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Posters

XueFu, J Biotechnol Biomater 2018, Volume 8
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Mitochondrial stress and disease

XueFu
Guizhou Provincial People's Hospital, China

Mitochondria are double-membrane organelles and are well known for the production of ATP via tricarboxylic acid cycle and aerobic respiration. Mitochondria also involved in fatty acid oxidation and oxidative phosphorylation. When the misfolded or misassembled proteins accumulate and overload in the matrix leading to increased the nuclear-encoded chaperonin proteins and protease which evoke mitochondrial unfolded protein response or mitochondrial stress. Different adverse environmental conditions such as exercise, fatigue, disease, oxidative stress, cold shock and the inhibitor of respiratory electron transport chain can cause varying degrees of mitochondrial stress. Upon the early stage of stress, several mitochondrion-to-nucleus signaling pathways, or retrograde responses have evolved to protect mitochondria and maintain cellular homeostasis. A gradual decrease of mitochondrial function is one of the main pathological events in neurological disorders. It is meaningful to study the physiological role of UPRmt in development, health, disease and aging during stress.

Biography

XueFu has completed her PhD at the age of 27 years from TianJin Medical University. She is working at the Guizhou Provincial People's Hospital. She has published 5 SCI papers as first author and more than 10 papers in reputed journals.

705230941@qq.com

Nayara Carvalho et al., J Biotechnol Biomater 2018, Volume 8
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Optimization and evaluation of SSR primers for *Urochloa brizantha*

Nayara Carvalho[1], Felipe Mont`alvão Canela[1], Diva Maria de Alencar Dusi[2], Lucimara Chiari[2], Vera Tavares de Campos Carneiro[3], Souza N O S[1] and **Buso G S C[2]**
[1]University of Brasilia, Brazil
[2]Embrapa Genetic Resources and Biotechnology, Brazil
[3]Embrapa Gado de Corte, Brazil

The genus *Brachiaria/Urochloa* belongs to the family Poaceae, and comprises approximately 100 species. The genetic characterization represents a great help for the knowledge of genetic resources and conventional breeding. SSR (simple sequence repeats) molecular markers have been used as an efficient tool for genetic variability analysis. The design of the primers used in this study is based on the sequences available in the *B. brizantha* expressed sequence database of the project "Functional genomics and genetic control of sexual reproduction and apomixis of plants with biotechnological perspectives", which after mining, clustering and reduction of redundancy, resulted in 315 SSR-EST (expressed sequence tags) primers. Thus, the objective of this study is to evaluate and characterize the primers for *U. brizantha*. A total of 40 accessions of the *Brachiaria* germplasm active bank of Embrapa Gado de Corte were used. The loci were amplified by PCR reactions (Polymerase Chain Reaction), the separation of the fragments performed by electrophoresis in 5% polyacrylamide gel and analysis by band presence or absence. From a total of 154 primers, 81 presented polymorphism representing 52.59% of the total tested. In a preliminary analysis, four polymorphic SSR primers were used for the 40 accessions that generated a total of 30 markers and grouped the accessions in a similarity that ranged from 0.18 to 1. Two groups were formed with 0.26 and 0.21 of similarity respectively. Thus, these primers are promising for the future study of accessions variability of the germplasm bank.

Biography

Nayara Carvalho has completed her Graduation in Agronomy at University of Brasilia (Brazil) in 2015. She is pursuing her PhD at the same university and is working on molecular markers since graduation. She has published one paper in *Genetic and Molecular Research* journal.

nayaracarvalho87@gmail.com

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Wellington Bruno dos Santos Alves et al., J Biotechnol Biomater 2018, Volume 8
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Development of a system for kinship determination and identification of coconut hybrids based on microsatellite markers

Wellington Bruno dos Santos Alves[1] and **Grattapaglia D**[2]
[1]Universidade Católica de Brasília, Brazil
[2]Embrapa Recursos Genéticos e Biotecnologia, Brazil

