1st Post-Doctoral Research Conclave
(PDRC2018)
Jamia Hamdard :: April 12, 2018

Souvenir and Book of Abstracts

http://www.jamiahamdard.ac.in/PDRC2018/PDRC.htm

PDRC2018

1st Post-Doctoral Research Conclave
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Jamia Hamdard, New Delhi proudly announces hosting of the **first Post-doctoral Research Conclave (PDRC2018)** on **April 12, 2018**. We warmly welcome post-doctoral researchers from universities, research institutions and other organizations to Jamia Hamdard in the Conclave to share their exciting research and to network with their peers.

In the US and other scientifically advanced countries where post-doctoral researchers contribute majorly to research output of a laboratory. In India there are post-doctoral research opportunities such as Research Associateship of CSIR, DBT, and ICMR. Besides, there is a post-doctoral fellowship offered by SERB named as N-PDF (National – Post-doctoral Fellowship) and UGC supports post-doctoral research by offering Dr. D.S. Kothari Fellowship. In spite of these initiatives post-doctoral research has not properly bloomed in India and is not taken seriously.

Taking a major initiative to boost post-doctoral research and to invite talented and enthusiastic researchers on its campus Jamia Hamdard launched **Silver Jubilee Post-doctoral Research Fellowship Programme** in 2015 from its own resources. Value of these fellowships was substantially enhanced in 2017 to make them at par with the fellowships offered by the government agencies. Recently, four post-doctoral researchers have been offered these fellowships which include a researcher from abroad. Jamia Hamdard is keen to promote post-doctoral research culture and views the post-doctoral researchers as the future leaders of science and academia. Jamia Hamdard with its top ranking in Pharmacy and cutting edge research in other allied disciplines has attracted post-doctoral researchers. Currently, we are proud host of half a dozen SERB N-PDFs. This Conclave (PDRC2018), the first of its kind in India has been conceptualized and patronized by our dynamic leader **Prof. (Dr.) Seyed Ehtesham Hasnain, Vice Chancellor, Jamia Hamdard** who has mentored over a dozen of PDFs and is a strong advocate of post-doctoral researchers and their grooming as the future leaders of research.

The Conclave will have the following broad themes:

- **Biology, Chemical and Biomedical Sciences**
- **Pharmaceutical and Clinical Research**
- **Environmental Science**
- **Humanities, Social Science and Management**
- **Engineering and Information Technology**

The Convolve is open to Post-Ph.D. (awarded/submitted) and M.D./M.S./M.D.S. Scholars.

PDRC2018

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Souvenir and Book of Abstracts

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Professor Dr. Seyed E. Hasnain
Phd, DSc(h.c.), DMedSc(h.c.), FNA, FTWAS, ML, FAAM
Vice Chancellor

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MESSAGE

I am happy to welcome you all to Jamia Hamdard for the 1st Post-doctoral Research Conclave being hosted by us on our campus. To my knowledge, it is the first Conclave of its kind in India focussed on post-doctoral research. Post-doctoral researchers have important role in the research outcome of any laboratory in the west. Based on their research outcome and productivity they move higher in the academic rank. Currently, in India post-doctoral fellows receive good support from funding agencies such as DBT, ICMR, SERB and UGC. UGC in particular has launched an attractive programme with name 'DS Kothari Fellowship which aims to support young PhDs in the universities.

Jamia Hamdard is perhaps the only University which has instituted, to begin with 8, high value post-doctoral fellowships offered on competitive basis. These fellowships, named as Jamia Hamdard – Silver Jubilee Post-Doctoral Fellowships, have attracted massive interest in researchers from all corners of India including a few applications from abroad. We selected four Jamia Hamdard - Silver Jubilee Post-doctoral Fellows in the 2017 cycle and assigned them to laboratory of their choice.

I hope this Conclave, which will be an annual event, will prove to be a vibrant platform for post-doctoral fellows to share their research findings and network with each other.

I wish all success to this Conclave.

Prof. (Dr.) Seyed Ehtesham Hasnain
Vice Chancellor

Professor Dr. Ahmed Kamal
FNASc
Pro-Vice Chancellor

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MESSAGE

I am pleased to inform you that Jamia Hamdard has planned to initiate the first Post-doctoral Research Conclave on April 12, 2018.

Moreover, such a meeting focused on Post-doctoral Research is being carried out for the first time in this country. In the recent years, Jamia Hamdard is strengthening its research capabilities as well as infrastructure. The outcome of research findings from this University have been quite notable particularly in the areas of Pharmacy, Medicine, Biotechnology, Chemistry and Toxicology. Many excellent research publications are being published from these disciplines that are being highly cited.

In this context, I am sure this Conclave will be an opportunity for the Post-doctoral researchers of various institutions including Jamia Hamdard to present and discuss about their research. This would allow them to obtain some useful suggestions from their peers and also may catalyze to develop a network for collaborations to carry out joint research programmes.

Wishing all the best to the Organizing Committee and participants of this meeting.

(Prof. Ahmed Kamal)

सत्यमेव जयते
प्रो. आशुतोष शर्मा
Prof. Ashutosh Sharma

स्वच्छ भारत
एक कदम स्वच्छता की ओर

सचिव
भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
विज्ञान और प्रौद्योगिकी विभाग
Secretary
Government of India
Ministry of Science and Technology
Department of Science and Technology

6th April, 2018

MESSAGE

I am happy to know that Jamia Hamdard is going to organize the 1st Post-Doctoral Research Conclave (PDRC2018) on April 12, 2018. To my knowledge, this will be the first such Conclave of post-doctoral researchers in India. I would like to compliment Jamia Hamdard and its leadership for conceiving this idea. I am sure this Conclave will provide opportunity to post-doctoral researchers to showcase their research and also network with each other. Jamia Hamdard which is a vibrant hub of research, particularly in the field of biomedical sciences will be a perfect venue for such an event.

I wish all the success to this Conclave.

(Ashutosh Sharma)

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Date: 5th April 2018

Dear Professor Raisuddin

We are pleased to learn that Jamia Hamdard would be organizing the **First Post-Doctoral Research Conclave (PDRC 2018)** on April 12, 2018. On behalf of the Wellcome Trust/DBT India Alliance, I congratulate the Jamia Hamdard community and its leadership for this important career-building exercise for early career researchers.

The "postdoc" is a period of transition from a fully supervised PhD environment to an independent research career. It is also a period that is often identified with loads of work, too little compensation and even less clarity in terms of expectations. In a properly mentored environment, this can be a period of much joy and productivity. But in a poorly mentored setting, it can be frustrating and a wasted opportunity.

The West has a robust postdoc culture, both in academia and industry. But even that model has come under strain due to variable mentorship and the paucity of opportunities further along the career track. In India the postdoc is still a rare species, but the culture is growing. This is therefore a good time to evolve our own model, which integrates learning from global best practices with local dynamics and career opportunities.

The Wellcome Trust/DBT India Alliance is pleased to support PDRC 2018. This meeting matches our own vision of supporting bright and enterprising researchers early in their careers. For example, the India Alliance Early Career Fellowships offer a semi-independent postdoc opportunity to fast track into an independent research career.

We hope PDRC 2018 would bring together early career researchers from many institutions to present their research, share experiences and to learn from experienced mentors on how to make the best use of this time.

Please accept our best wishes.

Sincerely

Shahid Jameel

Shahid Jameel, Ph.D.
Chief Executive Officer

PDRC2018

WELCOME MESSAGE

I, on behalf of Organizing Committee, welcome all the delegates to the 1st Post-Doctoral Research Conclave (PDRC2018) at Jamia Hamdard. The idea of such a Conclave has been conceived by our Vice Chancellor Prof. (Dr.) Seyed Ehtesham Hasnain who has implemented several innovative initiatives in Jamia Hamdard since he has taken up leadership role in Jamia Hamdard. Some of these initiatives include 'Distinguished Lecture Series', 'Abdul Mueed Leadership Excellence Oration', 'Annual Alumni Meet' and 'Cultural Events'. He has also espoused post-doctoral research culture in a big way and recently a large of post-doctoral research fellows has joined Jamia Hamdard. These initiatives have augmented the research ecosystem of Jamia Hamdard which is well known for high quality research in selected areas of research, particularly in biomedical science, pharmacology and toxicology. This high quality research at Jamia Hamdard has reflected in recognition at national and international levels such as among top (1-3) rank Pharmacy in NIRF 2016, 2017 and 2018, QS Subject Ranking in Pharmacy and Pharmacology at global level in 2018 (only 5 Indian institutions have been ranked in the range of 251-300 and Jamia Hamdard and BHU have been ranked in the same range of 251-250). On the basis of publications, *h*-index and citations Jamia Hamdard has also been selected for DST-PURSE grant which is available to only few selected universities in India.

I hope while participating in PDRC2018 post-doctoral fellows will take some time to visit laboratories at Jamia Hamdard to have a firsthand account of type of facilities and research programmes being pursued.

For successful organization of the Conclave I thank our Patron and Co-patron, Prof.(Dr.) Seyed Ehtesham Hasnain, Prof. Ahmed Kamal, Pro Vice Chancellor, all members of Organizing Committee and volunteers. Thanks are due to Wellcome Trust – DBT India Alliance for their generous support. Conclave is supported by the DST-PURSE grant and Schrödinger also provided some support.

Once again thanking you for your interest in PDRC2018.

Raisuddin.

Prof. S. Raisuddin
Organizing Secretary – PDRC2018
Advisor (Research)
Jamia Hamdard

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Keynote Speakers

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Keynote speaker

Dr. Shahid Jameel

Dr. Shahid Jameel is currently the CEO of the Wellcome Trust/DBT India Alliance. He has over 25 years of experience as a Scientist and Group Leader at the International Centre for Genetic Engineering and Biotechnology, New Delhi, India. His research at ICGEB dealt with human viruses – the hepatitis E virus (HEV) and HIV, where his group explored the role of viral proteins and host noncoding RNAs in pathogenesis.

Shahid has undergraduate degrees in Chemistry from the Aligarh Muslim University and the Indian Institute of Technology (Kanpur), India, and a PhD in Biochemistry from the Washington State University, Pullman, USA. His post-doctoral work in Molecular Virology was carried out at the University of Colorado Health Sciences Center, Denver, USA.

For his research, Shahid has received support from DBT, ICMR, Wellcome Trust (UK) and NIH (USA). His work is recognized through various awards, including the Shanti Swarup Bhatnagar Prize in Medical Sciences, and fellowships of all the three science academies in India. He is on the Editorial Boards of various international and Indian journals, and serves as a member or Chair of various key committees at DBT and ICMR.

Shahid loves to travel and enjoys reading history. He is also an avid amateur photographer and a (very) erratic blogger.

