared to diabetic control rats, where healing is otherwise delayed.

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2016
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Why are they missing? : Bioinformatics characterization of missing human proteins.

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Abstract

NeXtProt is a web-based protein knowledge platform that supports research on human proteins. NeXtProt (release 2015-04-28) lists 20,060 proteins, among them, 3373 canonical proteins (16.8%) lack credible experimental evidence at protein level (PE2:PE5). Therefore, they are considered as "missing proteins". A comprehensive bioinformatic workflow has been proposed to analyze these "missing" proteins. The aims of current study were to analyze physicochemical properties, existence and distribution of the tryptic cleavage sites, and to pinpoint the signature peptides of the missing proteins. Our findings showed that 23.7% of missing proteins were hydrophobic proteins possessing transmembrane domains (TMD). Also, forty missing entries generate tryptic peptides were either out of mass detection range (>30aa) or mapped to different proteins (<9aa). Additionally, 21% of missing entries didn't generate any unique tryptic peptides. In silico endopeptidase combination strategy increased the possibility of missing proteins identification. Coherently, using both mature protein database and signal peptidome database could be a promising option to identify some missing proteins by targeting their unique N-terminal tryptic peptide from mature protein database and or C-terminus tryptic peptide from signal peptidome database. In conclusion, Identification of missing protein requires additional consideration during sample preparation, extraction, digestion and data analysis to increase its incidence of identification.

Reproductive Biology
2017
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Multivitamins preventive therapy against subclinical endometritis in buffaloes: Its correlation to NEFA and oxidative stress

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Abstract

The current study was designed to elucidate the in vivo antioxidant, preventive, and ameliorating effects of vitamins AD3E on the incidence of subclinical endometritis (SCE) in buffaloes. Twenty-four buffaloes were divided equally into two groups; group I: control and group II: received AD3E combination. Endometrial cytological samples (n = 48) were collected using cytobrush to diagnose SCE by counting polymorphonuclear cells (PMN) _6% at 5th (W5) and _ 4% at 7th (W7) weeks postpartum. Results revealed that serum superoxide dismutase and nitric oxide significantly increased and decreased, respectively at W7 in AD3E group. The PMN% were significantly correlated with oxidative/anti-oxidative stress markers at W5 and W7. Vaginal score, PMN%, and blood neutrophils were significantly higher in the control group buffaloes than the AD3E enriched ones. Therefore, the prevalence of SCE reduced significantly in the AD3E supplemented buffaloes as compared to the control ones at W5 (23.15% and 38.46%) and W7 (9.8% and 32.34%), respectively. The control group revealed higher NEFA levels (P _ 0.05) at W5 and W7 than the AD3E group. The AD3E supplemented buffaloes had shorter days open and higher pregnancy rate at 120th and 150th days postpartum than the control ones. In conclusion, micronutrients (AD3E) intervention acts as a safeguard against the incidence of postpartum SCE and significantly improves the reproductive performance of buffaloes.

Aquaculture Nutrition Journal
2017
(23) 1048–1054

Immuomodulatory effect of dietary turmeric supplementation on Nile tilapia (*Oreochromisniloticus*)

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Abstract

This study aimed to assess the immunomodulatory effect of dietary turmeric (TUM) in *Oreochromisniloticus* juveniles. A total of 240 *Oreochromisniloticus* fingerlings were divided into four equal groups (n = 60), three replicates (n = 20) for each: control and TUM-treated groups at 2 (T1), 4 (T2) and 8 (T3) g kg^{-1} diets for 8 weeks. Body weight gain, leucocytes counts, plasma levels of interleukin 2 (IL-2), interleukin 4 (IL-4), lymphocyte proliferation index to pokeweed mitogen (PWM), nitric oxide (NO) and lysozyme enzyme activities were measured. Histopathology of spleen was performed. TUM at 2 g kg^{-1} significantly (p < .05) improved weight gain, leucocytes, NO and lysozyme activity than control and other treatment groups. IL-2 level was significantly lower (p < .05) in T2 and T3 than in control and T1, while IL-4 and lymphocyte proliferation index were significantly (p < .05) elevated in T3 than control, T1 and T2. Spleens of T2 showed improvement in white pulp, while spleen of T3 and T4 revealed white pulp depletion. In conclusion, TUM supplementation exerted immunomodulatory effect in *Oreochromisniloticus* through manipulation of lymphocyte count, IL-2, IL-4 and antibacterial enzymatic activity (NO and lysozyme) that resulted in higher weight gain. Increasing TUM supplementation of fish diets beyond 2 g kg^{-1} was not beneficial.

Tropical Animal Health and Production
2017
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Bacteriological and molecular studies of Clostridium perfringens infections in newly born calves.

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Abstract

Clostridium perfringens is considered one of the important causes of calf diarrhea. Two hundred and twenty-seven clinical samples from newly born and dead diarrheic calves were examined bacteriologically and by PCR. Bacterial culture identified C. perfringens in 168 of 227 samples. A total of 144 of these isolates were lecithinase positive, indicating C. perfringens Type A. In addition, 154 isolates were positive by alpha toxin encoding gene-PCR assay. This study showed high agreement between the results of bacteriology and multiplex PCR. The multiplex PCR typed all isolates that were typed as C. perfringens Type A through bacteriologic methods, but ten samples that were lecithinase negative were positive in the multiplex PCR. The study showed the highest occurrence of C. perfringens Type A isolations from calves during the winter and autumn compared with other seasons.

Faculty of Dentistry

Journal of Dentistry and Oral Care
2017
3: 1- 6

First experience of rotary nickel titanium root canal instrumentation performed by undergraduate students and general dentists.

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Abstract

Introduction: The purpose of the present study was to evaluate comparatively the efficiency of two rotary Nickel Titanium (NiTi) file systems in instrumentation of simulated curved canals performed by undergraduate dental students and general dentists.

Methodology: Twenty undergraduate dental students and 20 dentists participated in this study. After an introductory lecture, two simulated curved root canals in resin blocks with the same size and geometry were prepared by each participant, using the ProTaper Next or iRace systems. The preparation time was recorded, and each participant received a questionnaire for self-assessment and evaluation of the difficulty of the systems. Blocks were collected, coded, photographed digitally, and evaluated microscopically. The status of the apical foramen of the simulated root canals was classi ed as intact, blocked or instrumented. The shape of root canal was evaluated further for the presence of zipping or transportation. T-test and Fisher's exact test were used for statistical analysis of the collected data ($p < 0.05$).

Results: The mean time for instrumentation with the ProTaper Next system by the group of students was significantly greater than that prepared by the group of dentists. The time for instrumentation was significantly greater for the ProTaper Next system than that for the iRace system prepared by the group of students, while no significant difference was seen in the group of dentists between instrumentation with the two rotary systems. In general, no significant differences were observed between the two systems in terms of technical quality of instrumentation. In the group of students, significantly greater number of canals with blocked apical foramen were produced with ProTaper Next than the iRace system, while the number of over-instrumented canals was significantly greater with the iRace system. In the group of dentists, significantly greater number of canals with blocked apical foramen with the iRace than the ProTaper Next system was seen, while the number of over-instrumented canals was significantly greater with the ProTaper Next system.

Conclusion: No significant difference in the technical quality of simulated curved canal preparation was detected between the ProTaper Next and iRace rotary file Ni-Ti systems. Although no difference in the occurrence of procedural errors produced by the in experienced students or experienced dentists' groups was noticed, the types of procedural errors in relation to the used rotary files system were different between the two groups of participants.

Faculty of Pharmacy

Bioenergy Research
2017
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A halophilic, alkalithermostable, ionic liquid tolerant cellulase and its application in *in situ* saccharification of rice straw.

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Abstract

A cellulase, En5H, from halophilic, alkalithermophilic *Alkalilimnicola* sp. NM-DCM1 was expressed and purified. En5H had maximal hydrolytic activity at 55°C, pH 8.8 and 2.5M NaCl. En5H is β-1,4 linkage specific, hydrolyzing carboxymethyl cellulose, Avicel, cellobiose, and p-nitrophenyl β-D-glucopyranoside. En5H was resistant to inhibitors and organic solvents. The half-life of En5H was increased 16–43 fold when incubated in 20% (v/v) of ionic liquids (IL) at 55°C in the presence of 2.5 M NaCl, and maximal hydrolytic activity of En5H in 10% (v/v) 1-allyl-3-methylimidazolium chloride and 1,3-dimethylimidazolium dimethyl phosphate was 122% and 110%, respectively, as compared with activity in buffer. A cellulase-IL system combining IL pretreatment and enzymatic saccharification was tested. With an enzyme load of 110 U/g rice straw, the conversion of rice straw cellulose and hemicellulose increased by 28% compared with unpretreated rice straw. En5H has potential for use in transformation of lignocellulose to glucose in a single-step process.

Bioorganic Chemistry
2017
(71) 110–119

Synthesis, molecular modelling, and preliminary anticonvulsant activity evaluation of novel naphthalen-2-yl acetate and 1,6-dithia-4,9-diazaspiro [4.4] nonane-3,8-dione derivatives.

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Abstract

The synthesis, pharmacological evaluation and molecular modelling study of novel naphthalen-2-yl acetate and 1,6-dithia-4,9-diazaspiro [4.4]nonane-3,8-dione derivatives as potential anticonvulsant agents are described. The newly synthesized compounds were characterized by both analytical and spectral data. Alkylation of 1H-imidazole or substituted piperazine with 1-(2-naphthyl)-2-bromoethanone (2) gave naphthalen-2-yl 2-(1H-imidazol-1-yl) acetate (3) and naphthalen-2-yl 2-(substituted piperazin- 1-yl) acetate (4–8). Moreover, condensation of naphthalen-2-yl 2-bromoacetate or 2-bromo-1- (naphthalen-2-yl) ethanone with hydrazine hydrate and acetylacetone resulted in the formation of the cyclic pyrazole products 9 and 13. Sonication of naphthalen-2-yl acetate (1) with 2-chloropyridine,2-chloropyrimidine and 2-(chloromethyl) oxirane gave naphthalen-2-yl 2-(pyridin-2-yl) acetate (10),naphthalen-2-yl 2-(pyrimidin-2-yl) acetate (11) and naphthalen-2-yl-3-(oxiran-2-yl) propanoate (12) respectively. Cyclocondensation reaction of 2-iminothiazolidin-4-one (14) with thioglycolic acid, thiolactic acid and thiomalic acid gave 1,6-dithia-4,9-diazaspiro [4.4]nonane-3,8-dione derivatives (15–17). The compounds were tested in vivo for the anticonvulsant activity by delaying strychnine-induced seizures. The diazaspirononane (17) and 1-(2-naphthyl)-2-bromoethanone (2) showed a high significant delay in the onset of convulsion and prolongation of survival time compared to phenobarbital. The molecular modelling study of anticonvulsant activity of synthesized compounds showed a CNS depressant activity via modulation of benzodiazepine allosteric site in GABA-A receptors.

Bioorganic & Medicinal Chemistry Letters
2017
(27) 2377–2383

Novel pyrazoles and pyrazolo[1,2-a]pyridazines as selective COX-2 inhibitors; Ultrasound-assisted synthesis, biological evaluation, and DFT calculations.

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Abstract

COX-2 is an inducible enzyme mediating inflammatory responses. Selective targeting of COX-2 is useful for developing anti-inflammatory agents devoid of ulcerogenic activity. Herein, we report the design and synthesis of a series of pyrazoles and pyrazolo[1,2-a]pyridazines with selective COX-2 inhibitory activity and in vivo anti-inflammatory effect. Both series were accessed through acid-catalyzed ultrasoundassisted reactions. The most active compounds in this study are two novel molecules, 11 and 16, showing promising selectivity and decent IC50 of 16.2 and 20.1 nM, respectively. These compounds were also docked into the crystal structure of COX-2 enzyme (PDB ID: 3LN1) to understand their mode of binding.Finally, Mulliken charges and electrostatic surface potential were calculated for both compound 11 and celecoxib using DFT method to get insights into the molecular determinants of activity of this compound.These results could lead to the development of novel COX-2 inhibitors with improved selectivity.

Scientific Reports
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N. 6810

Mycobacterial DNA-binding protein 1 is critical for long term survival of Mycobacterium smegmatis and simultaneously coordinates cellular functions.

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Abstract

Bacteria can proliferate perpetually without ageing, but they also face conditions where they must persist. Mycobacteria can survive for a long period. This state appears during mycobacterial diseases such as tuberculosis and leprosy, which are chronic and develop after long-term persistent infections. However, the fundamental mechanisms of the long-term living of mycobacteria are unknown. Every Mycobacterium species expresses Mycobacterial DNA-binding protein 1 (MDP1), a histone-like nucleoid associated protein. *Mycobacterium smegmatis* is a saprophytic fast grower and used as a model of mycobacterial persistence, since it shares the characteristics of the long-term survival observed in pathogenic mycobacteria. Here we show that MDP1-deficient *M. smegmatis* dies more rapidly than the parental strain after entering stationary phase. Proteomic analyses revealed 21 upregulated proteins with more than 3-fold in MDP1-deficient strain, including DnaA, a replication initiator, NDH, a NADH dehydrogenase that catalyzes downhill electron transfer, Fas1, a critical fatty acid synthase, and antioxidants such as AhpC and KatG. Biochemical analyses showed elevated levels of DNA and ATP syntheses, a decreased NADH/NAD+ ratio, and a loss of resistance to oxidative stress in the MDP1-knockout strain. This study suggests the importance of MDP1-dependent simultaneous control of the cellular functions in the long-term survival of mycobacteria.

Bioorganic & Medicinal Chemistry Letters
2017
(60) 10257-10267

Novel pyrazoles and pyrazolo[1,2-a]pyridazines as selective COX-2 inhibitors; Ultrasound-assisted synthesis, biological evaluation, and DFT calculations.

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Abstract

Three series of biarylpyrazole imidazole and triazoles are described, which vary in the linker between the biaryl pyrazole and imidazole/triazole group. The imidazole and triazole series with the short $-CH_2-$ linker displayed promising antimycobacterial activity, with the imidazole–CH_2– series (7) showing low MIC values (6.25–25 μg/mL), which was also influenced by lipophilicity. Extending the linker to $-C(O)NH(CH_2)_2-$ resulted in a loss of antimycobacterial activity. The binding affinity of the compounds with CYP121A1 was determined by UV–visible optical titrations with K_D values of 2.63, 35.6, and 290 μM, respectively, for the tightest binding compounds 7e, 8b, and 13d from their respective series. Both binding affinity assays and docking studies of the CYP121A1 inhibitors suggest type II indirect binding through interstitial water molecules, with key binding residues Thr77, Val78, Val82, Val83, Met86, Ser237, Gln385, and Arg386, comparable with the binding interactions observed with fluconazole and the natural substrate dicyclotyrosine.

Bioorganic & Medicinal Chemistry
2017
(25) 1514–1523

Synthesis of new spirooxindole-pyrrolothiazole derivatives: Anti-cancer activity and molecular docking.

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Abstract

The 1,3-dipolar cycloadditions of an azomethine ylide generated from isatin and thiazolidinecarboxylic acid to a series of 2,6-bis[(E)-arylmethylidene]cyclohexanones afforded new di-spiro heterocycles incorporating pyrrolidine and oxindole rings in quantitative yields and chemo-, regio-, and stereoselectively.
The newly synthesized compounds were characterized using spectroscopic techniques. Furthermore, the molecular structures of 4a, 4e, and 4n were confirmed by X-ray crystallography. These newly synthesized compounds were screened for their in vitro activity against breast cancer cell line MCF-7 and K562-leukemia.
4k was found to be the most potent compound of this series in targeting MCF-7 breast cancer cells and K562-leukemia, with IC50 values of 15.32 ± 0.02 and 14.74 ± 0.7 lM, respectively. The molecular studies of the synthesized compounds were investigated.

Journal of Saudi Chemical Society
2017
(21) 619–632

Synthesis, structure combined with conformational analysis, biological activities and docking studies of bis benzylidene cyclohexanone derivatives.