Coconut (*Cocos nucifera* L.) is a diploid species belonging to the monocotyledonous family Arecaceae (Palmae) and is grown in more than ninety countries. The most commercially important types are 'typica' (Tall) and 'nana' (Dwarf). Hybrids between these two varieties have favorable characteristics, such as rapid growth and flowering, good vigor and productivity. Identification of hybrids based on morphological characters during the seedling stage is difficult and, often, unwanted dwarf coconuts are mistakenly used in planting, reducing productivity and generating cost. In addition, there is difficulty in identifying the male parental due the pollination being carried out with pollen mixture. This work aimed the optimization of a set of microsatellite markers that allowed the unequivocal validation of hybrids of the 'Tall x Dwarf' crossing, as well as the development of a system of male genitor identification for breeding purposes. 23 microsatellite markers were used for genotyping 168 dwarfs, 81 tall and 10 hybrids coconut palms. The GenAlex Software was used to obtain allelic frequencies, Hardy Weinberg Equilibrium and genetic distances. As a result, a system capable of identifying hybrid seedlings was developed, as well as a capable system of discriminating the male parent with 99% accuracy.

Biography

Wellington Bruno dos Santos Alves has completed his Graduation in Biological Sciences at Universidade Católica de Brasília and currently holds a Masters in Genomic Sciences and Biotechnology from Embrapa-Cenargen's Plant Genetics Laboratory, where he developed his research project.

welligtonnetrix@hotmail.com

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Lorena Ramos da Mata, J Biotechnol Biomater 2018, Volume 8
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Development and characterization of microsatellite markers in *Attalea speciosa* and their transferability to six other *Attalea* species

Lorena Ramos da Mata
Embrapa Genetic Resources and Biotechnology, Brazil

Babassu (*Attalea speciosa* Mart. ex Spreng) is a native palm tree with wide distribution in Brazil, where it is one of the main extractive products. The nut extracted from this palm is used in the oil manufacture with domestic and industrial utility. The sustainable use of babassu is important for the preservation of this forest resource and also for the economy of endemic regions of the genus. Microsatellite primers were developed for the main species of Attalea. Total genomic DNA library enriched for TC repeats was constructed for *A. speciosa* following a standard protocol, and 84 markers were developed. We evaluated the transferability of the 84 microsatellite markers for six other babassu species: *A. barreirensis, A. eichleri, A. funifera, A. maripa, A. phalerata* and *A. vitrivir.* The transferability was superior to 63% in all species studied. The markers were characterized in populations of seven *Attalea* species with 20 to 44 individuals each. The total number of alleles over all loci, observed and expected heterozygosity was similar for the seven *Attalea* species, ranging from 6.2 to 9.4, 0.64 to 0.74, and 0.48 to 0.56, respectively. These values are comparable to the values obtained for other palms and showed that the seven *Attalea* species has high genetic diversity. Cluster analysis showed groupings of plants according to their species and also showed that some of the plants are hybrids (*A. speciosa x A. eichleri*). The set of markers developed constitutes a powerful tool for genetic analysis in the genus Attalea.

Biography

Lorena Ramos da Mata has completed her Graduation in Pharmaceutical Sciences at the University of Brasilia in 2008 and MSc in Botany at the same university in 2016. She is currently an Analyst at the Brazilian Agricultural Research Company-EMBRAPA CENARGEN.

lorena.mata@embrapa.br

Notes:

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Accepted Abstracts

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Screening tomato lines for resistance to tomato yellow leaf curl virus

Aylin Kabas
Akdeniz University, Turkey

Tomato (*Solanum lycopersicum* L.) is one of the most economically important vegetable in Turkey and World. Tomato yellow leaf curl virus (TYLCV) is one of the diseases which cause significant economic losses ranging from 85% to 100% depending on the severity of the infection in the greenhouse tomato production. TYLCV is transmitted by whiteflies (*Bemisia tabaci*). The use of resistant varieties is the most efficient and environmental method in TYLCV management. In this study, tomato lines were tested with molecular methods against TYLCV. 60 tomato genotypes were tested for Ty-1 and Ty-3 in molecular test. JB1 (Ty-1) and P6-25 (Ty-3) markers were used in molecular tests and 15 cocktail cheery types, 10 beef types and 25 the single harvest types of a total of 50 resistant lines have been determined.