Keynote speaker

Prof. K. Muniyappa

Prof. Muniyappa received his B. Sc. and M.Sc degree with first rank from University of Mysore and PhD (and a medal) from Indian Institute of Science, Bangalore. He carried out his postdoctoral work and served as a junior faculty at Yale University School of Medicine, USA. During sabbatical, he has served as American Cancer Society Visiting Professor at the University of Washington, Seattle, and held similar positions at Medical Research Council, London, Osaka University, Japan, and University of Sydney, Australia. He is currently serving as Professor and J. C. Bose National Fellow, and Chairman of the National Research Associate Programs of the Department of Biotechnology, GoI, New Delhi.

He has played a pivotal role in establishing and nurturing DBT postdoctoral training programs in biotechnology and life sciences. These have set the benchmarks for training basic and clinical scientists and engineers for successful careers in science and technology. In addition, he founded an innovative Integrated Ph D program in biological sciences at IISc and has helped to start similar programs at several Institutes/Universities elsewhere in India. He has delivered many invited lectures, including plenary and named lectures at prestigious universities and institutions, international conferences in USA, Canada, Australia, Germany, UK, France, Brussels, Switzerland, Brazil, Argentina, China, Japan, Singapore, and has served as a Chairman/member of a number of national and international Organizing/ Advisory/Review Committees.

Prof. Muniyappa has received a number of national and international prizes and awards: To mention a few, Karnataka Rajyostava Award, S. S. Bhatnagar prize, IISc Alumni Award for Excellence in Research, J. C. Bose National Fellowship, Sir M. Visvesvaraya Award for life-time contributions to S & T by GoK, Kempe Gowda award for persons of eminence, Golden Jubilee award of the University of Mysore, Prof. Vishwanath Memorial award, American Cancer Society Eleanor Roosevelt award, Yamagiwa International Cancer award and the Rockefeller Foundation Career Development Award. He is an elected Fellow of all the major science Academies in India, Fellow of The World Academy of Sciences, the Founding Member of the Karnataka State Academy for Science and Technology and member of the Karnataka Vision Group on science and technology. He has been the Chairman/Member of several Task Force, Program Advisory and Award committees of DBT, CSIR, ICMR, DST, UGC, UPSC and TWAS, and faculty/scientist selection committees of several Universities and National Research Institutes. His research interests encompass various aspects of chromosome biology in normal and disease cells, and other interests include capacity building in higher education and research.

TRAINING OF POSTDOCTORAL RESEARCHERS FOR CAREERS IN RESEARCH AND HIGHER EDUCATION IN INDIA

K. Muniyappa
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The importance of well-trained workforce of postdoctoral scientists to science, technology and for other sectors of the society has been recognized world over. While many developed countries have implemented well-structured postdoctoral training programs to maintain excellence in science and engineering, in the Indian context they were rare until quite recently. The training programs are especially important in light of increasing global competition for the best students and scholars. The DBT postdoctoral training program in biotechnology and life sciences founded in 2001 (and a similar program dedicated for the NE region founded in 2010) has become an effective program and has succeeded in retaining a significant number of trained postdoctoral fellows in India. It is possible that the elements of this successful program may be transferable to other areas of science and engineering in India.

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Abstracts

Hakeem Abdul Hameed Post-Doctoral Research Gold Medal Award Session

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AP-01

TARGETING MYCOBACTERIAL CHAPERONIC PROTEINS USING FDA APPROVED DRUGS AND NANOPARTICLE: INTERESTING LEADS FOR NOVEL MOLECULAR INTERVENTIONS AGAINST DRUG TOLERANCE IN TUBERCULOSIS

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Approximately 60% of all hospital associated infections, over one million cases per year, are due to biofilms that cause recalcitrance of infections resulting in prolonged hospitalization. Microbial biofilm infections have propensity to evade host immune system causing chronic infections. Biofilms formed by Mycobacterium harbor several non-tuberculous bacteria as well that may lead to secondary manifestations of TB. Evidence suggests that survival of many environmental and pathogenic microbial species is influenced by their ability to develop subpopulation of persister cells within surface-associated multicellular communities called biofilms. These persister cells exhibit upto 500 times higher minimum inhibitory concentration (MIC) that confers drug tolerance. The persistence of *Mycobacterium tuberculosis (M. tb)* against antibiotics underlines the requirement of multidrug chemotherapy in effective control of tuberculosis (TB). We have characterized several key genes in *M. tb*, including a novel *M. tb* Cyclophilin, which acts as molecular chaperon, is essential for survival of *M. tb*. and plays key role in biofilm formation. Repurposing FDA approved drugs could expedite our efforts to develop new arsenal of drugs against the growing menance of drug tolerance in *M. tb*. We have screened US FDA approved drugs based on *in silico* interaction studies with *M. tb* Cyclophilin. We have also tested the efficacy of nanoparticles on biofilm formation and *M. tb* survival. Surface plasmon resonance (SPR) studies confirmed high degree of interaction of *M. tb* Cyclophilin with FDA approved drugs and nanoparticles. Our results show that targeting *M. tb* Cyclophilin by FDA approved drugs or nanoparticles suppressed biofilm formation. We propose that treatment with FDA approved drugs in combination with first line anti-TB drugs could reduce MIC of existing anti-TB drugs. In a nutshell, targeting *M. tb* Cyclophilin with FDA drugs could improve chemotherapeutic interventions against TB. Our results provide proof of principle that targeting biofilms could be masterstroke required for tackling a wide spectrum of diseases causing microorganisms.

Key words: *Mycobacterium tuberculosis*; Biofilm; Drug Tolerance; Drug repurposing; Nanoparticle

AP-02

TITLE: GENOME OF ENTAMOEBA HISTOLYTICA: HOW STABLE IT IS?

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Entamoeba histolytica is one of the significant causes of enteric diseases especially in the developing world. There are still a lot to be known about its genome and genetic diversity among different strains. Here we have sequenced for the first time the whole genome of a clonal strain of *E. histolytica* i.e. HM-1:IMSS clone-6 using both Illumina HiSeq 2000 and SMRT PacBio RS II sequencing platform. Our effort has significantly improved the available genome data for *E. histolytica* and we could also make a bioinformatics-based prediction of the chromosomal distribution in this organism that was impossible few years back. Here we have also demonstrated an important aspect of genomic plasticity in *E. histolytica*. It is evident from our study that the genome of *E. histolytica* demonstrate enough plasticity and can change even during continuous cultivation in axenic condition.

Key words: Entamoeba; genome; plasticity.

AP-03

COMPARATIVE PROTEOMIC ANALYSIS OF SECRETED EXCRETED ANTIGENS OF THREE STRAINS OF TRYPANOSOMA CRUZI

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Background: *Trypanosoma cruzi*, the blood borne protozoan parasite causing Chagas disease, infects an estimated 8 million people mostly in Latin America and poses a threat to blood supplies in endemic and non-endemic countries such as the U.S. Different strains of parasite are reported to display differences in growth rates, infectivity, tissue tropism, antigenic composition, virulence and morbidity in animal models and susceptibility to chemotherapeutic drugs. Due to the diversity in the clinical expression of infection there have been studies to find biological, biochemical and genetic differences among strains. The identification of proteins secreted by the infective stage of parasite in blood may contribute to a better understanding of the infection process and lead to the development of new diagnostics, drugs and/or vaccines.

Objective: To analyze the secretome of three strains of *T. cruzi*: Columbiana (resistant to benznidazole and of genotype I); 0704 (isolated by hemoculture from a US blood donor and of genotype I); and Tulahuen (genotype VI).

Methods: Culture supernatants of *T. cruzi* infected NIH-3T3 cells, containing trypomastigote excreted/secreted antigens (TESA) were collected, concentrated and trypsinized. The resulting peptides were analyzed by quantitative 2D nano-LC MS/MS.

Results: Results of proteomic analysis identified 1,438 proteins from Tulahuen; 1,157 from 0704, and 973 from Columbiana. The percentage of proteins having signal peptide and transmembrane motifs were 57.4%, 62.3% and 65%, respectively. Further, the secretomes of Columbiana and 0704 strains were the most similar (same genotype). In our animal model, C57BL/6 mice showed high susceptibility to the Columbiana strain, with blood parasitemia reaching 1.2x10e6 parasites/ml. The 0704 isolate is less virulent, with maximum parasitemia of 2.8x10e5 parasites/ml and the reference strain

Tulahuen results in no detectable parasites in blood by microscopy (< 1.5x10e4 parasites/ml).

Conclusions: We have used proteomics approach to compare the secretome of three strains of *T. cruzi*. In this study we identified some unique proteins, which could represent virulence factors, and also some conserved proteins which could be exploited for diagnostic and vaccine purposes.

Disclaimer: This presentation reflects the views of the authors and should not be construed to represent FDA's views or policies.

AP-04

OCTREOTIDE CONJUGATED DUAL LOADED NANOPARTICLES OF TOPOTECAN AND THYMOQUINONE FOR TARGETING BREAST CANCER: FORMULATION, CHARACTERIZATION AND *IN VIVO* CYTOTOXICITY ASSESSMENT

Devina Verma[1], Sushama Talegaonkar[2], Zeenat Iqbal[1]
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Effective cancer therapy by an anticancer drug relies on it's ability to reach the diseased site in its most active form and target multiple cancer hallmarks. However, the insufficiency of the classical anticancer drugs to target multiple pathways of cancer progression and the inability of the conventional delivery systems to carry the payload to the tumor site results in severe side effects and sub-optimal outcome necessitating the exploration of traditional medicine and measures to improve targeted delivery to treat this highly complex disease. The current study aims at utilizing octreotide as the targeting ligand for decorating the PLGA nanoparticle system incorporating a natural bioactive thymoquinone with a well-established anticancer drug, topotecan, to target the somatostatin receptors overexpressed in breast cancer. Topotecan and thymoquinone loaded nanoparticles (TP-TY NPs) were formulated by double emulsion solvent evaporation and decorated with octreotide by carbodiimide chemical conjugation. The optimized particles were the characterized in terms of particle size, zeta potential, reconstitution time, entrapment and loading efficiency. The optimized particles were then evaluated by ex-vivo cytotoxicity analysis in MCF-7, followed by *in vivo* analysis in Ehrlich ascites tumor model. The optimized Oct-TP-TY NPs had a particles size and polydispersity index of 245.7±3.5 and 0.204± 0.18 respectively, zeta potential of -1.08mV and reconstituted in less than 15 seconds. % loading and entrapment efficiency was 37±1.2 and 2.8±0.65 respectively for topotecan and 62.2±1.2 and 6.2±0.5 respectively for thymoquinone. The decorated particles showed a significantly lower IC 50 (1.9±0.4ug/ml) as compared to its undecorated counterpart (3.5±1.5ug/ml) or free drug solution (16.1±1.8ug/ml). This was further supported by higher cellular uptake of the former. Finally, Oct-TP-TY NPs resulted in marked tumor regression as compared to TP-TY NPs and free drug solution with no or minimal detrimental effect on the haematological profile. In conclusion, the biological evaluation generated proof of evidence in support of the combination of a synthetic and a natural bioactive in an octreotide decorated nanoparticle system for targeted breast cancer therapy.