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Abstract

We report the synthesis and biological evaluation of bis benzylidne cyclohexanone derivatives 2,6-di(4-fluorobenzylidene)cyclohexanone 3a and (2E,6E)-2,6-bis({[4-(trifluoromethyl) phenyl]methylidene})cyclohexanone 3b. Compound 3b crystallized in the monoclinic space group P21/n with unit cell parameters a= 29.3527(12) A ˚ , b=8.3147(3) A ˚ , c = 32.7452(14) A ˚ , b = 112.437(2), and V = 7386.8(5) A ˚ 3, Z = 16, and Rint = 0.072 at T = 100 K. The asymmetric unit contains four independent molecules, each of which has slight differences in the bond lengths and angles. One non-classical C11D–H11F F3A hydrogen bond connects the molecules. Density functional theory was used to optimize the structures and calculate the natural charges, dipole moments, frontier molecular orbitals, and NMR and UV–Vis spectroscopic properties, which are discussed and compared with the experimental data. The synthetic derivatives were evaluated for a-glucosidase inhibitory activity, and we found that compound 3a (IC50 =96.3 ± 0.51 lM) is a potent a-glucosidase inhibitor, showing superior activity to the standard drug acarbose (IC50= 841± 1.73 lM). Compound 3b (IC50= 7.92 ± 1.3 lg/mL) was found to be a potent antileishmanial compound, especially compared to the antileishmanial drugs pentamidine (IC50= 5.09 ± 0.04 lM) and amphotericine B (IC50 =0.29 ± 0.05 lg/mL). In addition, 3a and 3b have cytotoxic effects against PC3 (prostate cancer), HeLa (cervical cancer), and MCF-3 (breast cancer) cell lines. Docking study for compounds activity was performed with Openeye software in order to understanding their pose of interaction in the target receptors.

Archiv der Pharmazie
2017
350, e1700093

Synthesis of Some Novel 2,6-Disubstituted Pyridazin-3(2H)-one Derivatives as Analgesic, Anti-Inflammatory, and Non-Ulcerogenic Agents.

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Abstract

Some novel 2,6-disubstituted pyridazine-3(2H)-one derivatives were synthesized and evaluated for in vitro cyclooxygenase-2 (COX-2) inhibitory efficacy. Compounds 2-{[3-(2-methylphenoxy)-6-oxopyridazin- 1(6H)-yl]methyl}-1H-isoindole-1,3(2H)-dione (5a), 2-propyl-6-(o-tolyloxy)pyridazin-3(2H)-one (6a), and 2-benzyl-6-(3,5-dimethyl-1H-pyrazol-1-yl)pyridazin-3(2H)-one (16a) showed the most potent COX-2 inhibitory activity with IC50 values of 0.19, 0.11, and 0.24mM, respectively. The synthesized compounds with the highest COX-2 selectivity indices were evaluated for their anti-inflammatory, analgesic, and ulcerogenic activities. Compounds 6a and 16a demonstrated the most potent and consistent anti-inflammatory activity over the synthesized compounds, which was significantly higher than that of celecoxib in the carrageenin rat paw edema model and with milder ulcer scoring than that of indomethacin in the ulcerogenicity screening.

Talanta
2017
(164) 116–120

Redox-based chemiluminescence assay of aminothiols in human urine: A fundamental study.

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Abstract

The biological importance of aminothiols is well recognized with the concentration of these compounds within biological fluids such as plasma and urine functioning as valuable biomarkers in a number of clinical circumstances and a wide variety of diseases. Herein, for the first time, chromatographic coupled chemiluminescent assay was used for simultaneous determination of aminothiols in human urine. The method exploits nucleophilic nature of aminothiols to form adducts in the existence of quinones. The released adducts retain the redox-cycling capability of parent quinones and able to liberate reactive oxygen species (ROS) when come in contact with dithiothreitol (DTT). Strong glow is released upon reaction of ROS with luminol. The method succeeded to determine aminothiols in human urine after solid phase extraction achieving good linearity and high sensitivity shown by low limit of detection (LOD) ranged from 3.8 to 16 (fmol per injection).

Water Research
2017
(108) 197-211

Initial fate assessment of teratogenic drug trimipramine and its phototransformation products- Role of pH, concentration and temperature.

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Abstract

Trimipramine (TMP) is an antidepressant drug used for the treatment of a variety of depressive states and other psychiatric disorders. It has been already detected in the aquatic environment. Currently, no further knowledge is available on fate and effects of TMP in the aquatic environment. Therefore, we studied the biodegradability of TMP and of its photolysis transformation products (PTPs) generated by irradiation with polychromatic UV light in aqueous solution. Different conditions including initial drug concentration, pH, and temperature were applied during TMP photolysis. Subsequently, the time courses of TMP and dissolved organic carbon (DOC) concentrations were monitored throughout the whole photo-degradation process. Then, high-resolution mass spectrometry was used to identify and elucidate the structures of the resulting PTPs. After that, the two standardized biodegradation tests, Closed Bottle test (CBT; OECD 301 D) and Manometric Respirometry test (MRT; OECD 301 F), were performed for TMP and its photolytic mixtures to assess the biodegradability of TMP and its PTPs. Finally, the toxicity of TMP and its photolytic mixtures was predicted using different quantitative structure activity relationship (QSAR) software. It was found that after 128 min of UV-irradiation, 91.8% of TMP at the initial concentration of 100 mg L^{-1} was eliminated with only 23.9% removal in the DOC. So, it can be pointed out that more than 65% of the degraded TMP is transformed to new non-mineralized PTPs. 14 new PTPs were detected in TMP's photolytic mixtures. Their supposed structures indicate that the proposed photo-transformation pathway is mainly by hydroxylation. The statistical analysis confirms that the differences in the degradation rates of TMP as a function of concentration, pH, and temperature are statistically significant in most cases investigated here. In biodegradation testing, TMP and its PTPs are classified as not readily biodegradable, while LC-MS analysis revealed some PTPs to be eliminated more than TMP itself. Results from QSAR analysis confirmed that some of the PTPs could be biodegradable, and revealed that some of the non-biodegradable PTPs may be human and/or eco-toxic, posing a risk to the environment. Our findings show that TMP under UV-irradiation could lead to the formation of some more easily biodegradable PTPs and some others toxic and non-biodegradable PTPs. Therefore, further studies should be conducted regarding the fate and effects of TMP and its PTPs elucidated in this study on human health and on the environment.

RSC Advances
2016
(6) 465–9474

Development of an optimized HPLC method for the simultaneous determination of six compounds containing b-lactam ring in human plasma and urine using experimental design methodology†

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Abstract

b-Lactam antibiotics are commonly prescribed with b-lactamase inhibitors to patients, for that it is necessary to develop an optimized chromatographic method which determine them simultaneously in biological fluids. In the present study a gradient HPLC method was demonstrated for the simultaneous separation and quantification of four commonly used b lactam antibiotics and two b-lactamase inhibitors in human plasma and urine using statistical experimental design. A fractional factorial design was used in order to screen four independent factors: percentage of acetonitrile in the gradient program, pH of the aqueous phase, column temperature and percentage of trifluoroacetic acid (TFA) in aqueous phase. Examined factors were identified as significant using ANOVA analysis except column temperature and percentage of TFA in aqueous phase. The optimum condition of separation was determined with aid of central composite design. Chromatographic separation was achieved on Discovery® C18 column 5 mm (25 cm _ 4.6 mm) with UV detection at 225 nm. In this method, the analytes were extracted from plasma and urine using solid phase extraction. The method was found to be linear, specific, precise and accurate. Tinidazole (TZ) was used as an internal standard (I.S.).

RSC Advances
2017
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Simultaneous determination of selected veterinary antibiotics in Nile tilapia (Orechromis niloticus) and water samples by HPLC/UV and LC-MS/MS†

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Abstract

A method was optimized and validated for simultaneous estimation of some antibiotics such as chlorotetracycline (CTC), docxycline (DOX), florfenicol (FF), flumequine (FLU), nalidixic acid (NAL), sulfadiazine (SDI), sulfathiazole (STZ) and trimethoprim (TMP) in fish muscle and water samples . The method based on solid phase extraction (SPE) and simple extraction followed by high performance liquid chromatography-ultraviolet detector (HPLC-UV). HPLC method was optimized using experimental design. The optimum conditions of separation determined with the aid of central composite design were: (1) initial mobile phase concentration: 0.1%formic acid in water/acetonitrile (90/10, v/v), (2) column temperature 25 ˚C and (3) mobile phase flow rate (1.2 ml min^{-1}). The optimized method was validated according to ICH guidelines. The detection and quantification limits were between 0.2-0.4 and 0.3-0.6µg kg^{-1}, respectively for fish and between 0.005-0.02 and 0.01-0.08 µg ml^{-1} respectively for water . The procedure was applied to the analysis of spiked nile telipia samples at concentration range (30-300 µg kg^{-1}) and spiked water samples at concentration levels2-30 µg ml^{-1} for TMP, 2-25 µg ml^{-1} for SDI, 2-25µg ml^{-1} for STZ, 2-30 µg ml^{-1} for CTC, 2-30 µg ml^{-1} for DOX, 5-40 µg ml^{-1} for FF, 2-20 µg ml^{-1} for NAL and 2-25 µg ml^{-1} for FLU .. Three antibiotics (SDI, CTC and FF) were orally administered and the residue was analyzed using liquid chromatography-electrospray ionisation-mass spectrometry with positive ion mode (LC-ESI/MS)

Medecinal Chemistry Research
2017
(26) 2065–2073

Cytotoxic activity evaluation and molecular docking study of phenolic derivatives from Achillea fragrantissima (Forssk.) growing in Egypt.

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Abstract

Achillea fragrantissima (Forssk) Sch. Bip. (Asteraceae) is one of the most important medicinal plant species in Egypt. Phytochemical investigation of the methanolic extract of A. fragrantissima led to the isolation of two phenolic compounds Piceol (1) and Veratric acid (2),which are reported for the first time from this plant. Inaddition, four known flavonoid compounds; Eupatilin 7-methyl ether (3), Chrysosplenol D (4), Cirsiliol (5), andCirsimaritin (6) were isolated. Structure elucidation wasachieved using spectroscopic techniques, including onedimensionaland two dimensional nuclear magnetic resonance.Potential cytotoxic activities of the isolated compounds were measured by the sulphorhodamine Bassay. Compounds 1, 2, 3, 4, 5, and 6 displayed cytotoxic activity against (MCF7) with IC50 values of 18.2, 15.7, 9.5,8.33, 3.23, and 3.83 µg/ml, respectively, and against (HepG2) with IC50 values of 19.4, 41.2, 28.3, 20.8, 23.8,and 23.8 µg/ml, respectively. Also there was moderatecytotoxic activity against (A549) with IC50 values of 17.8,13.6, 3.98, and 10.3 µg/ml for the compounds 1, 2, 4 and 5,respectively, and against (HeLa) with IC50 values of 10.1,10.4, 4.88, and 3.98 µg/ml for the compounds 3, 4, 5, and 6,respectively. In addition, compounds 4 and 5 showedcytotoxic activity against (PC3) with IC50 values of 3.83and 3.98 µg/ml, respectively. An in silico study was performed, where cirsiliol (5) and piceol (1) were docked into the active sites of the crystal structures of PI3K and Akt,two protein kinases which are involved in prostate and breast cancer proliferation and survival.

Medecinal Chemistry Research
2017

Rhodozepinone, a new antitrypanosomal azepino-diindole alkaloid from the marine sponge-derived bacterium Rhodococcus sp. UA13

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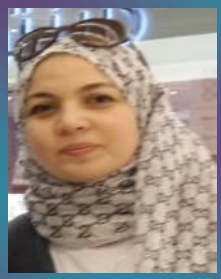
Abstract

A new azepino-diindole alkaloid; rhodozepinone (1), along with five known compounds, including 2-amino-3[2(1H)-quinolinon-4-yl]propionic acid (2), 3-hydroxy-2methyl-4H-pyran-4-one (maltol) (3), phenyl acetic acid methyl ester (4), indole-3-acetic acid (5), and 2-amino-3-(1Hindol-3-yl) propanoic acid (tryptophan) (6) were isolated and identified from the broth culture of Rhodococcus sp. UA13, which had been previously recovered from the Red Sea sponge Callyspongia aff. Implexa. The structures of compounds (1–6) were determined by spectroscopic analyses, including 1D and 2D NMR experiments in combination with HR-ESI-MS, aswell ascomparison with the literature. All the characterized metabolites were firstly reported herein from this marine sponge-associated actinomycete, and among them, (3), (4), and (6) were characterized for the first time from the genus Rhodococcus, whereas this is the first report for isolation of compound (2) from a natural source. Moreover, both the antimicrobial and antitrypanosomal properties of the isolated metabolites (1–6) were evaluated, and only rhodozepinone (1) exhibited significant antibacterial and antitrypanosomal activities against Staphylococcus aureus NCTC 8325 (IC50=8.9 µg/ml) and Trypanosoma brucei brucei TC221 [IC50=16.3 (48 h) and 11.8 (72 h) µg/ml], respectively. These results totally reflected the potential of sponge-derived actinomycetes as a rich source of new natural products with interesting bioactivities, as well as their promising future contribution to drug discovery.



Evidence-Based Complementary and Alternative Medicine
2016
7 pages

Evaluation of Hepatoprotective Activity of *Adansonia digitata* Extract on Acetaminophen-Induced Hepatotoxicity in Rats.

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Abstract

The methanol extract of the fruit pulp of *Adansonia digitata* L. (Malvaceae) was examined for its hepatoprotective activity against liver damage induced by acetaminophen in rats. The principle depends on the fact that administration of acetaminophen will be associated with development of oxidative stress. In addition, hepatospecific serum markers will be disturbed. Treatment of the rats with themethanol extract of the fruit pulp of *Adansonia digitata* L. prior to administration of acetaminophen significantly reduced the disturbance in liver function. Liver functions were measured by assessment of total protein, total bilirubin, ALP, ALT, and AST. Oxidative stress parameter and antioxidant markers were also evaluated.Moreover, histopathological evaluation was performed in order to assess liver case regarding inflammatory infiltration or necrosis. Animals were observed for any symptoms of toxicity after administration of extract of the fruit pulp of *Adansonia digitata* L. to ensure safety of the fruit extract.

Medicinal Chemistry Research
2017
(26) 3173–3187

Discovery of tetrahydro-ß-carboline derivatives as a new class of phosphodiesterase 4 inhibitors.

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Abstract

Phosphodiesterase 4 is the primary enzyme responsible for degradation of the second messenger cAMP in many of the cells releasing proinflammatory mediators. Inhibition of this enzyme could help in the management of various inflammatory conditions such as asthma, chronic obstructive pulmonary disorder, arthritis, and psoriasis. In this study, two novel series of tetrahydro-β-carbolines were designed by combining the pharmacophoric features of both tadalafil and piclamilast. Twenty-two compounds were synthesized and assessed for Phosphodiesterase 4 inhibition, four of them showed superior activity to the reference compound IBMX. Docking studies showed that the prepared compounds interact with the crucial Gln443 with variable interactions with the hydrophobic pocket Q2. This is the first report of tetrahydro-β-carbolines as a scaffold for Phosphodiesterase 4 inhibition. Currently, further optimization of the substituents is carried out to fine-tune the hydrophobic interactions and enhance the potency of this novel series of inhibitors.

European Journal of Medicinal Chemistry
2017
(138) 698 - 714

Design, synthesis and 2D QSAR study of novel pyridine and quinolone hydrazone derivatives as potential antimicrobial and antitubercular agents.