demirelliaylin@hotmail.com

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The cellular location of endo-acting galactanases confers keystone or recipient status to arabinogalactan degrading organisms of the human gut microbiota

Jose Munoz
Northumbria University, UK

Glycans, the major source of energy for the human gut microbiota (HGM), are metabolized primarily by the *Bacteroides* genus. Arabinogalactan proteins (AGPs) are a higher heterogenous group of plant glycans in which the β1, 3-galactan backbone and β1, 6-galactan side chains are conserved features. Diversity is provided by the extensive and highly variable nature of the sugars that decorate both the backbone and side chain galactans. The mechanisms by which nutritionally relevant AGPs are degraded at a cellular and biochemical level are poorly understood, as is the impact of this process on the ecology of the HGM. To address these issues we have explored how the HGM organism *Bacteroides thetaiotaomicron* metabolizes highly complex AGPs. The work provides a degradative model that reveals a repertoire of exo-acting family GH43 β1, 3-galactanases that release backbone galactose units that are attached at O6 to the side chains. The oligosaccharide side chains are depolymerized by the synergistic action of exo-acting enzymes in which catalytic interactions is dependent on whether degradation is initiated by a lyase or glycoside hydrolase. Growth studies of the 20 HGM *Bacteroides* species on a complex AGP revealed three keystone organisms that facilitated utilization of fragments of the glycan by the 17 other bacteria, which thus acted as recipients. The ability to function as a keystone organism was conferred by a surface endo-β1, 3-galactanase, which, when engineered into a recipient enabled the bacterium to also utilize complex AGPs and facilitate the growth of the other *Bacteroides* species. This study underpins future pre- and pro-biotic strategies to exploit AGPs to manipulate the structure of the HGM.

jlmunoz@um.es

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Integrated effect of plant growth promoting rhizobacteria, phosphate solubilizing bacteria and chemical fertilizers on growth of maize

Zahid Abbas
Nanjing Agricultural University, China

Integrated effect of PGPR and PSB along with chemical fertilizers has great significance for the improvement of soil fertility as well as to increase the plant growth and its biomass. The present study was conducted in order to test the effect of PGPR and PSB along with recommended doses of chemical fertilizer to evaluate the performance of different plant parameters under various chemical and biological treatments. The bacterial strains were isolated from root rhizosphere of maize II, SF and WC was characterized on the basis of their morphological, physiological and biochemical traits. The shape, size and structure of isolates were determined through microscopic analysis. The selected PGPR isolates produced reasonable quantity of IAA (ranging 0.11-0.83 µg/ml). The PSB strain showed highest solubilization index (0.88%). The co-inoculation of PGPR and PSB with 25% less N and recommended P and K fertilizers showed maximum plant height (88.7 cm) at vegetative stage, chlorophyll contents (50.1 mg/g), leaves/plant (12.7) and root dry biomass (19.93 g). While the maximum plant heights at maturity (114.5 cm) shoot dry biomass (31.2 g), root length (8.8 cm) were recorded on PGPR, PSB and recommended NPK. The highest plant phosphorous contents (0.29) were observed in treatment having the combination of Iple Iple (II) + PSB + recommended K + ¾ N + ¾ P. The PGPR, PSB and chemical fertilizer have showed very promising results on different parameters and vigorous growth of maize plants.