Keywords: nanoparticles; combination therapy; targeting; breast cancer; drug delivery

AP-05

MICRORNA-200A OVEREXPRESSION AS A PROGNOSTIC MARKER IN BREAST CANCER PATIENTS

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Background: Breast cancer is most common female malignant tumor and the incidence rate of breast cancer is increasing in the developing countries. MicroRNA-200a control post-transcriptional gene expression causing mRNA cleavage, and translational repression.

Objective: Clinical importance of serum miRNA-200a expression and therapy response in breast cancer patients.

Methodological approach: Histo-pathologically confirmed newly diagnosed 75 breast cancer patients were included, patient's blood sample were collected after and before therapy in plain vials and serum were separated for microRNA-200a expression study by quantitative real time PCR method.

Findings: In patients, more than 11 mean fold increased microRNA-200a expression was observed compare to controls. Increased microRNA 200a expression was observed to be associated with advanced stage (14.38 fold), lymph node involvement (13.81 fold) and distant organ metastases (22.21 fold). After neoadjuvant therapy had significant impact on reduction in miRNA-200a expression (p=0.0007). Patients treated with neoadjuvant therapy had significant impact on reduction of miRNA-200a expression and was found to be significantly associated with different clinicopathological feature of patients such as histopathological grade 2 &3, post menopause, TNM stage, lymph node, distant organ metastases, ER, PR, Her2/neu status. It was observed that increased miRNA-200a expression was found to be significantly associated with worse survival of breast cancer patients (p=0.02). ROC analysis showed that MicroRNA-200a expression may be used as potential predictive marker for breast cancer prognosis.

Discussion and Conclusion: Study suggested that MicroRNA-200a over-expression was associated with response to neoadjuvant therapy may be consider as primary treatment choice.

AP-06

IMMUNOMODULATORY ROLE OF ARGD FROM MYCOBACTERIUM TUBERCULOSIS: A MOONLIGHTING FUNCTION

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Rv1655 (ArgD) codes for enzyme ArgD belonging to Arginine synthesis pathway and also found to be essential for the growth and survival of the *Mycobacterium tuberculosis* (M.tb). Based on in-silico analysis which predicts Rv1655 gene product ArgD to be antigenic and its cell wall localization, we studied its effect in immune modulation in RAW 264.7 mice macrophage cell line. Our finding demonstrates moonlighting function of ArgD in immune modulation, which, otherwise is an enzyme. It induces pro-inflammatory cytokines TNF-α, IL-6 and IL-12 along with iNOS and induces apoptosis. It also stimulates macrophages for antigen presentation. These pro-inflammatory responses are NFkB mediated through TLR4. As predicted by in-silico analysis, it has been found to be a strong B-cell antigen in mice. These results suggest its probable subunit vaccine candidature. Also, these findings are significant in a way that it adds up to the information about moonlight function of proteins from important virulent bacteria. It will help in collection of data and may help in development of in-silico methods for prediction of moonlighting function of evolutionary and functionally linked proteins.

Keywords: *Mycobacterium tuberculosis*; moonlighting; pro-inflammatory response; virulence; vaccine

AP-07

QUERCETIN 3, 3', 4', 5, 7-*O*- PENTASULFATE (QPS) AS A PROMISING ANTIPLATELET AND ANTITHROMBOTIC AGENT

Neha Gupta[1], Qudsia Rashid[1], Mohammad Abid[2], Mohammad Zahid Ashraf, Mohamad Aman Jairajpuri[1]
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Introduction-Venous thromboembolism remains a major contributor to global health burden. Current antithrombotic treatment strategies which predominantly rely upon heparin and its derivatives, possess several complications including excessive bleeding. The quest for design of new antithrombotic molecules with reduced side effects envisages chemical modification of natural scaffolds like flavonoid for development of better antithrombotic/thromoprophylactic agents.

Objectives- Synthesis, Characterization of polysulfated derivative of Quercetin and testing its in vitro and in vivo antithrombotic potential.

Methodology-The pentasulfated derivative of known flavanoid Quercetin, i.e. – Quercetin 3, 3', 4', 5, 7-O-pentasulfate (QPS) was synthesized, purified with HPLC and its structure was validated using FTIR, NMR and mass spectrometry. For in vitro anticoagulant assays, plasma was isolated from human blood. Activated Partial thromboplastin time (APTT), Prothrombin Time (PT) and Thrombin Time (TT) were measured using commercial kits with samples pre-incubated with different concentration of QPS (10uM, 1mM, 2mM, 4mM, 7mM) and Quercetin. In vivo antithrombotic potential was tested using rat model for venous thrombosis (VT). Rats were injected with purified QPS at a dosage of (0.5 mg/kg), prior to thrombus induction and size of thrombus formed was measured and compared to vehicle controls. Anti -platelet action of QPS was tested by whole blood platelet aggregation assay.

Results- The clotting times for non-sulfated Quercetin and control plasma were found to be similar, even at maximum concentration tested. However, the presence of QPS si gni fi cantl y prolonged APTT and PT with minimal effect on TT. Intravenous administration of QPS remarkably reduced thrombus formation in rat model of VT. Additionally, QPS injected rats also showed prolonged APTT with profound effect on PT as compared vehicle treated controls. Platelets isolated from QPS injected rats exhibited significant reduction in aggregation as compar ed to those from vehicle controls.

Conclusion- Current observations propose QPS as a lead antithrombotic agent with anticoagulant and antiplatelet action.

Key words: Thrombosis; Antithrombotics; Quercetin pentasulfate; Antiplatelet

AP-08

AMYLOID BETA INDUCED ASTROGLIAL ACTIVATION AND NEUROTOXICITY IN RAT BRAIN

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Amyloid-beta (Aβ) peptide accumulation in the brain is a pathological hallmark of Alzheimer's disease (AD), which is a devastating age-related neurodegenerative disease. Aging also reduces the antioxidant defenses and induces oxidative stress. Furthermore, glial cells provide vital support to neurons; therefore, the toxic effects of Aβ on glial cells might promote neurodegenerative changes that lead to AD. We investigated the Aβ $_{(1-42)}$-induced oxidative stress, glial cells activation and apoptosis in rat brain. Aβ $_{(1-42)}$ was administered bilaterally through intra-cerebro-ventricular (icv) injection in the brain of adult male wistar rat. Biochemical alterations were assessed by estimating the levels of reduced glutathione (GSH) and nitrite levels estimation. Alterations in neuronal and glial cells were assessed by the expression of respective neuronal and glial cell markers such as microtubule associated protein-2 (MAP-2), glial fibrillar acidic protein (GFAP) and CD11b. Apoptotic death of neurons was assessed by the expression of end point apoptotic marker protein- caspase-3. Aβ $_{(1-42)}$ administration to rat brain caused significant decrease in glutathione levels and augmented nitrite levels. Aβ $_{(1-42)}$ administration also caused significantly decreased expression of neuronal marker protein such as MAP-2 and increased expression of glial cell marker proteins such as GFAP and CD11b. Aβ $_{(1-42)}$ administration also caused increased expression of caspase-3. These findings suggest that astroglial activation and apoptosis play an important role in Amyloid-beta induced biochemical alterations and neurotoxicity in rat brain.

Keywords: Amyloid-beta; oxidative stress; glial activation, neurotoxicity; apoptosis.

AP-09

TERMITOMYCES SP. OE 147: A PROMISING RESOURCE FOR THE BIOREMEDIATION OF TEXTILE dyes

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Termitomyces sp. OE 147 culture filtrate are rich in cellobiose dehydrogenase and laccases and its effectiveness has in evaluated in decolouration and degradation of Reactive blue (RB) 21. About 35% decolouration was achieved at low volumes of the culture supernatant without addition of external redox mediators. An optimized dye to culture fluid ratio (75 ppm: 0.1 ml) at a pH of 4–5 resulted in removal of colour by 60%. The degradation products of RB21 were analyzed by Electron Spray Ionization-Mass Spectrometry (ESI-MS) and several small molecules (of m/z 106–199) were detected. These were concluded to be o-Xylene, 2,3-Dihydro-1Hisoindole, Isoindole-1,3-dione, 2,Benzenesulfonyl-ethanol, (4-Hydroxy-phenyl)-sulfamic acid, 2,3-Dihydro-1H-isoindole-5-sulfonic acid and proposed to result from joint action of cellobiose dehydrogenase, laccase, peroxidases and unidentified oxidoreductases present in the culture fluids. Based on the products formed and the known reactions of these enzymes, a degradation pathway was proposed for RB21. The culture fluid was also effective in decolouration (by about 50%) and detoxification (by ~25%) of the combined effluent collected from a local mill indicating a treatment process that bypasses use of H_2O_2 and toxic mediators.

Keywords:
(Termitomyces sp. OE 147; Fungal culture filtrates; Complex phthalocyanine dyes; Cellobiose dehydrogenase/laccase; Textile effluents)

AP-10

PREDICTING NEUROLOGICAL ADVERSE DRUG REACTIONS BASED ON BIOLOGICAL, CHEMICAL AND PHENOTYPIC PROPERTIES OF DRUGS USING MACHINE LEARNING MODELS

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Adverse drug reactions (ADRs) have become one of the primary reasons for the failure of drugs and a leading cause of deaths. Owing to the severe effects of ADRs, there is an urgent need for the generation of effective models which can accurately predict ADRs during early stages of drug development based on integration of various features of drugs. In the current study, we have focused on neurological ADRs and have used various properties of drugs that include biological properties (targets, transporters and enzymes), chemical properties (substructure fingerprints), phenotypic properties (side effects and therapeutic indications) and a combinations of the two and three levels of features. We employed relief-based feature selection technique to identify relevant properties and used machine learning approach to generated learned model systems which would predict neurological ADRs prior to preclinical testing. Additionally, in order to explain the efficiency and applicability of the models, we tested them to predict the ADRs for already existing anti-Alzheimer drugs and uncharacterized drugs, respectively in side effect resource (SIDER) database. The generated models were highly accurate and our results showed that the models based on chemical (accuracy 93.20%), phenotypic (accuracy 92.41%) and combination of three properties (accuracy 94.18%) were highly accurate while the models based on biological properties (accuracy 82.11%) were highly informative.