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Abstract

The increased development of highly resistant bacterial strains and tuberculosis, constitute a serious public health threat, highlighting the urgent need of novel antibacterial agents. In this work, two novel series of nicotinic acid hydrazone derivatives (6a-r) and quinolone hydrazide derivatives (12a-l) were synthesized and evaluated as antimicrobial and antitubercular agents. The synthesized compounds were evaluated in vitro for their antibacterial, antifungal and antimycobacterial activities. Compounds 6f and 6p bearing the 3,4,5- (OCH3)3 and 2,5-(OCH3)2 benzylidene motifs were the most potent and as antibacterial, antifungal (MIC: 0.49e1.95 mg/mL) and (MIC: 0.49e0.98 mg/mL) respectively and antimycobacterial activity (MIC ¼ 0.76 and 0.39 mg/mL) respectively. Besides, several derivatives, 6e, 6h, 6l- 6o, 6q, 6r, 12a, 12b, 12e, 12h, 12k and 12l, exhibited significant antibacterial and antifungal activities with MIC values ranging from 1.95 to 7.81 mg/mL, they also displayed excellent to good activity against Mycobacterium tuberculosis with MIC range from 0.39 to 3.12 mg/mL. In addition, some of the most active compounds were tested for cytotoxic activities against human lung fibroblast normal cells (WI-38) and displayed low toxicity. Moreover, 2D-QSAR models to characterize the descriptors controlling the observed activities, were generated and validated.

Journal of Virology
2017
(92) 1 - 16

The Neutralizing Linear Epitope of Human Herpesvirus 6A Glycoprotein B Does Not Affect Virus Infectivity.

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Abstract

Human herpesvirus 6A (HHV-6A) glycoprotein B (gB) is a glycoprotein consisting of 830 amino acids and is essential for the growth of the virus. Previously, we reported that a neutralizing monoclonal antibody (MAb) called 87-y-13 specifically reacts with HHV-6A gB, and we identified its epitope residue at asparagine (Asn) 347 on gB. In this study, we examined whether the epitope recognized by the neutralizing MAb is essential for HHV-6A infection. We constructed HHV-6A bacterial artificial chromosome (BAC) genomes harboring substitutions at Asn347, namely, HHV-6A BACgB (N347K) and HHV-6A BACgB (N347A). These mutant viruses could be reconstituted and propagated in the same manner as the wild type and their revertants, and MAb 87-y-13 could not inhibit infection by either mutant. In a cell-cell fusion assay, Asn at position 347 on gB was found to be nonessential for cell-cell fusion. In addition, in building an HHV-6A gB homology model, we found that the epitope of the neutralizing MAb is located on domain II of gB and is accessible to solvents. These results indicate that Asn at position 347, the linear epitope of the neutralizing MAb, does not affect HHV-6A infectivity.

Journal of Diabetes
2017
(9) 821–826

Intestinal fatty acid binding protein Ala54Thr polymorphism is associated with peripheral atherosclerosis combined with type 2 diabetes mellitus.

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Abstract

Background: The intestinal fatty acid binding protein (FABP-2) is expressed in enterocytes and binds saturated and unsaturated long-chain fatty acids. FABP-2 Ala54Thr polymorphism was reported to have an influence on lipid metabolism. This study aimed to assess the relation of this polymorphism with peripheral atherosclerosis combined with type 2 diabetes mellitus in an Egyptian population .

Methods: The study included 100 diabetic patients with peripheral atherosclerosis and 100 control subjects. The Ala54Thr polymorphism was analyzed by PCR-RFLP. FABP-2 level was measured by ELISA technique. FBG, fasting serum insulin, HbA1c lipid profile, BMI, systolic and diastolic blood pressure were all determined .

Results: The Thr54 allele had higher frequency among the patients group (p = 0.002). The heterozygote Ala54/Thr54 and the rare Thr54/Thr54 genotype carriers showed significant increase in BMI and FABP-2. Carriers of Thr54/Thr54 genotype had significantly decreased HDL-C. Carriers of Thr54/Thr54 genotype had significantly higher systolic and diastolic blood pressure than carriers of both Ala54/Ala54 and Ala54/Thr54 genotypes. FABP-2 level was positively correlated with BMI, systolic and diastolic blood pressure, and was negatively correlated with HDL-C .

Conclusions: The Thr54 allele of FABP-2 Ala54Thr polymorphism was associated with increased incidence of peripheral atherosclerosis combined with type 2 diabetes mellitus in the studied population.

Antimicrobial Agents and Chemotherapy
2016
(60) 1702–1707

Chromosomally and Extrachromosomally Mediated High-Level Gentamicin Resistance in Streptococcus agalactiae.

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Abstract

Streptococcus agalactiae (group B Streptococcus [GBS]) is a leading cause of sepsis in neonates. The rate of invasive GBS disease in nonpregnant adults also continues to climb. Aminoglycosides alone have little or no effect on GBS, but synergistic killing with penicillin has been shown in vitro. High-level gentamicin resistance (HLGR) in GBS isolates, however, leads to the loss of a synergistic effect. We therefore performed a multicenter study to determine the frequency of HLGR GBS isolates and to elucidate the molecular mechanisms leading to gentamicin resistance. From eight centers in four countries, 1,128 invasive and colonizing GBS isolates were pooled and investigated for the presence of HLGR. We identified two strains that displayed HLGR (BSU1203 and BSU452), both of which carried the aacA-aphD gene, typically conferring HLGR. However, only one strain (BSU1203) also carried the previously described chromosomal gentamicin resistance transposon designated Tn3706. For the other strain (BSU452), plasmid purification and subsequent DNA sequencing resulted in the detection of plasmid pIP501 carrying a remnant of a Tn3 family transposon. Its ability to confer HLGR was proven by transfer into an Enterococcus faecalis isolate. Conversely, loss of HLGR was documented after curing both GBS BSU452 and the transformed E. faecalis strain from the plasmid. This is the first report showing plasmid-mediated HLGR in GBS. Thus, in our clinical GBS isolates, HLGR is mediated both chromosomally and extrachromosomally.

Chemico-biological interactions
2017
(107) 92-106

Celecoxib aggravates cardiac apoptosis in L-NAME-induced pressure overload model in rats: Immunohistochemical determination of cardiac caspase-3, Mcl-1, Bax and Bcl-2

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Abstract

Abstract The mechanism of celecoxib cardiovascular adverse events was earlier investigated; yet in-depth investigations are needed to assess the involvement of itspro-apoptotic effect throughout this process. An in-vivo chronic rat model of pressure overload employing N^{w}-nitro-l-arginine methyl ester (L-NAME) was tested at different time intervals to ensure the occurrence of persistent myocardial apoptosis along with pressure overload. Seven groups of male Wistar rats were assigned as (i) distilled water;(ii-iv) L-NAME (60 mg/kg) for 6, 12 or 16 weeks;(v-vii) L-NAME [16 weeks]+ celecoxib (25, 50 or 100 mg/kg), from week 13 to week 16. Treatment with L-NAME for 6, 12 or 16 weeks increased systolic blood pressure, serum level of creatine kinase-MB and lactate dehydrogenase. Further, it induced cardiac hypertrophy, detected in terms of greater heart weight index and cardiomyocyte cross-sectional area and produced interstitial and perivascular fibrosis. Moreover, administration of L-NAME increased cardiac immunostaining for activated caspase-3 and Bax/Bcl-2 ratio whereas; immunostaining for Mcl-1 was decreased. Administration of celecoxib (25, 50 or 100 mg/kg) aggravated the L-NAME-induced toxicity. The work results shed the light on the putative pro-apoptotic effect of celecoxib at a risk state of pressure overload comparable to the clinical condition of essential hypertension.

Naunyn-Schmiedeberg's archives of pharmacology
2017
(5) 483-492

Evening primrose oil or forskolin ameliorates celecoxib-enhanced upregulation of tissue factor expression in mice subjected to lipopolysaccharide-induced endotoxemia.

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Abstract

Abstract Celecoxib, a selective cyclooxygenase-2 inhibitor, produces thrombotic events in patients predisposed to cardiovascular risk factors. One theory reported an increase in endothelial expression of tissue factor (TF) as a predisposing factor. This work explored the effect of evening primrose oil (EPO), a source of prostaglandin E1, and forskolin (a cyclic adenosine monophosphate stimulator) against the prothrombotic effect of celecoxib in mice. Lipopolysaccharide mouse model of endotoxemia was used to induce an upregulation of TF activity. Male mice received celecoxib (25 mg/kg), celecoxib plus EPO, or celecoxib plus forskolin for 4 weeks and then subjected to a prothrombotic challenge in the form of anintraperitoneal injection of lipopolysaccharide. Results showed an increase in plasma TF activity, endothelial TF expression, and thrombin–antithrombin (TAT) but lower antithrombin III (ATIII) level in mice that received celecoxib in comparison to those that received the vehicle. Adding EPO or forskolin to celecoxib regimen significantly decreased the prothrombotic effect of celecoxib. A positive correlation ($r = 0.8501$) was found between TF activity and TAT. Co-administration of EPO or forskolin decreased the activity of TF and mitigated the prothrombotic effect of celecoxib. Therefore, these combinations may have the utility to abrogate the prothrombotic adverse effect of celecoxib in clinical setting.

Pharmaceutical Research
2017
(34) 2197–2210

Rhamnolipids Enhance *in Vivo* Oral Bioavailability of Poorly Absorbed Molecules.

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Abstract

Purpose:This report describes the effect of rhamnolipids (RLs) on the tight junctions (TJ) of the intestinal epithelium using the rat *in-situ* closed loop model.
Methods:We investigated the transport of 5 (6)-carboxyfluorescein (CF) and fluorescein isothiocyanate-labeled dextrans with average molecular weights of 4.4 and 10 kDa (FD-4 and FD-10) when co-administered with different concentrations of RLs. Lactate dehydrogenase (LDH) leakage assay and histopathological examination of treated intestinal loops were used to assess potential toxicity of RLs. Further, the effect of kaempferol on accelerating the resealing of the tight junctions *in vivo* was also investigated
Results:Data shows that administration of different RLs concentrations (1.0–5.0% v/v) increased CF absorption through rat intestine by 2.84- and 15.82-folds with RLs concentrations of 1.0% and 5.0% v/v, respectively. RLs exhibited size-dependent increase on FD-4 and FD-10 absorption. Dosing RLs at 1.0% v/v didn't cause a significant LDH leakage or histopathological changes to intestinal mucosa compared to higher concentrations, which showed a progressive damaging effect. Using kaempferol, a natural flavonoid that stimulates the assembly of the TJs, proved to enhance the recovery of barrier properties of the intestinal mucosa treated with high concentrations of RLs (2.5% and 5% v/v).
Conclusions:These results collectively illustrate the ability of RLs to enhance oral bioavailability of different molecules across the intestinal epithelial membrane in a concentration- and time-dependent fashion.

Published Research Articles in International Journals 2016-2017

Faculty of Agriculture

Applied Energy
2016
(180) 661-671

Fungal pretreatment of rice straw with Pleurotusostreatus and Trichoderma reesei to enhance methane production under solid-state anaerobic digestion .

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Abstract

Rice straw was subjected to fungal pretreatment using Pleurotusostreatus and Trichoderma reesei to improve its biodegradability and methane production via solid-state anaerobic digestion (SS-AD).

Effects of moisture content (65%, 75% and 85%), and incubation time (10, 20 and 30 d) on lignin, cellulose, and hemicellulose degradation during fungal pretreatment and methane yield during anaerobic digestion were assessed via comparison to untreated rice straw. Pretreatment with P. ostreatus was most effective at 75% moisture content and 20 d incubation resulting in 33.4% lignin removal and a lignin/cellulose removal ratio (selectivity) of 4.2. In comparison Trichoderma reesei was most effective at 75% moisture content and 20 d incubation resulting in 23.6% lignin removal and a lignin/cellulose removal ratio (selectivity) of 2.88. The corresponding methane yields were 263 and 214 L/kg volatile solids (VS), which were 120% and 78.3% higher than for the untreated rice straw, respectively.

Bioresource Technology
2017
(224) 174-182

"Combinations of fungal and milling pretreatments for enhancing rice straw biogas production during solid-state anaerobic digestion"

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Abstract

Rice straw was pretreated by different combinations of physical (milling) and biological (incubation with Pleurotusostreatusfungus) treatment to improve its biodegradability and biogas production during solid state anaerobic digestion (SS-AD). Effects of milling (62 mm) and incubation time (10, 20 and 30 d), on lignin, cellulose, and hemicellulose degradation during fungal pretreatment and methane yield during digestion were assessed by comparison with untreated rice straw. Both incubation time and milling had significant impacts on both lignin removal during fungal pre-treatment and methane yield during digestion. A combination of fungal pretreatment at 30 days followed by milling prior to anaerobic digestion resulted in 30.4% lignin removal, the highest selectivity value (the ratio between relative lignin removal and relative cellulose removal) of 4.22, and the highest methane yield of 258 L/kg VS. This was equivalent to a 165% increase in methane yield from SS-AD compared to untreated rice straw.

Energy Journal
2017
(120) 842-853

Influence of zero valent iron nanoparticles and magnetic iron oxide nanoparticles on biogas and methane production from anaerobic digestion of manure.

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Abstract

In this study, nanoparticles (NPs) were hypothesized to enhance the anaerobic process and to accelerate the slurry digestion, which increases the biogas and methane production. The effects of NPs on biogas and methane production were investigated using a specially designed batch anaerobic system. For this purpose, a series of 2 L biodigesters were manufactured and implemented to study the effects of the nanoparticles of Iron (Fe) and Iron Oxide (Fe_3O_4) with different concentrations on biogas and methane production. The best results of NPs additives were selected based on the statistical analysis (Least Significant Difference using M-Stat) of biogas and methane production, which were 20 mg/L Fe NPs and 20 mg/L Fe_3O_4 magnetic NPs ($p < 0.05$). The aforementioned NPs additives delivered the highest biogas and methane yields in comparison with their other concentrations (5, 10 and 20 mg/L), their salt ($FeCl_3$) and the control. Furthermore, the addition of 20 mg/L Fe NPs and 20 mg/L Fe_3O_4 magnetic NPs significantly increased the biogas volume ($p < 0.05$) by 1.45 and 1.66 times the biogas volume produced by the control, respectively. Moreover, the aforementioned additives significantly increased the methane volume ($p < 0.05$) by 1.59 and 1.96 times the methane volume produced by the control, respectively. The highest specific biogas and methane production were attained with 20 mg/L Fe_3O_4 magnetic NPs, and were 584 ml Biogas g^{-1} VS and 351.8 ml CH_4 g^{-1} VS, respectively compared with the control which yielded only 352.6 ml Biogas g^{-1} VS and 179.6 ml CH_4 g^{-1} VS.

Chemometrics and Intelligent Laboratory Systems
2016
(154) 29-37

Sparse regression for selecting fluorescence wavelengths for accurate prediction of food properties.

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Abstract

This paper tested various regression models (PLS, Ridge, Lasso, and sparse group Lasso) to select the appropriate fluorescence wavelengths/variables in excitation–emission matrices (EEMs) to improve the prediction of food identities. A framework using sparse models (the Lasso and sparse group Lasso) was proposed and compared with the conventional models. These sparse regression techniques can simultaneously achieve the ideal design of the estimator and select the most effective feature-related wavelengths. The experimental results showed that the proposed framework provided high prediction accuracy in selecting variables for accurate prediction of fish freshness and meat safety. Specifically, in case of predicting fish freshness, the sparse group Lasso regression had a determination coefficient R^2 of 0.790 with 493 EEM variables while the standard PLS regression had R^2 of 0.748 using all 1054 EEM variables.

Biosystems Engineering
2017
(161): 135-144

Validation of CFD models for the deep-bed drying of rice using thermal imaging.

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Abstract

Validation is one of the most important steps in modeling the drying process of cereal crops. Once a simulation model is validated, it can be used for further practical applications. This study examines the potential of the thermal imaging technique to validate computational fluid dynamic (CFD) simulation models developed for describing the deep-bed drying process of rough rice and to visualize the temperature profiles throughout the bed under different drying conditions. A laboratory forced-air convective dryer was designed and fabricated to dry the rough rice in deep layers and thermal images of the rough rice inside the drying bin were directly acquired during drying process. The predicted data of the CFD models for moisture and temperature distributions through the deep bed during drying were verified against the experimental results. The results revealed that the CFD model developed for predicting moisture content exhibited good correlation with a coefficient of determination R^2 = 0.96. The model was also very accurate for predicting the temperature of rough rice in the deep-bed dryer with coefficients of determination > 0.90 and low RMSE (<5°C). A fair agreement was also obtained between the temperature values recorded by the thermocouples and those exported from the thermal images with a coefficient of determination of 0.94.