2017201091@njau.edu.cn

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Influence of $LiNbO_3$ crystal cut (X/Z) on the performance of a Ti: $LiNbO_3$ waveguide-based biosensor

Chafia Benmouhoub[1, 2, 3], Bernard Gauthier-Manuel[2], Ameur Zegadi[3], Gwenn Ulliac[2], Laurent Robert[2] and **Jean-Yves Rauch[2]**
[1]Bordj-Bou-Arreridj University, Algeria
[2]Franche-Comté University, France
[3]Ferhat Abbas University, Algeria

Planar optical Ti: $LiNbO_3$ (Z-cut/X-cut) waveguides are proved to be very interesting optoelectronic devices especially when they are used like signal transducers in optical biosensing. The use of Z-cut and X-cut and the comparison between them are frequently in optoelectronics but are rare in the field of biosensors. In this work, a comparison between two different platforms for biomolecules detection will be done. The first platform uses an X-cut $LiNbO_3$ crystal and the second uses a Z-cut one. After several tests, we have observed that the Z-cut platform induced many more losses and therefore a strong attenuation of the signal.

chafia.makani@gmail.com

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Quantum computations of electronic structures of oligonucleotides used in antisense research

Henrik G Bohr
Technical University of Denmark, Denmark

Quantum mechanical calculations as well as clinical experiments are carried out on different important oligonucleotides with modifications used in anti-sense research. The anti-sense research in this context is about silencing certain genes and proteins in various diseases. The oligonucleotides are modified as phosphorothioates with LNA (Locked Nucleic Acid) being changes which are crucial for cellular uptake and for binding to targeted strands. The theoretical and experimental techniques employed are molecular computation using quantum mechanics (QM), for producing electronic structures for the target molecules and chromatography experiments to distinguish and characterize the various molecules under investigation. The huge computer calculations on these large molecules, containing more than 600 atoms, are performed with ab initio Hartree-Fock quantum methods that are giving detailed electronic information on energy and bonding, and can differentiate between diastereoisomers i.e. chiral states. Furthermore differential geometry techniques are used to develop and analyze electrostatic isopotential surfaces that in principles can tell how drug molecules interact with others. Physical and chemical descriptors of the oligonucleotides are derived from the atomic calculations and used for characterizing the theoretical and experimental data for the chiral state of the oligonucleotides. Selecting the right chiral state of a drug is crucial for its effect and for avoiding side-effects. Experiments have shown that a particular one out of two chiral states could be an effective drug based on its surface form. However, it can be demonstrated that even a small change, e.g. interchanging the positions of two atoms, can have a huge effect on the overall structure of the molecule but on the other hand also used to design new drug molecules. Anti-sense compounds are expected to play an important role in e.g. cancer therapy.

hbohr@dtu.dk

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An improved biofabrication process to enhance cell survival of cartilage regeneration and functionality of the osteoarthritic knee when enriched with bone marrow mesenchymal stem cells

José Manuel Baena, J L Carrillo and **J A Marchal**
[1]REGEMAT 3D, Spain
[2]IBIMER-University of Granada, Spain

Tissue regeneration (TR) is currently one of the most challenging biotechnology unsolved problems. Tissue engineering (TE) is a multidisciplinary science that aims at solving the problems of TR. TE could solve pathologies and improve the quality of life of billions of people around the world suffering from tissue damages. New advances in stem cell (SC) research for the regeneration of tissue injuries have opened a new promising research field. However, research carried out nowadays with two-dimensional (2D) cell cultures do not provide the expected results, as 2D cultures do not mimic the 3D structure of a living tissue. Some of the commonly used polymers for cartilage regeneration are polylactic acid (PLA) and its derivatives such as poly-L-lactic acid (PLLA), poly (glycolic acids) (PGAs) and its derivatives such as poly (lactic-co-glycolic acids) (PLGAs) and polycaprolactone (PCL). All these materials can be printed using fused deposition modeling (FDM), a process in which a heated nozzle melt a thermoplastic filament and deposit it in a surface, drawing the outline and the internal filling of every layer. All this procedures uses melting temperatures that decrease viability and cell survival. Research groups around the world are focusing their efforts in finding low temperature printing thermoplastics or restricted geometries that avoid the contact of the thermoplastic and cells at a higher temperature than the physiologically viable. This has mainly two problems; new biomaterials need a long procedure of clearance before they can be used in clinical used, and restrictions in geometries will limit the clinical application of 3D printing in TE.