Keywords: Adverse drug reactions; anti-Alzheimer; neurological; SIDER; substructure fingerprints

AP-11

MICROBE-INDUCED COLORECTAL CANCER GENESIS: PERSISTENT PRESENCE OF COMMENSAL NON-PATHOGENIC E. COLI IN INSTESTINAL CELLS INDUCES MALIGNANT STEMNESS AND TUMORIGENESIS.

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Colorectal cancer (CRC) is a serious global health issue accounting for approximately one million new cases annually. Gut microbial dysbiosis is a crucial environmental factor implicated in the genesis and propagation of CRC. E.coli, a normal inhabitant of gut, has been identified as a major protagonist in microbe-induced CRC. Its tumour-promoting attribute is normally linked to its virulence-related properties related to mammalian cell invasion and expression of DNA-damaging genotoxins. Using an engineered constitutively invasive variant of nonpathogenic E. coli, we demonstrate that chronic presence of internalized E. coli, even in the absence of virulence traits, leads to oncogenic transformation of intestinal epithelial cells. Instead of genomic damage, tumorigenic effect is mediated by expansion of cancer stem cell (CSC) population by active de-differentiation of lineage-committed mature intestinal cells, in both non-transformed and cancerous cell lines. Enriched CSC fraction remains stable with long-term self-renewal capacity in the absence of the instigating bacteria, fosters stemness traits in unexposed host cells through secreted factors and is specific to intestinal lineage cells and non-pathogenic bacteria. Expanded tumorigenic CSC population is marked by enhanced malignancy traits and robust tumorigenic potential, both in vitro and in animal xenograft model. Mechanistically, host cell invasion leads to realignment of multiple host signal transduction cascades- activation of Ras/PI3K/PTEN/Akt pathway with simultaneous repression of Ras/Raf/Mek/Erk pathway, leading to mutually re-enforcing NF-κB and β-catenin activation through reciprocal modulation of Nod1/Rip2 and TLR/MyD88 pathway, which facilitates the de-differentiation of committed, differentiated cells to CSCs. The dynamics and consequences of entry and chronic residence of avirulent host microbial species in human intestinal tissue offers novel and uncharacterized insights into microbe–driven CRC tumorigenesis and allow opportunities to discover attractive targets for therapeutic or preventive intervention.

Keywords: Colorectal cancer; gut microbiota; dysbiosis; de-differentiation; cancer stem cells

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Abstracts

Oral Presentation Session

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OP-01

DEVELOPMENT OF BORON COMPOUNDS FOR abnct (ACCELERATOR BASED BORON NEUTRON CAPTURE THERAPHY): MOLECULAR IMAGING WITH PET AND DRUG DISCOVERY.

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Boron Neutron Capture Therapy (BNCT) is an emerging form of cancer therapy based on the neutron capture by nuclei of boron-10 (^{10}B) selectively delivered to tumor cells, that is effective for therapy resistant tumors, leaving the surrounding normal tissues intact. Hence, when boron atoms capture a neutron they immediately undergo fission to produce a lithium atom and an alpha particle, which destroys the tumor cells. The main two 10B compounds, sodium borocaptate (BSH) and 4-borono-L-phenylalanine (L-BPA) are clinically used for BNCT and their effectiveness is reported by the reactor based-BNCT. L-BPA, in particular, has been widely used for the treatment of not only melanoma but also brain tumor and head and neck cancer because it can be taken up selectively by tumor cells through an amino acid transporter. Unlike conventional BNCT facilities which use nuclear reactors as a neutron beam source, a BNCT system that uses an accelerator is being developed which opens the possibility of installing the beam in a hospital for clinical implementation. The objective of this study to establish the convenient new synthetic methodology for the development of ^{10}B compounds for accelerator based BNCT. In addition, [^{18}F]-fluoro boronophenylalanine [^{18}F]FBPA, which is an analogue of BPA to obtain positron emission tomography (PET) radiotracer in order to apply diagnostic and therapeutic strategy in BNCT.

Keywords: BNCT; Accelerator; Tumor, PET, L-BPA, FBPA

OP-02

IN SILICO APPROACH FOR BIOREMEDIATION OF ARSENIC BY STRUCTURE PREDICTION AND DOCKING STUDIES OF ARSENITE OXIDASE FROM PSEUDOMONAS STUTZERI TS44

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Pseudomonas stutzeri TS44 is a moderately halotolerant, arsenite-oxidizing bacterium, containing genes for arsenite oxidation, arsenic resistance, and ectoine/hydroxyectoine biosynthesis. This paper reports in silico studies to understand bioremediation to eliminate toxic metal arsenic in water, air and soil by arsenite oxidase (AO), the bacterial enzyme from *P. stutzeri* TS44 that can be used for a low cost and eco-friendly removal of arsenite from the environment. To understand the activity of AO in elimination of arsenite, sequence analysis was carried out and homologs, orthologs, domains, family, and conserved residues were identified followed by model generation using various homology modeling tools. The generated models were validated for the best quality protein structure and the best model was used for further optimization using energy minimization approach. Molecular docking studies were performed to study the binding interaction of AO with arsenite. The study predicts and validates the 3D structure of *P. stutzeri* TS44 arsenite oxidase and reports four active site residues (His197, Glu205, Arg421, and His425) from a close structural homolog of AO from *A. faecalis* (PDB ID: 1G8K_A). The molecular docking studies suggested the formation of a stable complex and in silico site-directed mutagenesis revealed the importance of Arg421, which resulted in a decrease in stability of the complex when mutated. The study implicates *P. stutzeri* TS44 arsenite oxidase as a non virulent protein for low cost and eco-friendly bioremediation of arsenite.

Keywords: Bioremidiation; docking; active site; *Pseudomonas stutzeri*

OP-03

ABUNDANCE OF TREG CELLS IN ORAL CANCER PATIENTS AND EFFECTS OF THEIR INHIBITION ON GROWTH OF CANCER CELLS

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Oral squamous cell carcinoma (OSCC) is one of the major cancers affecting in Asian countries. The main causative factor has been tobacco habit. It has been reported that immune dysfunction in these patients is one of the major factors for tumor growth and dissemination that affects disease free survival of the patients.

We assessed the phenotypic and functional characteristics of Regulatory T (Treg) CD4+CD25+FoxP3+subsets in patients with OSCC by multicoloured flow cytometry. Subsequently we investigated the effects their inhibition via TDG on growth of OSCC cell lines in vitro.

An increased ($p<0.05$) prevalence of Treg phenotypes (CD4+CD25+, CD4+FoxP3+, CD8+FoxP3+, CD4+CD25+FoxP3+) was observed in the peripheral circulation of OSCC patients that positively correlated with clinicopathological features. The increased frequency of CD4+CD8+CD25+FoxP3+, a unique T cell subset, CTLA4+, GITR+, NrP1+ and granzyme B+ (GzmB) Tregs also showed a significantly higher prevalence in OSCC patients. Functionally CD4+FoxP3+ Tregs showed skewed expression of IL2, IL10 and IL35 in patients as compared with the normal controls. Higher expression of TGFβ in tumor tissues suggests their dominant role in the up regulation of differentiation of Tregs from naive T cells in the tumor bearing host. Further, enhanced expression of CCR5 and CCR7 on Tregs with up regulation of their ligands (CCL5, CCL19 and CCL21) in tumor cells indicates efficient recruitment and trafficking of Tregs to the tumor site. Treatment with βGBP showed growth promoting effects on Tregs and oral cancer cells. However, the treatment with its inhibitor TDG resulted in inhibition of Treg subsets and also decreased the frequency of IL10+ and IL35+ Tregs indicating its immunomodulatory effects.

Hence, it seems reasonable to assume that modulation of functional dynamics of selective Treg subsets may be useful in enhancing anti tumor immunity and developing immunotherapeutic strategies for patients with oral squamous cell carcinoma.

OP-04

VALIDATION OF MARKETED PROBIOTIC FORMULATION: A REALITY OR A NIGHTMARE

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Statement of the problem: There has been an upsurge of active research in the field of probiotics due to traditional history of improvement of health using natural health claiming products as well as due to rapidly increasing commercial interest in the probiotic products. Majority of the research is going on to understand the ability of particular probiotic organisms and to characterize specific probiotic organisms as per their specific health benefits. **T**he use of probiotics is grasping significant increase in medical profession. Day by day pharmaceutical formulations based upon probiotic preparations are entering to the global market. Hence it is important to manage its use by introducing appropriate regulatory control as the efficiency of these natural products depends on understanding the nature of competition between various species or strains. **Methodology and orientation:** The present study was aimed to validate and identify the presence of labeled bacterial species in the selected marketed formulation. The marketed formulation was procured from the market and critically reviewed for the label. Later the bacterial species were isolated and characterized using polyphasic identification (including phenotypic, biochemical as well as genotypic techniques especially 16s RNA sequencing) approach from procured formulation. Finally the identification was confirmed by EzTexan database and laser gene software. **Findings:** The isolated bacteria belong to *Bacillus* which was gram positive, nonmotile and catalase negative. As per the data analysis *i.e.* percentage homology and phylogenetic analysis, it is confirmed that the species is *Bacillus coagulans*. But as per the label of marketed formulation it had *Lactobacillus sporogenes.* **Conclusion and significance:** This type of study is essential for the probiotic characterization of all those marketed formulations which are being sold in the market without any regulatory control.

Keywords: Probiotics; Validation; 16s RNA sequencing

OP-05

OP-06 PROTECTIVE ROLE OF *HOTTUYNIA CORDATA* IN RESPONSE TO STREPTOZOTOCIN-INDUCED DIABETES *VIA* THE MITOCHONDRIAL DEPENDENT PATHWAY

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Increasing evidences in both experimental and clinical studies suggest that oxidative stress is involved in the pathogenesis of diabetic tissue damage. Pancreatic β-cell death is the cause of decreased insulin production in diabetes. Streptozotocin (STZ) is widely used to induce experimental diabetes due to its ability to selectively target and destroy insulin producing pancreatic β-cells via the formation of both reactive oxygen species (ROS) and RNS (reactive nitrogen species)[1]. This study investigated the prophylactic role of ethanol extract of *Hottuynia cordata* Thunb., Saururaceae against STZ-induced diabetes in the liver and pancreatic tissue of the Charls Foster strain rats (as a working model).We observed that STZ administration (at a dose of 65 mg/kg, bodyweight, i.p)[2] caused increased production of both ROS and RNS in the above mentioned tissue of experimental animals. This, over production of mitochondrial ROS accumulated in the mitochondrial matrix, leads to collapse of mitochondrial membrane potential ($\Delta\Psi_m$), decrease of ATP production and subsequent activation of caspase-3 which plays a key role in the mitochondrion dependent apoptotic cell death pathway. Treatment of animals with *H. cordata* (at a dose of 200, 400 mg/kg, p.o.) significantly inhibited STZ-induced alterations of these parameters. Thus, the present investigation justified the potential antidiabetic activity of *H. cordata*, which may play a pivotal role in developing evidence based herbal formulation which may benefit patients suffering from diabetes.