Journal of Chemical Ecology
2017
(43) 39–52

cis-Jasmone Elicits Aphid-Induced Stress Signalling in Potatoes.

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Abstract

Elicitation of plant defense signaling that results in altered emission of volatile organic compounds (VOCs) offers opportunities for protecting plants against arthropod pests. In this study, we treated potato, Solanum tuberosum L., with the plant defense elicitor cis-jasmone (CJ), which induces the emission of defense VOCs and thus affects the behavior of herbivores. Using chemical analysis, electrophysiological and behavioral assays with the potato-feeding aphid Macrosiphum euphorbiae, we showed that CJ treatment substantially increased the emission of defense VOCs from potatoes compared to no treatment. Coupled GC-electroantennogram (GC-EAG) recordings from the antennae of M. euphorbiae showed robust responses to 14 compounds present in induced VOCs, suggesting their behavioral role in potato/aphid interactions.
Plants treated with CJ and then challenged with M. euphorbiae were most repellent to alate M. euphorbiae.
Principal component analysis (PCA) of VOC collections suggested that (E)-2-hexenal, (E,E)-4,8,12-trimethyl-1,3,7,11- tridecatetraene (TMTT), (E)-β-farnesene, (E)-4,8-dimethyl-1,3,7-nonatriene (DMNT), methyl salicylate (MeSA), CJ, and methyl benzoate (MeBA) were the main VOCs contributing to aphid behavioral responses, and that production of TMTT, (E)-β-farnesene, CJ, and DMNT correlated most strongly with aphid repellency. Our findings confirm that CJ can enhance potato defense against aphids by inducing production of VOCs involved in aphid-induced signalling.

Journal of Chemical Ecology
2017
43:929–943

Oral Secretions Affect HIPVs Induced by Generalist (Mythimna loreyi) and Specialist (Parnara guttata) Herbivores in Rice.

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Abstract

Plants synthesize variable mixtures of herbivoreinduced plant volatiles (HIPVs) as part of their evolutionary conserved defense. To elucidate the impact of chewing herbivores with different level of adaptation on HIPV profiles in rice, we measured HIPVs released from rice seedlings challenged by either the generalist herbivore Mythimna loreyi (MYL) or the specialist Parnara guttata (PAG). Both herbivores markedly elicited the emission of HIPVs, mainly on the second and third days after attack compared to control plants.
In addition, side-by-side HIPV comparisons using MYL and PAG caterpillars revealed that generalist feeding induced comparably more HIPVs relative to specialist, particularly on day two as highlighted by multivariate analysis (PLS-DA) of emitted HIPVs, and further confirmed in mimicked herbivory experiments.
Here, mechanically wounded plants treated with water (WW) released more VOCs than untreated controls, and on top of this, oral secretions (OS) from both herbivores showed differential effects on volatile emissions from the wounded plants. Similar to actual herbivory, MYL OS promoted higher amounts of HIPVs relative to PAG OS, thus supporting disparate induction of rice indirect defenses in response to generalist and specialist herbivores, which could be due to the differential composition of their OS. (196 words).

Scientia Horticulturae
2017
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Mango trees productivity and quality as affected by Boron and Putrescine

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Abstract

Field experiments were conducted to study the effect of Boron (B) and Putrescine (PUT) on fruit drop percentage and quality of 'Zebda' mango during 2013 and 2014 seasons. Results indicated the beneficial effect of high concentration of B (0.3%) and PUT (0.45 mM) in decreasing the percentage of fruit drop and improving fruit quality. Fruit yield was increased by 19.2 and 16.2 kg tree^{-1} under B (0.3%) compared to the control in the first and second seasons, respectively. The reduction in fruit abscission was correlated with high activity of antioxidant enzymes (peroxidase, superoxide dismutase and catalase) in fruit petiole (FP). Also FP treated with B and PUT showed high contents of reducing sugars, free auxin, phosphorous and potassium as well as low contents of free amino acids, free phenolics and nitrogen. For fruit quality, total chlorophyll concentration in fruit peel was increased and 'L', 'a' and 'b' color values were affected by PUT (0.45 mM) and B (0.3%) treatments. Both treatments increased pulp (%), TSS (%) and TSS/TA ratio and decreased fruit firmness. It could be concluded that application of boron (0.3%) or Putrescine (0.45 mM) to 'Zebda' mango trees three times was effective in increasing fruit setting and yield in addition to improving fruit quality parameters.

African Entomology
2017
25(1): 248–249

Discovery of *Apis florea* colonies in northeastern Egypt

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Abstract

In this note, attention is focused on Apis species in particular the dwarf honeybees, while in previous studies we studied non-Apis bees (Shebl et al. 2013, 2014, 2015). Apis florea is widely distributed on the Asian continent, extending 7000 km from the east in Vietnam and China across Asia westwards to south of Oman (Hepburn et al. 2005). The species was accidentally introduced into Saudi Arabia and Sudan (Maa 1953; Hepburn et al. 2005). It is known only from Sudan in Africa and recently in Ethiopia (Bezabih et al. 2014) and has not been recorded previously in northern Africa. Apis florea was expected to invade Africa when it was first recorded on the eastern border of the Red Sea, around Aqaba, Jordan (Haddad et al. 2008). The Jordanian populations appear to have two origins with one linked to populations from Pakistan, Sudan, Oman then Saudi Arabia and Iran. The second one is linked to southern Indian and Sri Lankan populations (Haddad et al. 2009). It was predicted that the Jordanian and Sudanese populations would probably move into the Sinai Peninsula (Hepburn et al. 2011).

Insect Science
2017
(24) 103–113

Distribution and variability of deformed wing virus of honeybees (*Apis mellifera*) in the Middle East and North Africa.

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Abstract

Three hundred and eleven honeybee samples from 12 countries in the Middle East and North Africa (MENA) (Jordan, Lebanon, Syria, Iraq, Egypt, Libya, Tunisia, Algeria, Morocco, Yemen, Palestine, and Sudan) were analyzed for the presence of deformed wing virus (DWV). The prevalence of DWV throughout the MENA region was pervasive, but variable. The highest prevalence was found in Lebanon and Syria, with prevalence dropping in Palestine, Jordan, and Egypt before increasing slightly moving westwards to Algeria and Morocco Phylogenetic analysis of a 194 nucleotide section of the DWV Lp gene did not identify any significant phylogenetic resolution among the samples, although the sequences did show consistent regional clustering, including an interesting geographic gradient fromMorocco through North Africa to Jordan and Syria. The sequences revealed several clear variability hotspots in the deduced amino acid sequence, which furthermore showed some patterns of regional identity. Furthermore, the sequence variants from the Middle East and North Africa appear more numerous and diverse than those from Europe.

Animal reproduction
2017
(14) 1014-1023

Can feed supplementation of the refined vegetable oils enhance the seminal quality of rabbit bucks (*Oryctolagus cuniculus*)?

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Abstract

Exploring new feeding strategies are a necessary aspect for improving the reproductive performance in rabbits. Twenty healthy rabbit bucks with a mean live body weight of 1.01 kg (SD = 0.12) and age of 6 months old were used for a period of 17 weeks to examine the influence of feeding soybean and sunflower oils on their reproductive performance. Rabbits were randomly assigned into 4 groups (5 bucks/group), where bucks in the 1st group, served as a control, were fed for 14 weeks on a standard ration without any oil supplementation, while bucks in the 2nd, 3rd, and 4th groups received -on the basis of the inclusion rate- a ration supplemented with 3% soybean oil, 3% sunflower oil, and 1.5% soybean oil plus 1.5% sunflower oil, respectively. Climatic, bio-physiological, blood and seminal measurements were all been determined. The obtained results suggested that offering rations supplemented with soybean and/or sunflower oils at the level of 3% of DM to rabbit bucks had no impacts on their health status, based on the findings that feed conversion ratio, blood hematology as well as liver and kidney functions were all not altered; thereby, indicating that the refined vegetable oils can be safely supplemented into rabbits rations. Most importantly, the collected evidences proposed that supplementing vegetable oil-enriched rations to rabbit bucks during their adulthood may demonstrate subsequent positive influences on their reproductive characteristics as early as the 3rd/4th week after feeding on such oils. This was generally manifested by the higher ($P < 0.05$) sperm concentration, total sperm output, percentage of motile sperms, as well as the lower ($P < 0.05$) percentages of dead and altered acrosomal sperms that observed in bucks compared to their control twins. Based on the obtained results herein, feeding rations supplemented with soybean and/or sunflower oils at the level of 3% of DM to rabbit bucks during their adulthood would produce an acceptable semen quality compared to the control bucks. Research dealing with such aspect may improve our understanding of the nutritional requirements and production of rabbits. However, further researches are definitely imperative because of the number of bucks per group was considerably low in the current experiment.

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Biochar, a potential hydroponic growth substrate, enhances the nutritional status and growth of leafy vegetables.

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Abstract

A hydroponics system developed using a nutrient film technique was used to evaluate the effectiveness of rice husk biochar (RB) alone or in combination with perlite (PL) as substrates for increasing the growth of leafy vegetables compared with that of PL. Seedlings of cabbage, dill, mallow, red lettuce, and tatsoi were grown hydroponically in PL, RB, and PL þ RB (1:1 ratio of PL to RB, v/v) substrates for a 30-d under optimal environmental conditions in a greenhouse. Shoot length and fresh/dry masses of cabbage, dill, and red lettuce plants grown in RB substrate were decreased by 49% on average compared to those plants grown in PL substrate. In contrast, PL þ RB substrate led to approximately 2-fold increases in shoot length, number of leaves, and fresh/dry masses of leafy vegetable plants compared with those grown in PL substrate. Foliar nutritional composition (Ca, Mg, K, Na, Mn, Fe, and Zn) and nitrogen status (SPAD index) of plants grown in PL þ RB and PL substrates suggested the presence of optimal growth conditions for ensuring optimum yield with high quality. In addition, RB substrate contributed to respective increases of 1.2e3.5-fold in leaf K, Mg, Mn, and Zn contents in most vegetable plants compared with those grown in PL substrate. The RB alone or in combination with PL substrates decreased algal growth in the nutrient solutions as confirmed by scanning electron micrographs of microalgae on the RB surface. The results also indicated that use of PL þ RB hydroponic substrate could be an alternative and effective technology for the better management of unwanted algal growth in nutrient solutions and high production of leafy vegetables.

Chemosphere
2017
(178) 110-118

Mobility and phytoavailability of As and Pb in a contaminated soil using pine sawdust biochar under systematic change of redox conditions

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Abstract

Biochar has been adopted to control the mobility and phytoavailability of trace elements (TEs) in soils. To date, no attempt has been made to determine the mobility and phytoavailability of arsenic (As) and lead (Pb) in a contaminated soil with biochars as amendments under predefined redox potentials (EH). Thus, in this study, a soil contaminated with As and Pb (2047 and 1677 mg kg_1, respectively) was preincubated for 105 days with three amendments (pine sawdust biomass (BM) and two biochars produced from the same feedstock at 300 _C (BC300) and 550 _C (BC550)). The aged samples were then exposed to dynamic EH conditions to evaluate the mobility and phytoavailability of As and Pb after immobilization. The BM amendment significantly decreased and the BC300 slightly reduced the mobility and phytoavailability of As and Pb, which may be related to the oxygen-containing functional groups on the surface of BM and BC300. In contrast, BC550 increased the mobility of As at _300 to _100 mV and 100 mV, enhanced the phytoavailability of As under oxidizing condition (>100 mV), but reduced the phytoavailability of Pb, which might be caused by the properties of amendments and redox chemistry of the TEs. The effectiveness of BM and biochars for the stabilization of As and Pb varied under dynamic EH conditions, which indicates that detailed investigations should be conducted before the applications of biochar as soil amendment under variable environmental conditions, especially for contaminated paddy soils.

International Journal of Agriculture and Biology
2016
(18) 661-670

Producing Transgenic Thompson Seedless Grape (*Vitis vinifera*) Plants using *Agrobacterium tumefcians.*

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Abstract

Under osmotic stress plant avoid it by different modification in their metabolisms such as increasing the synthesis of mRNA of delta 1-pyrroline-5-carboxylate synthase (P5CS), where *P5CS* is a target gene for increasing proline production and expect to improve the resistance to abiotic stress. To test this hypothesis, grape (*Vitis vinifera* L.) cv. Thompson Seedless was conducted to develop a protocol for high frequency regeneration and Agrobacterium mediated *P5CS* gene transfer. Callus induction was achieved by culture leaf explants on Nitsch and Nitsch (NN) basal medium including 2.0 mg L^{-1} 2,4-di-chloro-phenoxy-aceticacid + 0.5 mg L^{-1} Thiadiazuron solidified with 2.5 g L^{-1} phytagel. While for in vitro proliferation of plant, the calli were cultured on NN medium supplemented with 3.0 mg L^{-1} Zeatin riboside + 0.5 mg L^{-1} Thiadiazuron. *Agrobacterium*-mediated transformation using the strain LB4404 harbouring the binary vector pBI121 with the *P5CS* gene under CaMV 35S promoter and the bar gene as a plant selectable marker was used for transforming grape explants. A *P5CS* specific band (2100 bp) was amplified from DNA extracted only from the transgenic grape plants and 24% for *P5CS* gene was positive for the bar gene. Over expression of the abiotic stress *P5CS* gene was enhanced synthesis of proline to over 6 times higher in transgenic plants compared to controls.

Archives of Biological Sciences
2017
(69) 305-314

Carotenoids in mature green and ripe red fruits of tomato (*Solanum lycopersicum* L.) grown under different levels of irrigation.

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Abstract

The effect of water deficit on concentrations of carotenoids was investigated in ripening tomatoes using HPLCPDA. Fifteen different tomato cultivars were grown under three levels of water supply and unripe and fully-ripe fruits were harvested at different stages. Water deficit significantly affected several morphological and fruit yield-related parameters. In unripe tomato fruits, the relative concentrations of xanthophyll cycle carotenoids, e.g., violaxanthin and antheraxanthin, were significantly increased at the expense of β-carotene upon limiting the water supply. In ripe fruits, nutritionally-relevant lycopene, β-carotene and lutein levels were broadly independent of water deficit when considering all 15 cultivars, although significant variations were observed among fruits from different genotypes. Our study highlights the importance of careful genotype selection for the production of tomatoes rich in nutritionally-relevant compounds like lycopene and β-carotene.

World Rabbit Science
2017
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Biostimulation and reproductive performance of artificially inseminated rabbit does (*oryctolagus cuniculus*).

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Abstract

Biostimulation is a non-hormonal and practical technique that has not yet been widely utilized when applied immediately before insemination to improve reproductive efficiency in livestock species. This study was conducted to determine the influence of short-term male biostimulation on behavioural and reproductive performance of inseminated rabbit does. A total of 142 female New Zealand White rabbits were randomly assigned to 3 groups. Females were either exposed to male odour (Odour group) or an adult aproned male (Male group), while the remaining does that were neither exposed to the male odour nor the adult male are considered the control group. All females were inseminated after the 2 h exposure session. Conception rates were determined by abdominal palpation 12 d after insemination. The results showed that conception rate of the male odour group (79.59%) was greater than that of male presence group (76.09%) and that of the control group (68.09%). Moreover, biostimulated does showed significant behavioural activities during the 2 h exposure session compared to the control group. Although no significant differences were recognised, litter size at birth and at weaning was slightly increased in biostimulated compared to control females. Nor were there any significant difference in serum oestradiol concentrations between treated groups. Conclusively, short-term 2 h biostimulation of rabbit does resulted in the appearance of various behavioural responses followed by differences in conception rates between groups after routine artificial insemination.

Published Research Articles in International Journals 2016-2017

Faculty of Computing and Information

International Journal of Information Security
2017
1-18

Optimal noise functions for location privacy on continuous regions

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Abstract

Users of location-based services are highly vulnerable to privacy risks since they need to disclose, at least partially, their locations to benefit from these services. One possibility to limit these risks is to obfuscate the location of a user by adding random noise drawn from a noise function. In this paper, we require the noise functions to satisfy a generic location privacy notion called ℓ-privacy, which makes the position of the user in a given region X relatively indistinguishable from other points in X. We also aim at minimizing the loss in the service utility due to such obfuscation. While existing optimization frameworks regard the region X restrictively as a finite set of points, we consider the more realistic case in which the region is rather *continuous* with a nonzero area. In this situation, we demonstrate that circular noise functions are enough to satisfy ℓ-privacy on X and equivalently on the entire space without any penalty in the utility. Afterward, we describe a large parametric space of noise functions that satisfy ℓ-privacy on X, and show that this space has always an optimal member, regardless of ℓ and X. We also investigate the recent notion of ϵ-geo-indistinguishability as an instance of ℓ-privacy and prove in this case that with respect to any increasing loss function, the planar Laplace noise function is *optimal* for *any* region having a nonzero area.

Discrete Dynamics in Nature and Society
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Neimark-Sacker Bifurcation and Chaos Control in a Fractional-Order Plant-Herbivore Model

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Abstract

This work is related to dynamics of a discrete-time 3-dimensional plant-herbivoremodel.We investigate existence and uniqueness of positive equilibriumand parametric conditions for local asymptotic stability of positive equilibrium point of this model.Moreover, it is also proved that the system undergoes Neimark-Sacker bifurcation for positive equilibrium with the help of an explicit criterion for Neimark-Sacker bifurcation. he chaos control in the model is discussed through implementation of two feedback control strategies, that is, pole-placement technique and hybrid control methodology. Finally, numerical simulations are provided to illustrate theoretical results. hese results of numerical simulations demonstrate chaotic long-term behavior over a broad range of parameters. The computation of the maximum Lyapunov exponents conirms the presence of chaotic behavior in the model.

Mathematics and Computers in Simulation
2017
(132) 86–99

Nonlinear Cournot and Bertrand-type dynamic triopoly with differentiated products and heterogeneous expectations

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Abstract

In a differentiated triopoly model with heterogeneous frms, the local stability of the Nash equilibrium under both quantity and price competition is analyzed. We fnd that the presence of a frm following a gradient rule based on marginal profts, and a player with adaptive expectations, determines the local stability of the Nash equilibrium, regardless the competition type, while the effects of the degree of product differentiation on the stability depend on the nature of products. Moreover, the Nash equilibrium is more stable under quantity competition than under price competition.

Annals of Nuclear Energy
2017
(102) 359–367

Nonstandard finite difference schemes for numerical solution of the fractional neutron point kinetics equations

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Abstract

In this paper, our purpose is to find approximate solutions of fractional neutron point kinetic equations by using non-standard finite difference method. The fractional neutron point kinetic equations are modeled with average one group of delayed neutron precursors and the fractional derivative is given in the form of Grunwald-Letnikov. The efficiency and reliability of the suggested approach are proved by some numerical experiments for critical reactivity, supercritical reactivity and subcritical reactivity for various values of fractional order. It is found that the nonstandard finite difference method (NSFDM) is preferable than the standard finite difference method (SFDM). Also, the stability of the numerical scheme is investigated.
The stability range of the step size is introduced for different values of the anomalous diffusion order ðaÞ and of the relaxation time ðsÞ. Numerical results and graphs for neutron flux for different values of the anomalous order and of the relaxation time are shown and compared with the classical solutions.

Annals of Nuclear Energy
2017
(106) 118-126

Modified fractional neutron point kinetics equations for finite and infinite medium of bar reactor core.

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Abstract

Fractional order neutron point kinetics equations are generalization of the classical neutron point kinetics equations. The system of the fractional neutron point kinetics equations is treated in different context by many authors ignoring an important term related to the derivative of the reactivity. In this paper, we derive a time fractional neutron point kinetics equations (FNPK) model considering a new term for the time derivative of the reactivity. Fractional Leibenz rule is used for such derivation. The effect resulting from the additional term of the reactivity derivative is discussed. It has been found that without this additional term, the modified model will be compliant with the earlier published models for the FNPK. The proposed model of FNPK describes infinite and finite bar reactor cores according to the nonleakage probability and the geometric buckling values. We have applied an effective implicit difference approximation to solve the modified model for finite cylindrical reactor core for both average one group and six groups of delayed neutron precursors. The neutron density results with different values of fractional order for step, ramp and oscillatory reactivities are shown and compared with the classical neutron point kinetics equations.

Memetic Computing
2017
(9) 347–359

A Hybrid grey wolf optimizer and genetic algorithm for minimizing potential energy function.

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Abstract

In this paper, we propose a new hybrid algorithm between the grey wolf optimizer algorithm and the genetic algorithm in order to minimize a simplified model of the energy function of the molecule. We call the proposed algorithm by Hybrid GreyWolf Optimizer and Genetic Algorithm (HGWOGA).We employ three procedures in the HGWOGA. In the first procedure, we apply the grey wolf optimizer algorithm to balance between the exploration and the exploitation process in the proposed algorithm. In the second procedure, we utilize the dimensionality reduction and the population partitioning processes by dividing the population into sub-populations and using the arithmetical crossover operator in each sub-population in order to increase the diversity of the search in the algorithm. In the last procedure, we apply the genetic mutation operator in the whole population in order to refrain from the premature convergence and trapping in local minima. We implement the proposed algorithm with various molecule size with up to 200 dimensions and compare the proposed algorithm with 8 benchmark algorithms in order to validate its efficiency for solving molecular potential energy function. The numerical experiment results show that the proposed algorithm is a promising, competent, and capable of finding the global minimum or near global minimum of the molecular energy function faster than the other comparative algorithms.

Published Research Articles in International Journals 2016-2017

Faculty of Engineering – Ismailia

Applied Thermal Engineering
2017
(112)1460-1473

Parametric studies on biomass gasification process on updraft gasifier high temperature air gasification

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Abstract

This paper discusses numerical simulation and experimental studies of different operating conditions of biomass gasification on the performance of an updraft gasifier high temperature air gasification (HTAG). The influence of gasification temperature and equivalence ratio (ER) on gas production and tar yield were examined. A mathematical model was used to simulate the effects of the parameters that influence the process of gasification. The results indicated that H_2 and CO contents and low calorific value gas production rate increased. Additionally, there was a decrease in tar yields, CO_2 content, and the temperature of the gas products necessary to reduce the CH_4. The present study proved that ER significantly influenced the composition of gas species products and helped obtain a higher gasification rate. The results showed that the model proposed in this study is a promising tool for simulating the gasification/combustion process of biomass within a gasifier.

Fuel
2017
(210) 154-164

Characterization of coal char surface behavior after a heterogeneous oxidative treatment.

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Abstract

Two typical types of bituminous coal (JN and SH) were employed for thorough devolatilization, then the samples were functionalized by O_2 at 1073 K to different conversion ratios (JN: 0.21, 0.34, 0.40, 0.53 and 0.63; SH: 0.15, 0.22, 0.32, 0.42 and 0.52) before the surface oxygen containing complexes C(O) were qualitatively and semi-quantitatively characterized by Fourier transform infrared spectroscopy (FT-IR) and temperature programmed desorption (TPD). A deconvolution method was applied to analyze the C(O) adsorption in the spectral region of 1800–1000 cm^{-1} in the FT-IR spectra, and the results indicated that the type and thermal stability of these functional groups were as follows: carboxylic (1250 K) < phenol (1350 K) < ether/anhydride (1550 K) < lactone/quinone (1650 K). The TPD results demonstrated that more active sites were generated on the particle surface after the oxidative treatment under O_2atmosphere, especially the samples with low conversion degree (J2, S2, and S3), coal type and conversion ratio had small effects on the ratios of metastable stable complexes to stable complexes $C_{wea}(O)/C_{str}(O)$ under the experimental conditions. The oxidized char samples were significantly more reactive than the raw char, and per unit mass of each oxidized sample could reduce more NO than raw char during the temperature programmed reduction (TPR) process, and phenol, ether and anhydride were the main reactants participated in the NO reduction reaction under high-temperature condition (1173–1600 K).

International Journal of Geomechanics
2016

Numerical Analysis of Existing Foundations Underpinned by Micropiles

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Abstract

Micropiles of small diameter have been used in practice to increase load capacities of existing foundations on soft soil, which may resist additional loads from the vertical expansion of structures. Load transfer from the existing foundation to the micropiles is an important mechanism to consider when designing an existing foundation underpinned by micropiles. However, this mechanism has not been well investigated or understood. This paper presents a numerical study on an existing foundation underpinned by micropiles using three-dimensional (3D) finite-difference software. Verification of the numerical model was first achieved by comparing the results of the numerical model to those obtained from the full-scale loading test. In this verification, the numerical model was used to simulate an existing footing initially constructed on a natural soil to support a structure and later subjected to additional loads under two different conditions. Under the first condition, micropiles were installed without connection with the existing foundation. The existing foundation was subjected to initial loads, and then the micropiles were connected to the existing foundation for additional loads. Under the second condition, the foundation was first subjected to initial loads. Micropiles were installed and then connected to the foundation for additional loads. These two conditions were investigated further in a parametric study to understand the behavior of micropiles in the underpinned foundation under additional loading, including the load transfer between the existing foundation and the micropiles. This parametric study revealed that the installation sequence of micropiles had obvious effects on the vertical displacement of the footing, the percent load on the micropile, and the skin friction along the micropile. This study also revealed that the initial pressure ratio for underpinning and the length of micropiles had more effects on the behavior of the existing foundation underpinned by micropiles than the modulus of micropiles.

Published Research Articles in International Journals 2016-2017

Faculty of Science

Swarm and Evolutionary Computation
2017
(32) 132-139

Genetic Algorithms to Balanced Tree Structures in Graphs

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Abstract

Given an edge-weighted graph $G = (V, E)$ with vertex set V and edge set E, we study in this paper the following related balanced trees structure problems in G. The first problem, called Constrained Minimum Spanning Tree Problem (CMST), asks for a rooted tree T in G that minimizes the total weight of T such that the distance between the root and any vertex v in T is at most a given constant C times the shortest distance between the two vertices in G. The Constrained Shortest Path Tree Problem (CSPT) requires a rooted tree T in G that minimizes the maximum distance between the root and all vertices in V such that the total weight of T is at most a given constant C times the minimum tree weight in G. The third problem, called Minimum Maximum Stretch Spanning Tree (MMST), looks for a tree T in G that minimize the maximum distance between all pairs of vertices in V. It is easy to conclude from the literatures that the above problems are NP-hard. We present efficient genetic algorithms that return(as shown by our experimental results) high quality solutions for these problems.

journal of Materials Chemistry and Physics
2017
(191) 225-229

Enhancement of the conductivity and dielectric properties of PVA/Ag nanocomposite films using ɣ irradiation .

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Abstract

Polymer based composites with tunable dielectric properties have many applications in organic electronics. This manuscript reports the influence of gamma irradiation on the electrical and dielectric properties of silver/polymer composite (Ag/PVA) films with thickness 0.18 mm. The films were prepared by the in-situ chemical reduction and later irradiated with gamma (γ) radiation doses (25, 50, 75, 100, 125 KGy). The content of Ag (0.4 wt %) in the PVA films were determined by the atomic absorption spectroscopy (AA). The films were characterized by the dielectric spectroscopy and Current-Voltage (I-V) measurements. The dielectric constant (ε_0) value decreased with the increasing gamma irradiation doses. The conductivity films and dielectric loss increased with the increasing gamma irradiation doses. The optimum conductivity: $\sigma = 4.9 \times 10^{-8}$ S m^{-1} was found at gamma radiation dose of 125 KGy. The Poole- Frenkel emission is the prevailing transport mechanism for all the samples.

Journal of Petroleum Science and Engineering
2017
(153) 297-313

Integrative 1D-2D Basin Modeling of the Cretaceous Beni Suef basin, Western Desert, Egypt .

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Abstract

An integrated seismic, borehole petrophysical and geochemical constrained 1D and 2D basin model study is conducted for the Beni Suef Basin (Western Desert, Egypt) to enhance the understanding of the Cretaceous plays while demonstrating how basin modeling can be used to reduce exploration risk and improve exploration success. The Cretaceous petroleum systems consist of two major source rocks (Upper Cretaceous limestone of Abu Roash "F" member, and Lower Cretaceous shales of Kharita and Alam El-Bueib formations), five reservoirs (Cretaceous sandstones of Abu Roash "A, E & G", Baharyia and Kharita formations), three seals (Lower Cretaceous and Upper Cretaceous shales of Kharita and Bahariya formations and fine grained limestones of the Abu Roash Formation), and vertical source mixing migration pathways owing to vertical faults resulting from four episodes of elastic crustal extension and above trap lateral migration. The entrapment style of the generated hydrocarbons and its roles on the charge and migration process in the Cretaceous reservoir rocks were determined from the seismic interpretation. Three episodes of uplift erosion (Early Cretaceous, Late Cretaceous-Paleocene, and Paleogene-Neogene) have occurred in the basin and have increased exploration risk in some areas by breaching the integrity of the seal. Migration from the source rock into the trap is mainly vertical migration. However, in areas where the hydrocarbons have escaped through the faults at the boundaries of the basin, migration in the layers above the trap is mainly lateral. The hydrocarbons generated are predominantly oil. Lower Cretaceous shales of Kharita and Alam El-Bueib formations exhibit good thickness, total organic content (TOC), kerogen type (mixed type II and III), and maturation.

Journal of Luminescence
2017
(192) 376–384

Synthesis and photo-physical properties of novel Tb(III) -[Ethyl-4-hydroxy-1-(4-methoxyphenyl)−2-quinolinone-3-carboxylate] complex and luminescence sensitivity towards Malathion and Crotoxyphos pesticides .

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Abstract

In this work, the luminescence of a novel Terbium-[Ethyl-4-hydroxy-1-(4-methoxyphenyl)−2-quinolinone-3- carboxylate] complex has been investigated as an analytical probe for pesticide detection. The sensitivity of Tb (III):L1 probe fluorescence in molar ratio 1:1 across eight pesticides was assayed in ethanol and water. The probe fluorescence has exhibited a remarkable sensitivity towards Crotoxyphos (P1) and Malathion (P2) pesticides in micromolar concentration range, where the fluorescence was quenched by gradual addition of both pesticides. Stern-Volmer studies implied static quenching dominated for P1 and P2. Using Lineweaver-Burk equation binding constants were obtained. Limit of detection (LOD) is 1.7 μM for P1 in water, 0.94, 2.68 μM for P2 in ethanol and water respectively, while the limit of quantitation (LOQ) is 5.88 μM for P1 in water, 3.1, 8.94 μM for P2 in ethanol and water, respectively. The thermodynamic parameters ΔH°, ΔS° and ΔG° were calculated to determine the nature of forces due to the interaction of the Tb(III)-L1 with P1 and P2. Finally, to assess the analytical applicability of the method, the influence of various potentially interfering anion and cations that naturally occur in water and soil were assayed. In addition, the selectivity was investigated in presence of other pesticides.

Arabian Journal of Chemistry
2017

Carbon nanotubes modified with 5,7-dinitro-8- quinolinol as potentially applicable tool for efficient removal of industrial wastewater pollutants.

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Abstract

The environmental pollution due to the industrial wastewater of four different areas in the Gulf of Suez, Red Sea, Egypt, was studied. Adsorption capacities toward the concerned heavy metal ions Cu(II), Zn(II), Fe(II), and Pb(II) by multiwalled carbon nanotubes (MWCNTs) and modified-MWCNTs with 5,7-dinitro-8-quinolinol were investigated. MWCNTs as well as the modified-MWCNTs were characterized using Fourier transform infrared (FTIR), Scanning elec- tron microscopy (SEM) and Transmission electron microscopy (TEM). Adsorption of the studied divalent metal ions was measured by atomic absorption spectrometry (AAS). The effects of solution conditions such as pH, shaking time, metal ion concentration, ionic strength and adsorbent dosage on the adsorption process were also examined. The obtained results showed that removals of the heavy metal ions under consideration by MWCNTs are obviously dependent on the experimental conditions. The maximum adsorption capacities as calculated applying Langmuir equation to single ion adsorption isotherms were found to be 142.8 mg/g for Cu(II), 250 mg/g for Zn(II), 111.1 mg/g for Fe(II), and 200 mg/g for Pb(II) using MWCNTs; meanwhile, the modified-MWCNTs exhibited higher values of the respective maximum adsorption capacities as 333.3 mg/g for Cu(II), 500 mg/g for Zn(II), 200 mg/g for Fe(II), and 333.3 mg/g for Pb(II). Kinetic studies were also performed and the experimental data followed a pseudo-second order model of the adsorption process. The obtained results suggest that the tested adsorption systems of MWCNTs and modified- MWCNTs have suitable affinity toward the metal ion under consideration. Both systems could act as potentially applicable tool in environmental protection.