OP-06

DEVELOPMENT AND CHARACTERIZATION OF HYALURONIC ACID MODIFIED ENGINEERED NANOCONSTRUCT FOR IMPROVED EFFICACY IN SOLID TUMOR

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Cisplatin is a potent and widely used chemotherapeutic agent to treat a variety of cancer including, ovarian, cervical, lung and head and neck. However, its clinical success is limited owing to the dose-dependent adverse effects, mainly nephrotoxicity, and acquired resistance to cisplatin. In this study, cisplatin loaded hyaluronic acid (HA) functionalized poly (lactic-co-glycolic acid)- poly (ethylene glycol) nanoparticles (CP-HA-PLGA-PEG-NPs) were fabricated using double emulsion solvent evaporation method to target CD44 receptor expressed on cancerous cells. The developed nanoconstructs were characterized for various *in vitro* characteristics, including size distribution, zeta potential, morphology, drug loading and *in vitro* release. The HA content on the HA-PLGA-PEG-NPs was quantified by a turbidimetric method. The *in vitro* anticancer study in human ovarian cancer (SKOV-3) cells showed significantly ($p<0.05$) higher cytotoxicity of CP-HA-PLGA-PEG NPs as compared to free cisplatin and non-targeted nanoparticles (CP-PLGA-PEG NPs). Further, laser scanning confocal microscopy revealed that there was enhanced cellular uptake of HA-PLGA-PEG NPs in CD44-over expressing ovarian cancer cell line (SKOV-3). The *in vivo* antitumor activity of CP-HA-PLGA-PEG-NPs was significantly ($p<0.05$) higher than free cisplatin and CP-PLGA-PEG-NPs in Ehrlich tumor (solid) bearing mice. The results demonstrated the potential of target specific nanoconstruct of cisplatin in the improved cancer chemotherapy.

Key words: CD44 receptors; hyaluronic acid; nanoconstruct; targeted drug delivery

OP-07

ORAL LIPIDIC NANOPARTICLES OF DIMETHYL FUMARATE ALONG WITH SESAMOL: ENHANCED PHARMACOLOGICAL PROFILE FOR RELAPSING MULTIPLE SCLEROSIS

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Introduction: Almost 2.5 million people have been affected by multiple sclerosis worldwide including India in the last decade. Dimethyl Fumarate is frequently available in the market in the different doses for the treatment of relapsing multiple sclerosis. It is associated with issues like multiple dosing, gastric intolerance and poor brain permeability. It is envisioned to develop lipid based carrier along with sesamol to enhance brain permeability and improve gastric compatibility.

Methods: Pre-screening of lipids (06 formulations), screening of the formulation attributes (08 formulations) and optimization (20 formulations) of the formulation were performed and validated with particle size, drug release and entrapment efficiency using design expert software trial version 9.0.3.1. Optimized solid lipid nanoparticles were altered and formula was redesigned for sesamol tagging and characterized for entrapment, drug loading and in-vitro release studies. Caco-2 and SH-SY5Y cellular uptake studies were performed. In-vivo Pharmacokinetic and biodistribution studies in Wistar rats were also done. Cuprizone induced demyelination were employed to perform behavioral and histopathological studies. Luxol fast blue dye was used to stain the demyelination and remyelination part in brain.

Results: Particle size, zeta potential and PDI for DMF-sesamol loaded solid lipid nanoparticles was found to be 139.43 ± 5.58, -4.09 and 0.321, respectively. Entrapment efficiency and drug loading was observed 84.44 ± 2.53 and 21.11 ± 0.64, respectively. Sustain release with Higuchian profile was observed to that of pure drug. Enhanced oral bioavailability, caco-2 and SH-SY5Y cellular permeability, and GIT compatibility were found to be superior to that of conventional formulations. Enhanced brain permeability was observed in in-vivo studies. Behavioral functions like grip strength and motor co-ordination of the Laca mice for optimized formulation are superior to pure drug and disease induced group.

Discussion: Enhanced remyelination and bioavailability, brain and intestinal permeability and GIT compatibility is proved that solid lipid nanoparticles along with sesamol are the better option for relapsing multiple sclerosis. SLNs with antioxidents like sesamol may be a promising alternative carrier for management of neurological disorders like relapsing multiple sclerosis employing DMF.

OP-08

SAFE AND ECONOMIC SUBSTITUTE OF HERBAL ORIGIN FROM *CITRUS PARADISI* (GRAPE FRUIT) FOR EXISTING ANTI-ANXIETY DRUG MODULES

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Persistent stress is known to lead to anxiety and unhealthy behavior. Benzodiazepines are used as a first line of treatment however difficulties with pharmacotherapy of anxiety disorders such as dependence and low response rate encourage researchers to find new approaches. A number of studies have been done on antianxiety activity of medicinal plants but major constraint is non suitability of the tested plant material for human use and non availability of plant materials in bulk at economical rates. This study entails to development of safe anti-anxiety economic drug of easy availability. In normal course aromatic oils from plants are being used however authors selected plant *Citrus paradisi* available worldwide and tested the anti-anxiety activity of four varieties of leaf extracts as leaf extracts can be made available at commercial scale. All the selected varieties have demonstrated a potential diazepam like effect in methanolic extracts at a dose of 100 mg/kg body weight using elevated plus maze model. Results showed no mortality/profound toxic reaction at dose up to 2000 mg/kg body weight that indirectly reflects the safety profile of the leaf extracts. Antianxiety activity guided fractionation of methanol extracts led to the isolation of six flavonoids (Rutin, Quercetin, Kaempferol, Myricetin, Naringenin and Fisetin). The isolated compounds (10 mg/kg, p.o.) exhibited significant anxiolytic activity in mice using Y Maze, light/dark model and hole-board model of anxiety. The study confirms the presence of six flavonoids responsible for anti-anxiety activity of leaves of different varieties of *Citrus paradisi*. Further efforts are needed to prepare an antianxiety formulation from the leaf extracts.

Keywords: *Citrus paradisi*; Flavonoids; Bioactivity; Anti-anxiety; Grapefruit

OP-09

A MECHANISM OF SYNERGISTIC EFFECT OF STREPTOMYCIN AND CEFOTAXIME ON CTX-M-15 TYPE β-LACTAMASE PRODUCING STRAIN OF *E. CLOACAE*: A FIRST REPORT

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A blaCTX-M-15 gene is one of the most prevalent resistant marker found in member of enterobacteriaceae. It encodes cefotaxime hydrolysing β-lactamase-15 (CTX-M-15) causing resistance against beta lactam antibiotics. Since single antibiotic therapy fails to control infection caused by multidrug resistance strain, therefore combination therapy was came into practice as an effective treatment. We have first time explained the mechanism where two antibiotics of different classes work against resistant strains. Binding parameters obtained by spectroscopic approach showed significant interaction and complex formation between drugs and CTX-M-15 enzyme with decreased ksv and kq values. CD analysis showed altered conformation and significant changes in alpha helical content of CTX-M-15 enzyme on interaction with streptomycin in combination with cephalosporin. Steady state kinetics revealed decrease in hydrolytic efficiency of enzyme to about 27% by cooperative binding behaviour upon sequential treatment of enzyme with streptomycin and cefotaxime. Therefore, the study concludes that combination therapy against CTX-M-15 producing strain with Cefotaxime/Streptomycin in 1:10 molar ratio, decreases CTX-M-15 efficiency significantly because of the fact that streptomycin induced structural changes in CTX-M-15 hence cefotaxime was not properly bound on its active site for hydrolysis rather available for the target to inhibit bacterial cells.

Keywords: Antibiotic resistance; synergy; beta-lactamase; streptomycin; cefotaxime.

OP-10

ANTIOXIDANT DEFENSE RESPONSE AND LIPID PEROXIDATION PROFILE OF TOMATO (*LYCOPERSICON ESCULENTUM MILL.*) CHALLENGED WITH TOXIC METABOLITES (TEA, AOH AND AME) OF *ALTERNARIA ALTERNATA*

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The present study investigates the phytotoxic effect of metabolites produced by phytopathogenic fungi *Alternaria alternata*. We have evaluated the physiological response associated with defence signalling network and the biochemical and molecular changes relevant to three potent phytotoxins including tenuazonic acid, alternariol, and alternariol monomethyl ether. The necrotic lesions produced by pathogen were found to be as similar as those infiltrated with these toxins in tomato plants. The biochemical changes due to toxins induced cell death are characterized by increased H_2O_2 production, increased activity of defence related antioxidative enzymes such as SOD, APx, CAT and GR in order to maintain the level of H_2O_2 produced due to these toxins. APx, CAT and GR were increased for first 48 hours and then decreased furthermore whereas the SOD activity was found to be higher for the first 24 hours and then decreased successively. The isoenzymatic profile of SOD and CAT were found to be higher in pathogen treated plants compared to control. The cellular damages due to phytotoxic effect include lipid peroxidation as evidenced by increased MDA content and reduced chlorophyll content. The assessments of cell death were measured by Evans blue dye and the DAB staining predicts the possible sites of H_2O_2 accumulation as remarkable from reddish brown coloration of tissues ultimately leading to cell death and DNA damages. Thus, a fine tuning occurs for the defense related antioxidative enzymes against detoxification of key ROS molecules and are effectively regulated in tomato plant against pathogen treated and metabolites challenged oxidative stress.

Key words: *Alternaria alternata*; pathogen; phytotoxic metabolites; toxins; polymerase chain reaction (PCR)

OP-11

RNA-SEQ BASED TRANSCRIPTOME ANALYSIS OF ROOT ENDOPHYTE *PIRIFORMOSPORA INDICA* IN RESPONSE TO SALT STRESS.

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Background: *Piriformospora indica*, a filamentous fungus of the order Sebacinales, is able to make symbiotic interaction with roots of different plant species. Previous reports have established the fact that *P. indica* provides better growth and higher yield to the host plant as well as resistance against biotic and abiotic stresses. High soil salinity, the excess of NaCl, is one of the important environmental factors that limit distribution and productivity of major crops. The need to produce crops with enhanced tolerance to salt stress has been the stimulus for research. *P. indica*-mediated salt tolerance mechanism was found to be linked strongly with the increase in antioxidants under salt stress in barley which attenuates the NaCl-induced lipid peroxidation, metabolic heat efflux, and fatty acid desaturation in barley leaves. Salt stress studies have indicated the promising effect of mutualistic fungi in plants. Therefore, it is vital to identify and functionally characterize salinity stress-related genes of *P. indica* to elucidate the mechanisms underlying halotolerance and develop salinity stress-tolerant plants.