Journal of Electron Spectroscopy
and Related Phenomena
2017
(220) 86–90

Influence of re-activation and ongoing CO oxidation reaction on the chemical and electronic properties of Au on a Au/CeO_2 catalyst: A XANES study at the Au L_{III} edge.

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Abstract

The influence of oxidative/reductive pretreatment, oxidative re-activation and ongoing CO oxidation on the chemical/electronic properties of a 4.5 wt.% Au/CeO_2 catalyst was investigated by in *operando* X-ray absorption spectroscopy at the Au L_{III} edge. Experimental data on the electronic structure and the size of the Au nanoparticles are correlated with findings from kinetic and deactivation measurements. The results of this study show that oxidative re-activation as well as reductive and oxidative pretreatment significantly affect the Au electronic structure and, in consequence, the catalytic properties. Independent of the type of the treatment, however, the Au nanoparticles rapidly reach a metallic state during reaction, both after oxidative pretreatment and after oxidative re-activation, and can therefore not be responsible for the long-term deactivation of the catalyst. Correlations between electronic/chemical structure, evaluated in a semi-quantitative model, and the catalytic performance are discussed.

European Journal of Medicinal Chemistry
2017
(125) 360-371

Design, selective alkylation and X-ray crystal structure determination of dihydro-indolyl-1,2,4-triazole-3-thione and its 3-benzylsulfanyl analogue as potent anticancer agents

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Abstract

Three sets of substituted indolyl-triazoles were synthesized by the alkylation of 1,2-dihydro-5-(1H-indol-2-yl)-1,2,4-triazole-3-thione with different alkyl halides. The use of pyridine restricted the alkylation to sulfur. Whereas, upon using K_2CO_3, the alkylation exceeded sulfur to one of the remaining triazole nitrogens. The assignment of which nitrogen is alkylated besides sulfur is made for the first time using X-ray analysis of single crystals and 2D NMR which indicated that S-, 2-N-isomers will be preferably formed over the S-, 1-N-isomers. The antiproliferative activity on HEPG-2 and MCF-7 cancer cell lines was tested. The results showed that compound 2a is the most active with an IC50 3.58 mg/mL and 4.53 mg/mL for HEPG-2 and MCF-7 respectively and compound 7 is the least active with an IC50 > 100 mg/mL compared to the standard drug doxorubicin (IC50 4.0 mg/mL). The interaction of the synthesized compounds with tyrosine kinases, namely, Akt, PI3, and EGFR was also studied using molecular docking simulation to predict their mode of action which will drive future work directions.

J. Heterocyclic Chem
2017
54, 95

Synthesis and Regioselectivity in the Alkylation of 1,3,4-Oxadiazolethiones with Dihaloalkanes and Epichlorohydrin.

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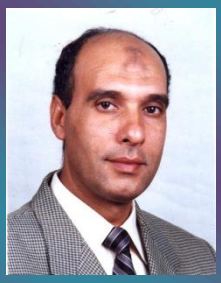
[c]Institute of Analytical Chemistry, Chemo and Biosensors, University of Regensburg, Universitätsstrasse 31, Regensburg 93053, Germany

Abstract

The regioselectivity in the alkylation of 1,3,4-oxadiazolethiones with dihaloalkanes was found that it depends mainly on the length of the alkyl chain connecting the two halides; moreover, the formation of thiirane ring instead of epoxide ring during the alkylation with epichlorohydrin was surprising.



Journal of environmental earth sciences
2017
(76) , 783-793

The effectiveness of the very low frequency electromagnetic method (VLF-EM) in the exploration of sulphide mineralization in arid environments, case study from South Sinai Peninsula, Egypt .

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Abstract

Very low frequency electromagnetic (VLF-EM) measurements were carried out in Wadi Isbayia area, south Sinai Peninsula, to test the efficiency of the VLF-EM method in the exploration of sulphide mineralization in arid environments. The VLF-EM field measurements, including tilt angle, real and imaginary components of the received VLF field, were carried out along fifteen profiles covering a quartz monzonite bedrock. Interpretation of the VLF measurements, in the light of geological information, has showed that sulphide minerals in the Wadi Isbayia area extend from the ground surface to a depth of about 200 m. However, the structural lineaments, especially faults, have controlled the distribution of the sulphide mineralization. A few of polished sections for rock samples, collected from the sites of the VLF-EM anomalies in the study area, have been prepared and examined by ore microscopy which confirmed the presence of pyrite and chalcopyrite as well as iron oxides, disseminated in the quartz monzonite bedrock. These results showed that the VLF-EM method is an effective tool in the exploration of sulphide minerals in the arid environments.

Journal of Coastal Research
2017
(33) 786-794

Geomorphological Changes along the Nile Delta Coastline between 1945 and 2015 Detected Using Satellite Remote Sensing and GIS

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Abstract

This study describes geomorphologic changes along the Nile Delta coastline between 1945 and 2015. The study used topographic maps produced by the Egyptian Geological Survey in 1945 and Landsat satellite imagery taken between 1973 and 2015. The study found that the coastline's geomorphology greatly changed during this time period, especially at Damietta and Rosetta promontories, which were highly eroded after construction of the Aswan High Dam. Other stretches of the coastline also eroded, while some accretion occurred along the coastline down-drift from the promontories. The trend has been erosion of the beaches along the Nile promontories and accretion within the embayments between the promontories, resulting in an overall smoothing of the coastline. A portion of the eroded material has accreted in the form of spits or shoals near the inlets. The principal causal factors of coastline change were the impacts of the Aswan High Dam, sea-level rise, land subsidence, storms, and coastal protection devices. Efforts to stop erosion have had mixed results. Seawalls built along the city of Alexandria have maintained the coastline, while other coastal protection devices have not impeded erosion. Areas of cultivated land are highly susceptible to saltwater intrusion due to sea-level rise and the fact that much of the delta is at or near sea level.

Computers and Electronics in Agriculture
2017
(135) 183–194

A new approach for estimating mangrove canopy cover using Landsat 8 imagery.

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b Geomatics Program, University of Florida, Gainesville, FL, USA

Abstract

Due to background reflectance, it is difficult to accurately map sparse canopy vegetation using moderate resolution satellite imagery. Information contained in virtually all the pixels is a mix of leaf vegetation, soil, branches and shadow. Presented in this paper is a novel approach to improving the accuracy of mapping mangrove canopy using Landsat 8 imagery by incorporating seven indices: Normalized Difference Vegetation Index, Infrared Index, Leaf Area Index, Green Atmospherically Resistant Index, Optimized Soil Adjusted Vegetation Index, Normalized Difference Built-up Index and Normalized Difference Water Index. Results demonstrated that the accuracy of mapping mangrove can be significantly improved using this approach.

Arabian Journal of Geosciences
2017
(18) 1-19

Morphotectonic controls of groundwater flow regime and relating environmental impacts in Northwest Sinai, Egypt .

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2 Geology Department, Faculty of Science, Port Said University, Port Said 42522, Egypt

Abstract

The frequent appearance of some hydro-environmental hazard features, such as waterlogging and soil salinization along the susceptible zones at Northwest Sinai area (NWSA), has put serious challenges and obstacles for a correct and efficient land use planning of this region, for several decades. Although previous studies have shown that the whole region of Northern Sinai is greatly affected by the tectonic movements associated with the Syrian Arc folding system (SAS), NWSA is barren of any obvious surficial structures. The current work aims to investigate the effect of subsurface tectonic features on the hydrogeologic regime of NWSA. Hydrogeological and remote sensing data were integrated with ground geophysical gravity and magnetic measurements, using the geographic information system. Data integration asserts the role played by buried tectonic features not only in governing the landforms of the upper water-bearing quaternary formations but also in controlling their flow regime. Two major subsurface structures were identified through interpreting the geophysical measurements. A buried domelike structure, dominating the central part of the mapped area, coincides with the radial flow pattern observed on the water table map. At the southwestern corner of the study area, an elevated groundwater level, caused by continuous groundwater accumulation at the discharge boundary, is superimposing a subsurface block-faulted depression. The waterlogging features (saturation of the soil by groundwater and inundation of local depressions due to rising of water table) dominating the discharge lowlands of NWSA support the conclusion that a buried block-faulted structure exerts a strong influence on the thickness and groundwater flow regime of the shallow quaternary aquifer.

Environmental Earth Sciences
2017
(76) pp. 263

Land-use/land-cover change: a key to understanding land degradation and relating environmental impacts in Northwestern Sinai, Egypt .

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Abstract

Land degradation and environmental impacts are major impediments to the utilization of land in many arid and semiarid regions of the world and are a major issue in the Northwestern Sinai (NWS), Egypt. Monitoring and detecting of land-use/land-cover (LU/LC) changes and land degradation are very important for the planners, governments and the scientific communities, particularly where there are increasing pressures from human and natural activities on the adjacent environment. Water-logged, salt affected soils, coastal erosion and sand dunes encroachment are serious environmental hazards resulting in the wasteland and geoenvironmental risks. Presently, attempts have been made to analyze and determine the changes in LU/LC of NWS. The present work utilizes image processing and GIS techniques to determine most of the causes that result in intensive land degradations and recommends appropriate remedial measures within the NWS. Multi-temporal remote sensing data and ASTER GDEM were used to map the LU/LC change areas. Many image processing techniques and statistical analysis were applied to draw numerous thematic and geospatial distribution maps for the degraded lands. The results showed that the rapid change in LC was attributed to human activities which led to heavy deteriorations of NWS environment. Also, the prevalence of natural risk corresponding to coastal erosion, water level rising and sand dunes encroachment increase the susceptibility of hazards to the NWS area. The current study provides decision makers and resources managers with appropriate remedial measures that are necessary to avoid severe future environmental difficulties within the NWS.

Marine Biodiversity
2017

A new species of Calanopia (Copepoda, Calanoida, Pontellidae) from the plankton of the central Red Sea.

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2 Department of Marine Sciences, Suez Canal University, Ismailia 41522, Egypt

Abstract

Calanopia tulina sp. nov., a new pontellid copepod,is described from plankton samples collected in Saudi Arabian waters of the Red Sea. The female of the new species differs from other congeners in having the genital operculum located posteroventrally on the genital compound somite and by a slightly asymmetrical leg 5, in which the right leg is slightly shorter than the left one. The male is distinguished by: (1) the presence of a distinct notch on the medial margin of the right prosomal corner; (2) the structure of leg 5, in which the second exopodal segment of the left leg has one medially directed spine and two large laterally directed and curved serrated spines distally; and (3) the first exopodal segment of the right leg has a very small rounded-tip thumb located at the midlength.
The new species is most similar to Calanopia media described from the Red Sea. The presence of the new species in night collection may be due to the diel vertical migration behavior that is known for some species of this genus.

Progress in Oceanography
2016
(140) 69–90

Carbon and nitrogen stable isotope ratios of pelagic zooplankton elucidate ecohydrographic features in the oligotrophic Red Sea.

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Abstract

Although zooplankton occupy key roles in aquatic biogeochemical cycles, little is known about the pelagic food web and trophodynamics of zooplankton in the Red Sea. Natural abundance stable isotope analysis (SIA) of carbon (d13C) and N (d15N) is one approach to elucidating pelagic food web structures and diet assimilation. Integrating the combined effects of ecological processes and hydrography, ecohydrographic features often translate into geographic patterns in d13C and d15N values at the base of food webs.This is due, for example, to divergent 15N abundances in source end-members (deep water sources: high d15N, diazotrophs: low d15N). Such patterns in the spatial distributions of stable isotope values were coined isoscapes. Empirical data of atmospheric, oceanographic, and biological processes, which drive the ecohydrographic gradients of the oligotrophic Red Sea, are under-explored and some rather anticipated than proven. Specifically, five processes underpin Red Sea gradients: (a) monsoon-related intrusions of nutrient-rich Indian Ocean water; (b) basin scale thermohaline circulation; (c) mesoscale eddy activity that causes up-welling of deep water nutrients into the upper layer; (d) the biological fixation of atmospheric nitrogen (N2) by diazotrophs; and (e) the deposition of dust and aerosol-derived N.This study assessed relationships between environmental samples (nutrients, chlorophyll a), oceanographic data (temperature, salinity, current velocity [ADCP]), particulate organic matter (POM), and net-phytoplankton, with the d13C and d15N values of zooplankton collected in spring 2012 from 16_280 to 26_570N along the central axis of the Red Sea. The d15N of bulk POM and most zooplankton taxa increased from North (Duba) to South (Farasan). The potential contribution of deep water nutrientfueled phytoplankton, POM, and diazotrophs varied among sites. Estimates suggested higher diazotroph contributions in the North, a greater contribution of POM in the South, and of small phytoplankton in the central Red Sea. Consistent variation across taxonomic and trophic groups at latitudinal scale, corresponding with patterns of nutrient stoichiometry and phytoplankton composition, indicates that the zooplankton ecology in the Red Sea is largely influenced by hydrographic features. It suggests that the primary ecohydrography of the Red Sea is driven not only by the thermohaline circulation, but also by mesoscale activities that transports nutrients to the upper water layers and interact with the general circulation pattern. Ecohydrographic features of the Red Sea, therefore, aid in explaining the observed configuration of its isoscape at the macroecological scale.

Hydrogeology Journal
2017
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Mapping of groundwater prospective zones integrating remote sensing, geographic information systems and geophysical techniques in El-Qaà Plain area, Egypt .

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Abstract

The geospatial mapping of groundwater prospective zones is essential to support the needs of local inhabitants and agricultural activities in arid regions such as El-Qaà area, Sinai Peninsula, Egypt. The study aims to locate new wells that can serve to cope with water scarcity. The integration of remote sensing, geographic information systems (GIS) and geophysical techniques is a breakthrough for groundwater prospecting. Based on these techniques, several factors contributing to groundwater potential in El-Qaà Plain were determined. Geophysical data were supported by information derived from a digital elevation model, and from geologic, geomorphologic and hydrologic data, to reveal the promising sites. All the spatial data that represent the contributing factors were integrated and analyzed in a GIS framework to develop a groundwater prospective model. An appropriate weightage was specified to each factor based on its relative contribution towards groundwater potential, and the resulting map delineates the study area into five classes, from very poor to very good potential. The very good potential zones are located in the Quaternary deposits, with flat to gentle topography, dense lineaments and structurally controlled drainage channels. The groundwater potential map was tested against the distribution of groundwater wells and cultivated land. The integrated methodology provides a powerful tool to design a suitable groundwater management plan in arid regions.

Arkivoc
2017
104-120

Synthesis of methyl[3-alkyl-2-(2,4-dioxo-3,4-dihydro-2H-quinazolin-1-yl)-acetamido]alkanoate.

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Abstract

A series of methyl[3-alkyl-2-(2,4-dioxo-3,4-dihydro-2H-quinazolin-1-yl)-acetamido]alkanoate 10-13a-f has been developed on the basis of the N-chemoselective react on 3-substituted quinazoline-2,4-dione3a-d with ethyl chloroacetate and azide coupling method with amino acid ester hydrochloride. The precursor quinazoline diones 3a-d chemoselective reactions were studied using DFT(B3LYP) l6-311G level of theory and were prepared by a new rearrangement method from the corresponding 2-(3-methyl-4-oxo-3,4-hihydroquinazolin-2-ylthio)acetohydrazide6.

Journal Heterocyclic Chemistry
2017
(54) 2881-2888

Antimicrobial Evaluation of new quinoxaline derivatives synthesized by selective coupling with alkyl halide and amino acid esters.