Observations: We have compared the transcriptome of *P. indica* growing under high salt conditions (0.5 M NaCl) with salt free conditions as a control. Approximately 30-40 million 76 bp paired-end reads per sample were obtained using an Illumina NextSeq500. RNA-seq analysis was performed using Bowtie/TopHat/Cufflinks software pipeline. Total 15410 unigenes were generated with n50 value of 3038. A total of 13461 differentially expressed genes (fold change ≧ 2) were identified and 2646 genes were downregulated while 2446 genes were upregulated under high salt condition. We found that the genes involved in different cellular processes,such as metabolism, energy and biosynthetic processes, DNA repair, regulation of protein turnover, transport and salt stress tolerance were changed under high salt condition.

Conclusions: RNA-Seq analyses reveal the significant differences in gene expression in salt-stressed P. indica. Our study shows the complex mechanism of *P. indica* adaption to salt stress and systematic work to cope with the high salinity environmental problems. Thus, our results could be helpful for further investigation of the salt resistance mechanism.

OP-12

BIPHASIC ROS ACCUMULATION AND PROGRAMMED CELL DEATH IN A CYANOBACTERIUM EXPOSED TO SALINITY (NACL AND NA2SO4)

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Salinity is among the detrimental factors that influence the metabolic activities, growth, yield and survival of the organisms. High salinity increases antioxidative activities in plants; however, their significance for overall plant salt tolerance remains to be established. This work provided *in vivo* evidence of salinity induced biphasic reactive oxygen species (ROS) accumulation evoking oxidative stress in the cyanobacterium *Anabaena fertilissima*. Cyanobacterium *A. fertilissima* was selected for the determination of ROS accumulation, photosynthetic O_2 evolution and electron transport activities, detection of apoptotic cells, vitality of cells and GSH assay using DCFHDA staining, polarographic oxygen electrode system, Annexin V-FITC staining, 4,6-diamidino-2-phenylindole (DAPI) and 5′-dithio-bis-(2-nitrobenzoic acid)/GSSG reductase recycling assay respectively. First, a transient increase in ROS (intense and short-lived) was observedwithin 5 min of salt exposure, which peaked within 15 min and reached basal level by 2 h. This was followed by a second relatively long-lived and low magnitude ROS accumulation that started at 4 h of salt stress, attained its maximal at 6 h, followed by a gradual decline but did not attain the basal level by the end of experimentation (12 h). Phase I ROS accumulation timing corresponded to the reaction of cyanobacterial cells to the salt stress, while altered photosynthetic and respiratory parameters corresponded with the phase II ROS generation. Relatively lower magnitude of ROS generation during phase II may be attributed to the rapid activation of robust antioxidative systems in cyanobacteria. Consequently, ROS generation lead to the activation of programmed cell death (PCD) undergoing various apoptotic stages such as externalization of phosphatidylserine, DNA laddering and loss of plasma membrane integrity. *A. fertilissima* exposed to salt in the presence of SO_4^{-} was relatively better equipped to deal with salt stress.

Keywords: salinity; cyanobacteria; oxidative stress; apoptosis

OP-13

EVALUATION OF COLD ACTIVE CELLULASE BASED THREE STRATEGIES FOR BIOETHANOL PRODUCTION FROM PADDY STRAW

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Lignocellulosic biomass is the most abundant renewable resource with 150–170 X 10^9 tons produced annually. Paddy straw is an important agro-waste residue for second generation bioethanol production. In the present work, cold active cellulases produced by psychrotolerant microbes was used to counteract the energy intensive and high cost of the total process. Soil samples collected from Singalila Ridge, Himalayan region were enriched at 5 °C and hydrolytic potential of all nine fungal isolates in terms of cellulases and xylanases were tested under solid state fermentation by using paddy straw and corn stover as a substrate. Psychrotolerant fungi including Isolate *Fusarium tricinctum* SERB5, *Trichoderma lixii* SERB8 and *Aspergillus tubingensis* SERB13 exhibited significantly higher hydrolytic enzyme production. The indigenous cold active cellulase enzyme cocktail was developed by statistical Experimental Mixture Design and optimized for hydrolysis of alkali pretreated paddy straw resulted in maximum sugar yield (473.43 ± 0.18 mg/gds) at 30 °C. The fermentation process was evaluated through three strategies including Separate Hydrolysis and Fermentation (SHF), Simultaneous Saccharification and Fermentation (SSF) and Pre-saccharification and Simultaneous Saccharification and Fermentation (Pre-SSF). The highest ethanol concentration of 32.5 g/L with theoretical yield of 88.24% was achieved during Pre-SSF process after 72 h at 30 °C. This study establishes the suitability of cold active cellulase cocktail for developing an energy and cost efficient second generation bioethanol production process.

OP-14

IMMOBILIZATION OF CELLULASE ON MULTIWALL CARBON NANOTUBES FOR THE BIOMASS SACCHARIFICATION

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The global trends in the demand of cellulase has been arisen due to its wide range of applications in food & agriculture industry and fermentation of biomass into biofuels. However, in general, cellulases do not fulfill the requirements for industry: they undergo inhibitions; exhibit low catalytic efficiency and costlier. Therefore, stable and reusable cellulases are highly desirable. In present study, cellulase was immobilized onto functionalized multiwalled carbon nanotubes (MWCNTs) via covalent method to attain the improved catalytic efficiency. MWCNTs offer unique advantages including enhanced electronics properties, a large edge to basal plane ratio, rapid electrode kinetics and it's possess higher tensile strength properties due to their structural arrangements. The bionanoconjugate prepared under optimized condition retained 79% activity. The immobilized prepration had improved pH and temperature stability. The preparation could be reused ten times without significant loss in enzyme activity. The presence of enzyme on Multiwalled carbon nanotube was confirmed by FTIR (Fourier transform infrared spectroscopy) and SEM (scanning electron microscope). The bionanoconjugates could also be used for the conversion of agricultural waste to biofuel/ plateform chemicals.

Keywords: Multiwalled Carbon Nanotube, Cellulase, Immobilization, Biomass

OP-15

A STUDY OF TRANSCRIPTIONAL RESPONSES OF BIOSYNTHETIC GENES RELATED TO WITHANOLIDE PRODUCTION IN FUNGI ELICITED CELL SUSPENSION CULTURE OF *WITHANIA SOMNIFERA*

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Ashwagandha (*Withania somnifera*) is one of the most reputed medicinal plants in the traditional medicinal system. In this study, cell suspension culture of *W. somnifera* was elicited with cell homogenates of fungi (*A. alternata, F. solani, V. dahliae and P. indica*) in shake flask and the major withanolides like withanolide A, withaferin A and withanone were analysed. Simultaneously expression levels of key pathway genes from withanolides biosynthetic pathways were also checked via quantitative PCR in shake flask as well as in bioreactor. The results show that highest gene expression of 10.8, 5.8, 4.9, and 3.3 folds were observed with HMGR among all the expressed genes in cell suspension cultures with cell homogenates of 3% *P. indica, 5% V. dahliae, 3% A. alternata and 3% F. solani*, respectively, in comparison to the control in shake flask. Optimized concentration of cell homogenate of *P. indica* (3% v/v) was added to the growing culture in 5.0-l bioreactor under optimized up-scaling conditions and harvested after 22 days. The genes of MVA, MEP and withanolides biosynthetic pathways like HMGR, SS, SE, CAS, FPPS, DXR and DXS were up-regulated by 12.5, 4.9, 2.18, 4.65, 2.34, 1.89 and 1.4 folds, respectively in bioreactor. The enhancement of biomass (1.13 fold) and withanolides [withanolide A (1.7), withaferin A (1.5), and withanone (1.5) folds] in bioreactor in comparison to shake flask was also found to be in line with the upregulation of genes of withanolide biosynthetic pathways.

Keywords: *W. somnifera*; Withanolides; Bioreactor; *P. indica*; Cell suspension cultures

OP-16

THE EFFECT OF ENVIRONMENT (LIGHT, TEMP) AND GROWTH HORMONES (IAA, GA_3, KINETIN AND 2,4D) ON SEED GERMINATION AND SEEDLING GROWTH OF *DIANTHUS. BARBATUS.*L (CARYOPHYLLACEAE)

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Dianthus. barbatus. L. belongs to family Caryophyllaceae. There are number of factors controlling the seed germination and seedling growth including temperature, light and Plant hormones *etc*. The best growing temp for carnation considered as 50ºF (10ºC). Seeds are sowing in the month of December and flowering takes place in February-March. The treatment of different concentration (50ppm, 100 ppm and 200 ppm) of different hormones (IAA, GA3, Kinetin, 2,4D) effect the growth of seedling and seed germination. Observation reveled that the seed germination was started after 3rd day of sowing the seed. All the concentration of IAA and GA3 showed inhibitory effect in *D. barbatus* L The 50 ppm Kinetin and control have equal number of seed germination. The 100 ppm and 200 ppm Kinetin showed highly inhibitory effect for seed germination. There was no germination in 50 ppm of 2,4D. The observation reveled that in all IAA treatment (50 ppm, 100 ppm, 200 ppm) the total length of seedling gradually decreased with increased of concentration of hormones. The average length of radicle and cotyledons slightly decreased in all the concentration of IAA. It was found that IAA showed strong inhibitory effect on hypocotyl length. In 200 ppm concentration of GA3, the average length of seedling was slightly increased in comparison to control. Average length of hypocotyl and radicle was decreased in all concentration of GA3. The length of cotyledons was increased in all concentration of GA3. The average length of seedling, radicle and hypocotyl was reduced in all the concentration of kinetin but average length of cotyledons was increased in all concentration of kinetin. When the seed of *D. barbatu.* L treated with to 2,4D (100 ppm, 200 ppm) showed inhibitory responses. The size of seedling was not measurable in 50 ppm of 2,4D. Different concentration of hormones showed promotary and inhibitory effect on seed germination and seedling growth.

Key words: Treatment; Hormones (Auxin, Gibberellin, Kinetin, 2,4D) Germination; Seedling; Radicle, Plumule

OP-17

FABRICATION OF ORGANIC-SELENIUM BASED CHALCOGENIDE SEMICONDUCTOR FOR APPLICATIONS IN PHOTOVOLTAICS (PV) TECHNOLOGIES

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Chalcogenide semiconductor have attracted great interest in PV application owing to their unique properties, showing broad spectrum of soluble alloy and a wider band gap device that access the optimal energy bandgap. These alloys are promising candidate because of low band gap (1.0-1.6 eV) and high extinction coefficient. Organic-Chalcogenide Semiconductor Photovoltaic (PV) developing next-generation, increased efficiency, high-performance, low cost, low toxicity, large-area has lead a dominant role for PV industry in the future. Both the conjugated polymers and Metal chalcogenide semiconductor thin film act as active layer and electron–hole pair generators. This dissociated electrons and holes are driven by build-in electric field and collected at the negative and positive electrode respectively to give useful electric power. Our solar cell structure consists of two electrodes of different work function, at least one of them being transparent, and an active layer in between, where the photovoltaic effect takes place. The photoactive material consists of the electron-donor organic polymer and electron-acceptor Chalcogenide materials. After deposition of full solar structure, top metal electrode will be deposited by thermal evaporation/sputtering. To test bandgap compatibility between the donor and acceptor levels, Cyclo-Voltammetry (CV) measurement of the materials will be performed before employing them into the devices. We also modify devices by various surface treatment of substrate, change of electrodes, changing of functional group in polymer, changing thickness of the thin films, introducing more layer in between for better matching of band gap for ohmic contact at the ends of devices etc. This research is applicable to the next generation of high-power of PV devices, with specific applications in renewable energy and also a great combination of materials that advance PV technology by being moderately stable under atmospheric conditions.