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Abstract

Alkylation of quinoxaline scaffold 1 in the presence of K2CO3 preferred N-alkylation than O-alkylation. Quinoxaline hydrazide 6 was successfully coupled with various amino acids, esters, and amines via azide-coupling method. New heterocyclic compounds containing quinoxaline linked to 1,3,4-oxadiazolethione or pyrazole were obtained from cyclization of 6 with CS2 and acetylacetone, respectively. A series of hydrazide Schiff's bases were formed from hydrazide 6 by condensation with a set of aldehydes and ketones. NMR spectroscopy and mass spectrometry were used for structure elucidation of new compounds. The antimicrobial activity of the synthesized compounds was investigated toward two wild-type bacterial strains (Staphylococcus aureus and Escherichia coli) and two fungal species (Alternaria brassicicola and Fusarium oxysporum). Four compounds displayed a significant activity toward S. aureus. The ester 4 showed higher activity than the standard drugs, which make it a promising lead compound.

International Journal of Electrochemical Science
2016
(11) 9745 – 9761

Unused Meropenem Drug as Corrosion Inhibitor for Copper in Acidic Medium; Experimental and Theoretical Studies .

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Abstract

Inhibitive and adsorption properties of unused meropenem drug for the corrosion of Cu in one molar HNO3 solution have been done by utilized (EIS), tafel polarization and (EFM) techniques as well as mass reduction methods of monitoring corrosion. The Effect of temperature was investigated at temperature range (25 - 450C). The obtained results indicated that the examined drug is an excellent inhibitor in 1 M HNO3 and its efficiency equalize to 98.7% at 300 ppm. The inhibition efficiency percent (% IE) improvements with raising the drug dose while it lowering with raising the temperature of solution. The polarization data indicated that this drug play as mixed inhibitor type. The adsorption of the drug on the Cu surface follows the Temkin isotherm. Thermodynamic parameters have been calculated and discussed.

International Journal of Electrochemical Science
2017
(12) 1952 – 1969

An Expired Non-Toxic Diltiazem Hydrochloride as Corrosion Inhibitor for Cu in Nitric Acid Medium.

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Abstract

The corrosion inhibition of Cu in 1 M HNO_3 solution by expired Diltiazem Hydrochloride (HD) has been tested by Tafel polarization, electrical frequency modulation, electrical impedance spectroscopy, and mass loss method. The Diltiazem Hydrochloride gives 86.5 % protection efficiency at optimum dose at 300 ppm. DILTIAZEM HYDROCHLORIDE PP studies suggest that it is mixed kind inhibitor. EIS technique was also utilized to give the corrosion inhibition mechanism. The adsorption of the Diltiazem Hydrochloride on Cu surface was found to follow the Temkin's isotherm. Some adsorption parameters and thermodynamic activation were measured to given the corrosion protection mechanism. The relationship among the IE and some quantum calculation have been computed and argument.

Biomedicine & Pharmacotherapy
2017
(91) 602–610

Ameliorative effect of vitamin E and selenium against oxidative stress induced by sodium azide in liver, kidney, testis and heart of male mice

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Abstract

The study purported to define the effects of daily administration of vitamin E (Vit E) and selenium (Se) on antioxidant enzyme activity in mice treated with high doses of sodium azide (SA). Male mice were randomly split into nine groups. Groups 1, 2 and 3 were injected daily with saline, Vit E, and Se, respectively, while groups 4, 5 and 6 administrated with different doses of SA (low, medium and high, respectively). The mice in groups 7, 8 and 9 received 100 mg/kg Vit E, 17.5 mg/kg Se, and a combination of Vit E and Se, respectively before the SA-treatment. Hepatic, renal, testis and heart, antioxidant enzymes as well as levels of lipid peroxidation and total antioxidant capacity levels were determined. Vit E alone affected on the antioxidant parameters of the examined tissues. Se had a preventive effect on the decrease of antioxidant parameters caused by SA and improved the diminished activities of all of them. The study demonstrates that a high dose of SA may alter the effects of normal level antioxidant/oxidative status of male mice and that Se is effective in reducing the SA-damage. Se acts as a synergistic agent with the effect of Vit E in various damaged caused by SA.

Biomedicine & Pharmacotherapy
2017
(96) 459–465

Protective effect of α–lipoic acid against spleen toxicity of dimethylnitrosamine in male mice: Antioxidant and ultrastructure approaches.

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Abstract

Assess the potency of α-lipoic acid (ALA) against the toxicity of dimethylnitrosamine (DMN) on spleen of mice by assessing the antioxidants, histopathological and ultrastructure changes. The experiment was achieved on six groups of male mice as following; groups 1, 2, 3, and 4 were served as a control, ALA groups, low dose of DMN (DMN-LD; 2 mg kg−1) and high dose of DMN (DMN-HD; 4 mg kg−1). Group 5 was received DMN-LD plus ALA and group 6 was given DMN-HD plus ALA. The results indicated that DMN elevated lipid peroxidation, xanthine oxidase, nitric oxide, and decline the antioxidant enzymes as well as raise the C-reactive protein and tumor necrosis factor. A critical obstruction was harmonized with a reduced in lymphocyte number in the white pulp were observed. All the lymphatic nodules appeared smaller in DMN-HD group. In spleen tissues, marked changes of rough endoplasmic reticulum and appearance of three large lymphocytes were noticed. ALA/DMN treatments were improved all the oxidative damage and the ultrastructure changes. The data evince that ALA was eliminated the adverse effects of DMN on spleen of mice.

Bioorganic Chemistry
2017
(73) 128–146

Auspicious role of the steroidal heterocyclic derivatives as a platform for anti-cancer drugs.

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Abstract

Steroids are polycyclic compounds that have a wide range of biological activities. They are biosynthesized from cholesterol through a series of enzyme-mediated transformations, so they are highly lipophilic and readily enter most cells to interact with intracellular receptors, making them ideal vehicles for targeting a broad array of pathologies. New curative agents for cancers have been developed from several steroidal derivatives. Some biologically important properties of modified steroids are dependent on structural features of the steroid moiety and their side chains. Therefore, chemical derivatization of steroids provides a way to modify their function, and many structure–activity relationships have been confirmed by such synthetic modifications. Several studies demonstrate that steroidal heterocyclic derivatives can be effective in the prevention and treatment of many types of hormone-dependent cancers.

The present review is a concise report on steroidal heterocyclic derivatives, with special emphasis on steroid heterocyclic derivatives with 5 membered rings or six-membered rings having interesting therapeutic potential as enzyme inhibitors and cytotoxic drugs to be used as candidates for anticancer drug development.

Beilstein J. Org. Chem.
2017
(13) 174–181

A novel method for heterocyclic amide–thioamide transformations

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Abstract

In this paper, we introduce a novel and convenient method for the transformation of heterocyclic amides into heteocyclic thioamides. A two-step approach was applied for this transformation: Firstly, we applied a chlorination of the heterocyclic amides to afford the corresponding chloroheterocycles. Secondly, the chloroherocycles and *N*-cyclohexyl dithiocarbamate cyclohexylammonium salt were heated in chloroform for 12 h at 61 °C to afford heteocyclic thioamides in excellent yields.

Bioscience, Biotechnology, and Biochemistry
2017
(81) 2086-2089

Isolation, structural identification and biological characterization of two conopeptides from the *Conus pennaceus* venom.

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Abstract

A novel anti-mollusk conopeptide pn4c was isolated from the Conus pennaceus venom by repeated HPLC fractionation based on the activity against freshwater snails. The primary structure of pn4c was determined by the mass spectrometric de novo sequencing analysis. In addition, pn3a was isolated from the same fraction containing pn4c, as a peptide with unknown functions.

Electrochimica Acta
2017
(249) 145–154

Detection of transient dopamine antioxidant radicals using electrochemistry in electrospray ionization mass spectrometry.

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Abstract

We describe formation and detection of transient radical intermediates and $2e^-$, $2H^+$ oxidation products (OPs) of dopamine (DA) by electrospray ionization (ESI) mass spectrometry (MS) which has not been reported previously. The results confirm formation of DA radicals by proton coupled electron transfer pathway. DA radicals and $2e^-$, $2H^+$ oxidation products that were identified are of interest because of their reported neurotoxicity. Using different solution compositions and MS detection conditions three different DA radicals were identified that have different stability. DA reactions with reactive oxygen species (ROS) relevant to DA reactivity in vivo are discussed. Detection of DA OPs by electrochemistry/ mass spectrometry with a floated on-line electrochemical cell is also illustrated.

Journal of Alloys and Compounds
2017
(727) 970-977

Facile synthesis and structural insight of chloride intercalated Ca/Al layered double hydroxide nanopowders .

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Abstract

Chloride intercalated Ca/Al layered double hydroxide (Ca/Al-Cl-LDH) was successfully synthesized by a one pot solvent-free mechanochemistry method. The effects of ion contents (0.1, 0.15, 0.2, 0.25, 0.3, 0.35, and 0.4) on phase compositions and structural features were evaluated by Rietveld analysis. The as-prepared specimens were characterized by X-ray diffraction (XRD), Fourier Transform Infrared spectroscopy (FTIR), field emission scanning electron microscopy (FE-SEM), energy dispersive spectroscopy (EDS), transmission electron microscopy (TEM), and thermogravimetric analysis (TGA). The XRD-Rietveld refinement results confirmed that the formation of high crystalline hydrocalumite was varied by incorporation of different ion contents. The characterization results demonstrated that pure hydrocalumite was the only crystalline phase in the midrange, while calcium hydroxide and gibbsite were appeared as additional phases with hydrocalumite at low and high Al substitutions, respectively. Detailed study of this phase behavior and structural trends was also scrutinized. Microscopic observations illustrated the hexagonal platelet-like shape of hydrocalumite powders with an average edge length of 397 nm. The thermal decomposition details of Ca/Al-Cl-LDH were scrutinized and reported. This unique approach offers an optimum ion concentration for the future design of Ca/Al-Cl-LDH framework that can be applied for numerous applications like biomedical and water treatment.

Surface & Coatings Technology
2017
(319) 353–358

Reduction of defects in self-assembling colloidal monolayer via surface modifiers and periodic mechanical vibration.

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Abstract

Convective self-assembly has been demonstrated to be useful as a technique to generate self-assembled monolayers of nanoparticles over a given area. These films, however, suffer from defects that occur with misaligned grain boundaries and point defects frommissing particles.We demonstrate the effect of surfactantmodified substrate and externalmechanical vibration on reducing the inherent defects in colloidalmonolayers obtained using an industrially scalable process: convective assembly. Surfacemodified substrates coupledwith vibration during the deposition resulted in a higher degree of ordering over a large deposition area. Numerical investigation further shows the increased capability of these external modifiers helps in producing better quality films. A significant 86% reduction in the defects,with larger crystal domains are realized in comparison to control, enabling this technique to easily be scaled up for various industrial applications.

Hydrological Processes
2017
(31) 4081–4091

Quantifying temporal variations in water resources of a vulnerable middle eastern transboundary aquifer system.

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Abstract

Freshwater resources in the arid Arabian Peninsula, especially transboundary aquifers shared by Saudi Arabia, Jordan, and Iraq, are of critical environmental and geopolitical significance. Monthly Gravity Recovery and Climate Experiment (GRACE) satellite- derived gravity field solutions acquired over the expansive Saq transboundary aquifer system were analysed and spatiotemporally correlated with relevant land surface model outputs, remote sensing observations, and field data to quantify temporal variations in regional water resources and to identify the controlling factors affecting these resources. Our results show substantial GRACE- derived terrestrial water storage (TWS) and groundwater storage (GWS) depletion rates of −9.05 ± 0.25 mm/year (−4.84 ± 0.13 km3/year) and −6.52 ± 0.29 mm/year (−3.49 ± 0.15 km3/year), respectively. The rapid decline is attributed to both climatic and anthropogenic factors; observed TWS depletion is partially related to a decline in regional rainfall, while GWS depletions are highly correlated with increasing groundwater extraction for irrigation and observed water level declines in regional supply wells.

Turkish Journal of Fisheries and Aquatic Sciences
2017
(17) 945-958

Population Dynamics of the Cockle *Cerastoderma glaucum*: A comparison between Lake Qarun and Lake Timsah, Egypt .

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Abstract

The cockle *Cerastoderma glaucum* represents one of the most common marine mollusc species present in Egyptian waters. This study aims to investigate the population structure, growth, mortality, and exploitation status of this cockle along Lake Qarun and Lake Timsah in order to make a comparison study. Cockles were collected from Lake Qarun at monthly intervals between February 2008 and May 2009 and collected from Lake Timsah at four seasons only. Length frequency data were analyzed using FiSAT software for estimation of population parameters to evaluate the stock. Asymptotic length ($L\infty$) was smaller in Lake Qarun (28.35 mm) compared to that in Lake Timsah (33.60 mm).Growth coefficient (K) was higher in Lake Qarun (0.450 yr-1) than in Lake Timsah (0.280 yr-1).Growth performance index (Φ) values were similar (2.56) in both cockle stocks. The theoretical maximum age (Tmax) was higher in Lake Timsah (12.6 yr-1) than in Lake Qarun (7.4 yr-1). Total mortality (Z) was estimated by length-converted catch curve at 1.02 and 0.24 yr-1, fishing mortality (F) at -0.04 and 0.47 yr-1 and natural mortality (M) at 1.06 and 0.71 yr-1 for Lake Qarun and Lake Timsah, respectively. Recruitment was continuous and showed two major pulses in the two lakes.

Indian Journal of Geo-Marine Sciences
2017
(46) 1145-1154

Heavy metals and some nutritional elements in the Mediterranean carpet shell clam *Donax semistriatus.*

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Abstract

The present study was conducted to determine the concentrations of some heavy metals in the sea water, sediment and soft tissue of the carpet shell clam Donax semistriatus in the Egyptian Mediterranean coast. Level of Fe was the highest in the three components. However, the mean value of heavy metal accumulation in the clam tissues exhibited the following decreasing order: Fe>Zn>Cu>Pb>Cd. Similarity between metals in both sediment and biota were analyzed. A comparison between the present results and others (local and international) was carried out. Fortunately, the present work recommended that D. semistriatus is safe and with nutritive value for human consumption.

PLOS ONE
2017

Arbuscular mycorrhizal strategy for zinc mycoremediation and diminished translocation to shoots and grains in wheat.

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Abstract

Mycoremediation is an on-site remediation strategy, which employs fungi to degrade or sequester contaminants from the environment. The present work focused on the bioremediation of soils contaminated with zinc by the use of a native mycorrhizal fungi (AM) called *Funneliformis geosporum* (Nicol. & Gerd.) Walker & Schüßler. Experiments were performed using *Triticum aestivum* L. cv. Gemmeza-10 at different concentrations of Zn (50, 100, 200 mg kg^{-1}) and inoculated with or without *F. geosporum*. The results showed that the dry weight of mycorrhizal wheat increased at Zn stressed plants as compared to the non-Zn-stressed control plants. The concentrations of Zn also had an inhibitory effect on the yield of dry root and shoot of non-mycorrhizal wheat. The photosynthetic pigment fractions were significantly affected by Zn treatments and mycorrhizal inoculation, where in all treatments, the content of the photosynthetic pigment fractions decreased as the Zn concentration increased in the soil. However, the level of minerals of shoots, roots, and grains was greatly influenced by Zn-treatment and by inoculation with *F. geosporum*. Treatment with Zn in the soil increased Cu and Zn concentrations in the root, shoot and grains, however, other minerals (P, S, K, Ca and Fe) concentration was decreased. Inoculation of wheat with AM fungi significantly reduced the accumulation of Zn and depressed its translocation in shoots and grains of wheat. In conclusion, inoculation with a native *F. geosporum*-improves yields of wheat under higher levels of Zn and is possible to be applied for the improvement of zinc contaminated soil.

Journal of Molecular Structure
2016
(1108) 60-70

Synthesis, structure and antidiabetic activity of chromium(III) complexes of metformin Schiff-bases.

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Abstract

A series of Cr3 complexes with Schiff-bases of metformin with each of salicylaldehyde (HL^1); 2,3-dihydroxybenzaldehyde (H_2L^2); 2,4-dihydroxybenzaldehyde (H_2L^3); 2,5-dihydroxybenzaldehyde(H_2L^4); 3,4-dihydroxybenzaldehyde (H_2L^5) and 2-hydroxynaphthaldehyde (HL^6) were synthesized by template reaction. The new compounds were characterized through elemental analysis, conductivity and magnetic moment measurements, IR, UV-Vis., NMR and mass spectroscopy. The complexes have octahedral structure with m value of hexacoordinated chromium ion. TGA, DTG and DTA analysis confirm the proposed stereochemistry and a mechanism for thermal decomposition was proposed. Thermodynamic parameters are calculated for the second and third decomposition steps. $[CrL^4Cl(H_2O)_2].3H_2O$ and $[CrL^5Cl(H_2O)_2].2½H_2O$ were able to produce significant decreases in the blood glucose level.

Journal of the Geological Society
2017
(174) 318-335.

Control of extensional transfer zones on syntectonic and post-tectonic sedimentation: implications for hydrocarbon exploration.

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Abstract

The Gulf of Suez–Red Sea rift system exhibits superb outcrop examples of extensional transfer zones and displays the control of these zones on syntectonic and post-tectonic sedimentation. Hard and soft linkage transfer zones were identified at variable scales. Hard linkage transfer zones form inward and outward fault kinks whereas soft linkage transfer zones form relay ramps between overlapping rift-parallel faults. The two types of transfer zones invariably exerted fundamental control on the deposition of syn- and post-tectonic sediments, flow direction of drainage systems and locations of sediment entry points, as well as the intensity of erosion patterns of the structurally high sediment source areas. This study highlights the close relationship between the transfer zones and hydrocarbon accumulations in clastic syntectonic reservoirs in rift basins.

Oxidative medicine and cellular longevity
2017
8 pages

Genetic Transformation and Hairy Root Induction Enhance the Antioxidant Potential of Lactuca serriola L.

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Abstract

Lactuca serriola L. is a herbaceous species, used for human nutrition and medicinal purposes. The high antioxidant capacity of L. serriola indicates the possibility of enhancing its edible and health potential by increasing the flavonoid and phenolic contents. The present study aimed at enhancing the production of phenolics and flavonoids by hairy root cultures in Lactuca serriola transformed with Agrobacterium rhizogenesstrain AR15834 harbouring the rolB gene. The genetic transformation of rolB in transformed roots was validated, and rolB expression level was evaluated using real-time qPCR analysis. Expression levels of flavonoid biosynthesis genes (CHI, PAL, FLS, and CHS) were assessed in the hairy and nontransformed roots. Results showed higher expression levels in the transgenic roots than in the nontransformed ones (). Transgenic hairy roots exhibited a 54.8–96.7% increase in the total phenolic content, 38.1–76.2% increase in the total flavonoid content, and 56.7–96.7% increase in the total reducing power when compared with the nontransgenic roots (). DPPH results also revealed that the transgenic hairy roots exhibited a 31.6–50% increase in antioxidant potential, when compared to normal roots. This study addressed the enhancement of secondary metabolite biosynthesis by hairy root induction in L. serriola.

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(8)

The activity of the neutral sphingomyelinase is important in T cell recruitment and Directional Migration.

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Abstract

Breakdown of sphingomyelin as catalyzed by the activity of sphingomyelinases profoundly affects biophysical properties of cellular membranes which is particularly important with regard to compartmentalization of surface receptors and their signaling relay. As it is activated both upon TCR ligation and co-stimulation in a spatiotemporally controlled manner, the neutral sphingomyelinase (NSM) has proven to be important in T cell activation, where it appears to play a particularly important role in cytoskeletal reorganization and cell polarization. Because these are important parameters in directional T cell migration and motility in tissues, we analyzed the role of the NSM in these processes. Pharmacological inhibition of NSM interfered with early lymph node homing of T cells *in vivo* indicating that the enzyme impacts on endothelial adhesion, transendothelial migration, sensing of chemokine gradients or, at a cellular level, acquisition of a polar-ized phenotype. NSM inhibition reduced adhesion of T cells to TNF-α/IFN-γ activated, but not resting endothelial cells, most likely *via* inhibiting high-affinity LFA-1 clustering. NSM activity proved to be highly important in directional T cell motility in response to SDF1-α, indicating that their ability to sense and translate chemokine gradients might be NSM dependent. In fact, pharmacological or genetic NSM ablation interfered with T cell polarization both at an overall morphological level and redistribution of CXCR4 and pERM proteins on endothelial cells or fibronectin, as well as with F-actin polymerization in response to SDF1-α stimulation, indicating that efficient directional perception and signaling relay depend on NSM activity. Altogether, these data support a central role of the NSM in T cell recruitment and migration both under homeostatic and inflamed conditions by regulating polarized redistribution of receptors and their coupling to the cytoskeleton.

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A luminescent europium complex for the selective detection of trace amounts of aldicarb sulfoxide and prometryne.

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Abstract

The interaction between luminescent Eu(TAN)2(Phen) ternary complex (where TAN = 4,4,4-Trifluoro-1-(2-naphthyl)-1,3-butanedione and Phen = 1,10 phenanthroline) with prometryne and aldicarb sulfoxide was studied by fluorescence spectroscopic technique. The results showed that the luminescence of europium complex was strongly quenched at λ = 614 nm by prometryne and aldicarb sulfoxide at pH 7.4 using PIPES buffer solution. The quenching mechanism was discussed to be a static quenching procedure, which was proved by the Stern Volmer (KSV) constants at different temperatures where the detection limits are 0.33 and 0.18 μmol L−1 for prometryne and aldicarb sulfoxide, respectively. According to Lineweaver–Burk equation at different temperatures, the thermodynamic parameters, ΔH, ΔS and ΔG associated with the interaction of the complex with the two pesticides were calculated.

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Influence of salt stress on inoculated *Casuarina glauca* seedlings

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Abstract

Salinity is a serious threat to agriculture in arid and semi-arid regions including Egypt. There is currently a need to select highly salt-tolerant plants to improve recycling of agricultural drainage waters. Due to the importance of *Casuarina* in soil reclamation and rehabilitation, our study was carried out to evaluate the survival and growth of inoculated *Casuarina glauca* in hydroponic N-free medium supplemented with different NaCl concentrations (50, 100, 200, 300, 400 and 500 mM). Salt tolerant *Frankia* strains CcI156 and CgIM4, isolated from root nodules of *Casuarina* trees grown in loamy sand soils in Egypt, were used for seedling inoculation. Our results showed that inoculated Casuarina seedlings were able to withstand up to 200 mM NaCl. At higher NaCl concentrations (300 to 500 mM), the seedling died gradually three days after exposure to salt stress. However, at lower NaCl (50 mM) concentration, inoculated *C. glauca* seedlings showed a higher growth rate and higher percentages of nodulation. Nitrogenase activity and the total nitrogen content of nodulated seedlings were also influenced by elevated NaCl concentrations and recorded a reduction at high concentration (200 mM). Salt stress had a strong effect on biosynthesis of osmoprotectants molecules like L-Proline and carbohydrates, which strongly correlated (r = 0.98 and 0.87, respectively) with increasing salt concentrations.

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Genomic, transcriptomic, and proteomic approaches towards understanding the molecular mechanisms of salt tolerance in Frankia strains isolated from Casuarina trees.

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Abstract

BACKGROUND:Soil salinization is a worldwide problem that is intensifying because of the effects of climate change. An effective method for the reclamation of salt-affected soils involves initiating plant succession using fast growing, nitrogen fixing actinorhizal trees such as the Casuarina. The salt tolerance of Casuarina is enhanced by the nitrogen-fixing symbiosis that they form with the actinobacterium Frankia. Identification and molecular characterization of salt-tolerant Casuarina species and associated Frankia is imperative for the successful utilization of Casuarina trees in saline soil reclamation efforts. In this study, salt-tolerant and salt-sensitive Casuarina associated Frankia strains were identified and comparative genomics, transcriptome profiling, and proteomics were employed to elucidate the molecular mechanisms of salt and osmotic stress tolerance.

RESULTS:Salt-tolerant Frankia strains (CcI6 and Allo2) that could withstand up to 1000 mM NaCl and a salt-sensitive Frankia strain (CcI3) which could withstand only up to 475 mM NaCl were identified. The remaining isolates had intermediate levels of salt tolerance with MIC values ranging from 650 mM to 750 mM. Comparative genomic analysis showed that all of the Frankia isolates from Casuarina belonged to the same species (Frankia casuarinae). Pangenome analysis revealed a high abundance of singletons among all Casuarina isolates. The two salt-tolerant strains contained 153 shared single copy genes (most of which code for hypothetical proteins) that were not found in the salt-sensitive(CcI3) and moderately salt-tolerant (CeD) strains. RNA-seq analysis of one of the two salt-tolerant strains (Frankia sp. strain CcI6) revealed hundreds of genes differentially expressed under salt and/or osmotic stress. Among the 153 genes, 7 and 7 were responsive to salt and osmotic stress, respectively. Proteomic profiling confirmed the transcriptome results and identified 19 and 8 salt and/or osmotic stress-responsive proteins in the salt-tolerant (CcI6) and the salt-sensitive (CcI3) strains, respectively.

CONCLUSION:Genetic differences between salt-tolerant and salt-sensitive Frankia strains isolated from Casuarina were identified. Transcriptome and proteome profiling of a salt-tolerant strain was used to determine molecular differences correlated with differential salt-tolerance and several candidate genes were identified. Mechanisms involving transcriptional and translational regulation, cell envelop remodeling, and previously uncharacterized proteins appear to be important for salt tolerance. Physiological and mutational analyses will further shed light on the molecular mechanism of salt tolerance in Casuarina associated Frankia isolates.

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The impact of low-flow season on source drinking water quality, Rosetta branch, Egypt .

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Abstract

The present work was conducted to document the problems raised regarding low-flow in the Rosetta branch, Egypt and to develop management options to protect drinking water sources. The water quality was monitored during low-flow periods at four drinking water intakes. Results showed an increase in electric conductivity (EC), ammonium(NH_4), nitrite (NO_2), phosphate (PO_4), and total organic carbon (TOC) during the low-flow period. EC ranges from 454 to 1,062 µS/cm and the mean value is 744. Ammonium ranges from 0.38 to 18.5 mg/L and the mean value is 5.45. NO_2, PO_4, and TOC have mean values of 0.73, 1.85, and 6.71 mg/L, respectively. Statistical evaluation revealed the association of NH_4, EC, and PO_4 that are good indicators for the load of wastewater. High ammonium often refers to a bad situation regarding oxygen while high nitrite indicates the first oxidation for wastewater through microbiological processes. The low-flow action has a serious impact on drinking water source. A high content of ammonium has delayed coagulation, enhanced algae growth, and prevented the breakpoint being reached during chlorination processes. Potential management options to deal with water scarcity and low-flow, meanwhile reducing the contaminant load in the source drinking water were proposed.

Dyes and Pigments
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Single crystal ruthenium(II) complex dye based photodiode

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Abstract

The electrical and photoresponse properties of Ruthenium(II) complex dye based on photodiode were analyzed by current, capacitance and conductance measurements performed in a wide illumination intensity and frequency range. It was observed that the reverse current increases with increasing illumination intensity. The results confirm that the photodiode exhibits a photoconducting behavior. Also, the transient photocurrent, photocapacitance and photoconductance of the photodiode were investigated as a function of time. It was observed that the values of these parameters increase after illuminating and reach back to original value after turning off the illumination. In addition, the interface states and series resistance of the photodiode were determined from capacitance/conductanceevoltage measurements.

The value of these parameters decreases with increasing frequency. The obtained experimental results suggest that the photodiode with Ruthenium/Ru(II) complex thin film could be used in various optoelectronic devices and applications.

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Electromagnetic shielding properties of graphene/acrylonitrile butadiene rubber nanocomposites for portable and flexible electronic devices.

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Abstract

The modern advances in portable and flexible electronic devices require integration of flexibility into future electromagnetic interference shielding nanocomposites. Lightweight and flexible acrylonitrile butadiene rubber/graphene nanosheets (NBR/GN) nanocomposites were fabricated using conventional rubber e roll milling technique. The surface morphology of as prepared GN and NBR/GN nanocomposites were examined by scanning and high resolution electron microscopy. The incorporation of GN nanosheets into NBR matrix has significantly enhanced the mechanical properties and electrical conductivity of nanocomposites. The dielectric properties of (NBR/GN) in the frequency range from 1 GHz to 12 GHz were studied. The electromagnetic interference shielding effectiveness (SE) of conducting NBR/GN nanocomposites was studied as a function of GN content, frequency and thickness of absorber and their interrelation was explored. We found an excellent agreement among theoretically predicted shielding effectiveness and the experimental data. The obtained results revealed that NBR/GN nanocomposites can be used as very effective, lightweight microwave shielding materials for spacecraft, aircraft, microelectronic and structural applications.

Ecotoxicology and Environmental Safety
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Zinc-induced differential oxidative stress and antioxidant responses in Chlorella sorokiniana and Scenedesmus acuminatus.

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Abstract

Algae are frequently exposed to toxic metals, and zinc (Zn) is one of the major toxicants present. We exposed two green microalgae, *Chlorella sorokiniana* and *Scenedesmus acuminatus*, to sub-lethal concentrations (1.0 and 0.6 mM) of Zn for seven days. Algal responses were analysed at the level of growth, oxidative stress, and antioxidants. Growth parameters such as cell culture yield and pigment content were less affected by Zn in *C. sorokiniana*, despite the fact that this alga accumulated more zinc than *S. acuminatus*. Also, *C. sorokiniana*, but not *S. acuminatus*, was able to acclimatize during long-term exposure to toxic concentrations of the test metals (specific growth rate (μ) was 0.041/day and total chlorophyll was 14.6 mg/mL). Although, Zn induced oxidative stress in both species, *C. sorokiniana* experienced less stress than *S. acuminatus*. This could be explained by a higher accumulation of antioxidants in *C. sorokiniana*, where flavonoids, polyphenols, tocopherols, glutathione (GSH) and ascorbate (ASC) content increased. Moreover, antioxidant enzymes glutathione S transferase (GST), glutathione reductase (GR), superoxide dismutase (SOD), peroxidase (POX) and ascorbate peroxidase (APX), showed increased activities in *C. sorokiniana*. In addition to, and probably also underlying, the higher Zn tolerance in *C. sorokiniana*, this alga also showed higher Zn biosorption capacity. Use of *C. sorokiniana* as a bioremediator, could be considered.

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Sensitivity of two green microalgae to copper stress: Growth, oxidative and antioxidants analyses.

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Abstract

Depending on species, heavy metals, including copper (Cu), differentially affect algal growth and metabolism. Here, we aim to evaluate the differential responses of two green microalgae, *Chlorella sorokiniana* and *Scenedesmus acuminatus*, exposed to sub-lethal doses of Cu (25 and 50 μM, respectively) for 7 days. The changes in growth, oxidative damage markers, and antioxidants were analysed. We found that *S. acuminatus* could acclimatise during long-term exposure to Cu stress. *S. acuminatus* accumulated lower Cu content and showed a slight decrease in H_2O_2 levels when compared to *C. sorokiniana*. Cu stress induced membrane damage in the two microalgae species, however, this increase was slightly lower in *S. acuminatus*. To mitigate Cu stress impact, *C. sorkiniana* markedly increased proline, polyphenols, flavonoids, tocopherols, glutathione levels, as well as the activities of GST, APX, GR and SOD enzymes, which could explain less-stress sensitivity. On the other hand, *S. acuminatus* exhibited significant increases in proline, polyphenol, and tocopherol contents. Activity levels of POX, APX, GR and SOD enzymes, were also increased. These results suggest that the two microalgae differentially induced the antioxidant defence system to neutralize the oxidative damage induced by Cu stress. This study also provided new data for Cu tolerance and Cu removal abilities of two microalgal species, which commonly exist in surface water bodies, where low Cu uptake and efficient antioxidant defence system protected *S. acuminatus* against oxidative stress induced by Cu stress. This makes it feasible for treatment of Cu contaminated waters.

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