Keywords: Solar cells; Light trapping; Chalcogenide thin film; Polymers

OP-18

APPLICATION OF ISLAMIC TEACHINGS IN THE MODERN AGE: AN ONGOING CPS INTERNATIONAL STUDY

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Islam has faced many challenges from the modern age. One of which is to reconcile Islamic teachings with modern concepts such as freedom, democracy, secularism, living in multi-religious societies, using science and technology and more. In spite of immense efforts by innumerable Contemporary Muslims scholars who have tried to reconcile Islam with modernity the question still remains: Is Islam compatible with the modern age? This is all the more important as Muslims worldwide, especially in the Western countries, find themselves in situations that require them to find answers to questions such as: Can Muslims vote in a democracy? How should they live in a multi-religious society? What target does Islam give them today? And many more.

Islamic scholar, Maulana Wahiduddin Khan has spent a lifetime undertaking studies specifically in this field. His research has led him to conclude that Islam is a perfectly suitable ideology for the modern age. He has presented his findings in his more than 200 books other writings and recordings. To carry forwarded this work, he has launched the *CPS Academic Program* which comprises of Education and Research wings.

In the educational field efforts are ongoing to make people at large understand and apply Islamic teachings in the modern age through formal and informal educational courses: Applied Quran, Islam and the Modern Age, Prophetic Wisdom, Calling People to God and Peace, Culture of Peace, ClearLight, Interfaith Dialogue for Peace-Making, Countering Extremism as well as Conflict Resolution and Peace-Building.

The literature of Maulana Wahiduddin Khan has been prepared after intensive research over decades. Under the Maulana's guidance and through his literature, hundreds of scholars have been undertaking research. CPS International Academic Program is carrying forward the research endeavours by facilitating academic research of CPS scholars and supporting research scholars and research fellows. CPS has collaborated with Jamia Hamdard to undertake doctoral research in the field of Islamic Studies. The aim of the program is to support research in the fields of Islam and the Modern Age, Peace, Interfaith Harmony, Conflict Resolution and Related Topics. Further, CPS has initiated an ongoing study entitled, "Application of Islamic Teachings in the Modern Age". The aim of this is *firstly*, to conduct further research to understand Islamic teachings in the modern age; *secondly*, to develop fruther material in the academic or educational style for easy understanding; and *thirdly*, to disseminate these to people at large through research findings, educational courses and one-on-one interactions. CPS will publish the interim and conclusive findings of the study regularly on www.cpsinternational.info and journals.

The presenter will give insight into the ongoing activities and the study, citing ways by which participants can take part in and benefit from the Application of Islamic Teachings in the Modern Age Study.

Keywords: Islam and the Modern Age, Freedom, Democracy, Secularism, Interfaith Dialogue, Peace-making, Peace-Building, Applied Quran, Prophetic Wisdom, Conflict Resolution.

OP-19

A STUDY ON BIAS IN PROMOTION IN CORPORATE SECTOR

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Background: Bias is an inclination or preference that influences judgment from being balanced or even handed. Many of us may unknowingly have some bias about a person whether it is based on name, age, gender, race or other factors; this type of biasness is called unconscious bias. When such type of biasness seeps into HR processes it can cause companies to miss out on hiring or promoting the most suitable person for the organization. Conscious bias is when people discriminate on purpose.

Objective: To understand what causes biasness in promotion in corporate sector and solutions to resolve such issues to promote a healthy and happy work environment. Methodological Approach: This study is done with the help of surveys and personal interview.

Important Findings: i. To understand what is biasness and an existence of conscious and unconscious bias in corporate sector. ii. To analyze how each individual is influenced in ways that are completely hidden from our conscious mind and how we view & evaluate other or ourselves.iii. To study the ways to tackle such type of biasness to promote healthy, happy & satisfactory work environment.

Discussion & Conclusion: We're all biased one way or another and we often don't realize it. To achieve true equality at work, companies need to take initiative and ensure they are making the necessary small steps to achieve bigger goal. When managing and promoting, managers need to know who is doing a good job, talent that is more engaged works better and harder. Many companies fail to get the process of promotion right due to unconscious promotion bias or sometimes limited role availability, budget or other factors. But on the other hand organization should also ensure employees know what is required to earn a promotion. Now a days, corporate sector is dealing with promotion bias in numerous ways, few of them are:

- Companies provide unconscious bias training programs/workshops to senior management or people involved in promotions.
- Organizations are trying to implement a structured promotion program backed by performance management software (PMS), can help eliminate bias from promotion decisions.

Keywords: Bias; Corporate Sector; Promotion Bias; Work environment.

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Abstracts

Poster Presentation Session

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PP-01

REMEDIATION OF CADMIUM THROUGH CALCITE PRECIPITATION BY USING UREOLYTIC SERRATIA MARCESCENS AND ENTEROBACTER SP.

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Heavy metals are one of the major inorganic contaminants present in the environment. Excessive industrialization and urbanization resulted in widespread distribution of high levels of toxic metals in the nature. In the midst of different heavy metals, Cd is one of the most prevalent and toxic heavy metals. Its concentration in the environment is continuously rising through diverse anthropogenic factors. Considering this, herein ureolytic *Serratia marcescens* and *Enterobacter* sp. EMB19 (MTCC10649) were separately studied for removal of cadmium using ureolysis-induced calcium carbonate precipitation approach. Both the cultures were observed to efficiently remediate cadmium from the media through co-precipitation of Cd and Ca ions. In case of *S. marcescens* 96% removal of initial 5.0 mg L^{-1} of Cd was observed, while *Enterobacter* sp. showed 98% removal of the same level of Cd after 96 h of incubation. Good removal efficiency was also evident at higher Cd concentrations of 10 and 15 mg L^{-1}, for both the cultures. The elemental analysis of the metal-precipitated products using Energy Dispersive X-ray spectroscopy (EDX) revealed the presence of Ca and Cd ions in the precipitated product. The morphology Cd-Ca precipitated products were observed to be of different shape and size as observed through Scanning Electron Microscopy (SEM). Overall study shows one of the sustainable option which could effectively be used to tackle Cd (II) or other heavy metal pollution in the environment.

Keywords: Cadmium; Bioremediation; Ureolysis; *Serratia marcescens*; *Enterobacter* sp.

PP-02

BIOREMEDIATION OF HEAVY METALS UPTAKE THROUGH AQUATIC PLANTS : REVIEW

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Heavy metals are defined as metallic elements that have a relatively high density compared to water. Heavy Metals are defined as high density metallic elements with atomic number above 20. Heavy metals contaminants that are commonly found in the environment are cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), lead (Pb), nickel (Ni) and zinc (Zn). Thus Bioremediation is one of the most effective management tools to manage the polluted environment and recover contaminated eco-system. The process use various agents such as bacteria, fungi, algae and higher plants as major tools in treating heavy metals present in the environment. Phytoremediation is an ecofriendly that has shown promising results for the contaminants like heavy metals. The basic fundamental elements in phytoremediation are plants whether terrestrial or aquatic which play key role for remediation of heavy metal affected environments.Phytoremediation is an ecofriendly technology that uses natural or genetically modified plants, with their associated rhizospheric microorganisms which stimulate plant growth and decontaminate soil and water in combination with the plants The basic fundamental elements in phytoremediation are plants whether terrestrial or aquatic which play key role for remediation of heavy metal affected environments. Aquatic plants are of special interest, because they are capable of bio-accumulating toxic metals and nutrients in large quantities. The main focus of this paper is to discuss the potential of phytoremediation technique to treat heavy metal contaminated sites, and to provide information about the mechanisms adopted by plants for heavy metal uptake and also to give a brief list of aquatic plants efficient for remediation of various metals.

Keywords: Heavy metals, Bioremediation, Phytoremediation

PP-03

EXPLORING THE TOXICITY OF IONIC LIQUIDS FOR INHIBITION OF B-LACTAMASE AND ITS PRODUCTION BY *BACILLUS CEREUS* EMB20 CELLS

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The rampant use and misuse of antibiotics in human medicine, agriculture and veterinary have become the key contributors to global antimicrobial resistance. One of the significant resistance mechanism that inactivates antibiotics and impedes treatment of bacterial infections is the expression of β-lactamases. Rising evidences of newer variants of β-lactamases in the environment is therefore a serious threat to the presently available antibiotic armory. Present study investigates the use of ionic liquids for the inhibition of β-lactamase produced by an environmental strain of *Bacillus cereus* EMB20. Maline, a deep eutectic solvent was found to inhibit the lactamase efficiently. The structural insights of maline inhibition were further gained by far-UV CD and intrinsic fluorescence spectroscopy. A disrupted secondary as well as tertiary structure was found as a function of maline concentration. The effect of individual components of maline on lactamase inhibition showed that malonic acid was mainly responsible for inhibiting lactamase activity. Far-UV CD, intrinsic fluorescence and docking studies found that malonic acid led to major perturbations in the secondary and tertiary structure of the enzyme while H-bonding with the active site residues. Further the antibacterial and cytotoxic studies also confirmed the potential of maline as a potent growth inhibitor of β-lactamase producing *Bacillus cereus* EMB20. The present study thus provides the potential of ILs in designing suitable non β-lactam based inhibitors for antibiotic resistant microorganisms.

Keywords: Ionic liquids; β-lactamase inhibition; Maline; CD; Fluorescence; *Bacillus cereus* EMB20

PP-04

SWITCHING BEHAVIOUR OF DROSOPHILA CIRCADIAN RHYTHM INDUCE BY CASEIN KINASE-2

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In the recent years, several studies have been done to understand the circadian rhythm phenomena. Circadian rhythm is a biological process defined as a roughly repeats after every 24 hours in most of the living beings which includes plants, animals, fungi and cyanobacteria. Several research work reports that it is endogenously generated rhythm and can be modulated by external factors such as sunlight and temperature. Circadian rhythms are important in determining the sleeping and feeding patterns of all animals, including human beings. It regulates and maintains many important biological activity and network such as controlling brain activity, hormone production, cell regeneration and other biological activities etc. We developed an integrated model by inducing a signaling molecule CK2 (casein kinase 2) to the circadian oscillator. Recent studies suggest that CK2 directly interact with clock protein and promotes the progressive phosphorylation of clock protein which leads to the rapid degradation of hyperphosphorylated isoforms by the ubiquitin-proteasome pathway. The molecular network model is studied as stochastic model. We have developed a code to simulate the stochastic model. Our results indicate very interesting phenomena and also correlate with the experimental results already published. We have also shown how the noise plays an important role on regulating the circadian oscillator at molecular level. We have also shown how the CK2 level controls circadian oscillator. Our results suggest that noise play a destructive role in the system. Further experimental verification is needed for the medical application of this theoretical predicted idea.

Keywords: Circadian Rhythm, Casein kinase-2, Per protein, Interaction, Stochastic dynamics.

PP-05

PROTEINS EXTRACTED FROM SWISS 3T3 FIBROBLAST CELLS AS SUBSTITUTE FOR FEEDER CELLS IN HUMAN EPIDERMAL KERATINOCYTE CULTURE

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Earlier, we invented a novel method of inducing differential growth arrest in a specific sub-set of Swiss 3T3 cells using Mitomycin C (MC) and a specific feeder batch was identified to maximally stimulate human epidermal keratinocytes' proliferation leading to faster construction of epidermal sheets for grafting in burns patients. The method was functionally equivalent, if not superior to the expensive and cumbersome Irradiation method. It is hypothesized that the optimized keratinocyte stimulation was perhaps due to possible expression of exclusive proteins by the fibroblast feeder cells and it would be of immense translational value if such proteins were identified as substitute for feeder cell-dependent culture systems for epithelial and embryonic stem cells.

A strategy was therefore, proposed to initially test the whole protein extract of feeder cells on keratinocyte proliferation followed by identification of potential proteins through sub-cellular fractionation and proteomic approach. Since the superior feeder sub-set yielded low cell turnover than a spontaneously transformed clone of 3T3 cells produced previously in the lab, the latter was employed for initial round of experiments. The extracted proteins were tested for epidermal keratinocyte cell proliferation in feeder-free and serum-free conditions while comparing with cultures containing bovine pituitary extract or feeder cells plus serum. It was found that the total proteins extracted from the clone cells supported the proliferation of keratinocytes in feeder-free and serum-free culture conditions as much as the feeders plus serum although without clonal growth. This is a first ever demonstration of fibroblast cell proteins as exclusive growth promoters of human epidermal keratinocytes. The SDS-PAGE revealed differences in protein bands between the clone and the sub-set of 3T3 cells treated or untreated with MC. Further studies on sub-cellular protein fractionation of murine and human fibroblasts with or without MC induction of growth arrest are in progress.

Keywords: 3T3 cells; clone cells; Mitomycin C; Serum-free feeder-free; subcellular fractions; 2D electrophoresis

PP-06

HEAVY METAL POLLUTION OF SOIL & ITS IMPACT ON PLANTS

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Heavy metals are natural constituents of the earth's crust, but indiscriminate human activities have drastically altered their geochemical cycles and biochemical balance. Heavy metals are the major source of soil pollution originates from mining, chemical, metal processing industries, and other allied industries. Nowadays heavy metal pollution becomes a wide-reaching problem and is likely to influence the health of the plants. As we know, soil is very significant environment where rocks, air & water interface each other. Thus soil is subjected to a number of pollutants due to anthropogenic activities i.e. industrial, agricultural, transport etc (Sharma & Dietz 2008). Study find that these heavy metals not only affecting the human health by diseases and problems but also the animals ,trees and plants. These heavy metals are readily absorbed by the plants from soil which induce phytotoxic effects i.e. growth, physiological, biochemical and molecular processes in plants .Thus these heavy metals decrease the soil fertility and increases the metal input in the food chain which give rise to the accumulation of toxic metals in the food items and thereby affecting the human health. The influence of heavy metals on plants and their metabolic activities caused by the geological and biological redistribution of heavy metals through pollution of the air, water and soil were briefly discussed in this review.

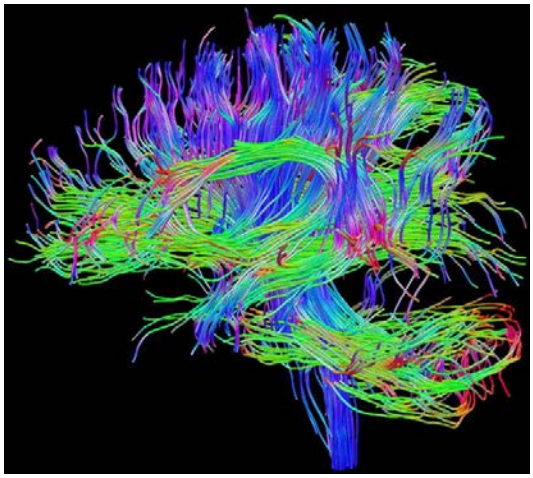
Keywords: Heavy metal; Anthropogenic,; Phytotoxic,; Food chain

INDEX

NOTES

NOTES

Enabling biomedical research in India through funding and engagement



The Wellcome Trust/DBT India Alliance is a visionary partnership funded equally by the Wellcome Trust, UK, and the Indian government's Department of Biotechnology. It aims to build excellence in the Indian biomedical research community by identifying and supporting future leaders in basic, clinical and public health research for improving human and animal health.

Fellowships for biomedical research in India

Since its inception in 2009, the fellowship programme has awarded 280 fellowships at 82 different institutions in 29 Indian cities. About a third of the Fellows are women and about a quarter do clinical and public health research. The focus is on funding the best people early in their careers and set them on a leadership track.

Besides supporting exceptional biomedical research scientists at Indian institutions through fellowships and a continuous system of engagement and mentoring, India Alliance aims to build a strong research ecosystem in India that can drive innovations to tackle health challenges, and inspire the next generation of researchers.

Training workshops for biomedical scientists and clinicians

Science Communication Workshops
To train Indian scientists in communication, the India Alliance conducts one-day SciComm101 and two-day SciComm workshops. Since 2011, more than 2,000 PhD students, postdoctoral scientists and clinicians from around 100 institutions have received communication training through these workshops. In 2016, India Alliance formed a partnership with Nature India and Nature Jobs (India) for Science Communication and Career workshops, held in tandem with major scientific meetings. In 2017, India Alliance and Nature India held a two-day workshop Visualising Science that armed scientists and those in allied fields with visual tools and methods to convey their research more effectively.

Research Leadership workshops
Leadership and management skills are critical for a successful science career. India Alliance organizes leadership workshops for its Fellows and other young Indian researchers to help them recognize and develop their leadership style, and gain critical lab management and communication skills.

Developing Indian Physician Scientists (DIPS) workshops
India Alliance launched Developing Indian Physician Scientists (DIPS) workshops in 2017 to ignite the research interests of young doctors, while promoting an understanding of the frontiers of medicine and related sciences. The workshops, presented by eminent physician scientists, provide training in quantitative methods and research methodology, and an opportunity to discuss biomedical research and career options.

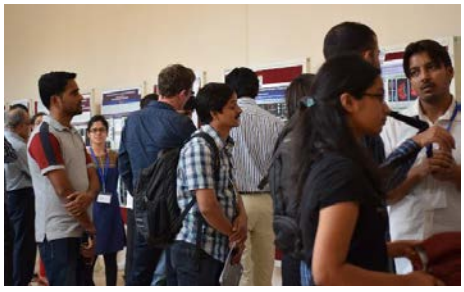
Supporting interdisciplinary scientific meetings in India

India Alliance has financially supported many major scientific events including the Young Investigator Meetings, which provide an excellent platform for young investigators to meet senior scientists from across the country to discuss existing opportunities which would help them to establish their research careers in India.

India I EMBO Symposia
The India Alliance and European Molecular Biology Organization (EMBO) entered into a partnership in 2017 to co-fund up to three meetings per year in India. These meetings are expected to address discovery and innovation through an interdisciplinary approach, with the speakers and participants discussing important global challenges in the context of the life sciences. Since its launch, four scientific meetings have been supported through this initiative.

Public Engagement Connecting science to society

The India Alliance also aims to increase the public understanding of science and health issues through its Public Engagement activities. Through this it brings the scientific community and the public together to share, debate and deliberate on important matters of science, especially human health, which have implications for the society at large. To fulfill this vision, India Alliance regularly organizes public events in different Indian cities and supports its Fellows, other individuals and organizations that undertake public engagement activities.



Training workshops for scientists and creative public engagement programs are central to India Alliance's vision of building a robust biomedical research ecosystem in India. Top image represents a whole brain's anatomical connections as measured with diffusion MRI followed by tractography. Image credit- Dr. Sridharan Devarajan, IISc Bangalore.

For more information on India Alliance's programs and its latest initiatives such as the **India Research Management Initiative** (IRMI) and **Africa-India Mobility Fund** (AIMF) visit **www.indiaalliance.org**

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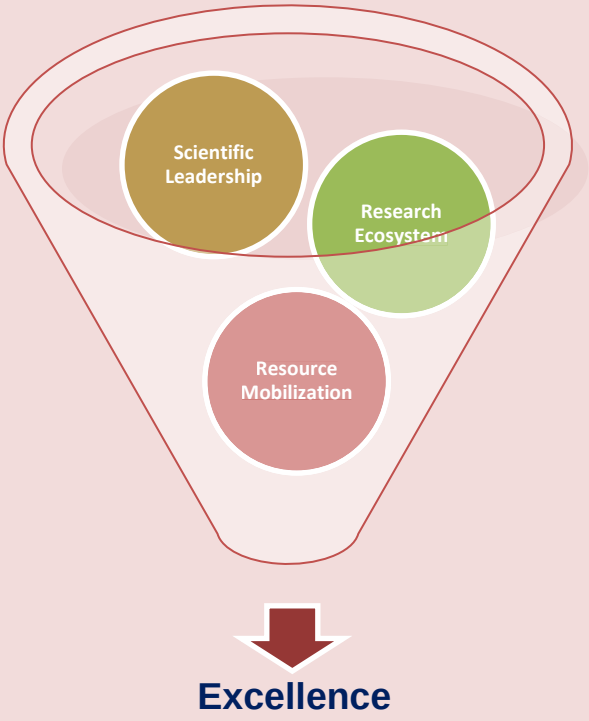

Research Ecosystem at Jamia Hamdard
▪ Well-equipped Laboratories.
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▪ Active Industry – University Collaboration
▪ CPCSEA approved Central Animal House Facility
▪ CDSCO recognized IRB and CPCSEA recognized IAEC
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