bd1@regemat3d.com

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First finding of antibodies to *Encephalitozoon cuniculi* in raised chickens in Egypt

Karam Imam Ashmawy and **Somaia Seif Abuakkada**
Alexandria University, Egypt

In the present study, the presence of antibodies against *Encephalitozoon cuniculi* in chickens of different breeds were investigated by the method of enzyme linked immunosorbent assay (ELISA). A total number of 88 serum samples were collected randomly from chickens raised in houses and commercial farms in different locations of Behera province, Egypt. The breeds sampled included Egyptian native breed (balai) chickens (n=35), commercial egg-laying (Hy-line) breed (n=40) and commercial broiler Sasso breed (n=13). The age of the tested birds ranged from one month to 20 months. Antibodies against *E. cuniculi* were detected in 13/88 (14.77%) of sera examined. *E. cuniculi* antibodies were detected only in the sera of egg-laying chickens. Results of this study indicate that chickens are exposed to *E. cuniculi* infection in Egypt. These results are of epidemiological relevance and public health importance; as the presence of *E. cuniculi* in raised chickens indicates a risk of infection to humans, mainly chicken breeders. Therefore, routine screening examinations of large-scale breeding of chickens are advised considering the zoonotic potential of these parasites.

ka_ashmawy49@yahoo.com

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Mesenchymal stem cell expansion with small molecules

Lamia Yazgi Alyazici
Yeditepe University, Turkey

Mesenchymal stem cells are present in the adult body; they can self-renew themselves and exhibit multipotency. They can differentiate to bone, fat, chondrocyte and other various cell types under specific conditions. They are a great candidate for transplantation-based therapies with their immunomodulatory abilities, differentiation potentials and because of their easy accessibility. They can be obtained from different tissue types including; bone marrow, adipose tissue, umbilical cord etc. Isolation of MSCs is easy but there are major challenges on mobilization, expansion, understanding the differentiation mechanism. If these challenges overcame, MSCs show great potential for experimental and clinical applications. In this study, author has focused on expansion of mouse bone marrow-MSCs, with small molecule treatment. She has selected the effective molecules conducting WST-1 assay, pyronin y/hoechst staining, cell cycle analysis, apoptosis analysis and settled on four different molecules. First and most effective molecule is a GSK-3 inhibitor that stabilizes free cytosolic β-catenin and inhibits differentiation. Second one is a p38-MAPK inhibitor. The goal after this study is to carry this knowledge to therapeutic field.

yazgialyzc@gmail.com

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Interaction of chitosan, curcumin, and hydroxyapatite nanoparticles on the reproductive system and its molecular parameters in male rat

Mokhtar Ibrahim Yousef[1], **Haitham Hassen Abd**[1], **Maher Abd El-naby Kamel**[2] and **Yaser Mohamed Helmy Elkamary**[3]
[1]Institute of Graduate Studies and Research-Alexandria University, Egypt
[2]Medical Research Institute-Alexandria University, Egypt
[3]European Egyptian Pharmaceutical Industries, Egypt

Hydroxyapatite nanoparticles (HAP NPs) have been widely used as a biocompatible ceramic in many areas of medicine, but mainly for contact with bone tissue, due to its resemblance to mineral bone. Risk assessment of HA NPs has attracted extensive attention despite their promising potential in many biomedical applications, that's why the present study aimed to investigate the toxic effects of HAP NPs on the reproductive system and its molecular parameters in male rat and the protective role of nano-antioxidants (Chitosan CSNPs and curcumin CurNPs) alleviating this toxicity. The present results indicated that HAP NPs showed significant decrease in semen characteristics and testosterone level, 17-ketosteroid reductase, antioxidant enzymes (GST, SOD, CAT, GPx and TAC), and reduced glutathione in testes; Total antioxidant capacity and total oxidative stress levels were determined to evaluate the oxidative injury, While HAP NPs caused significant increase in LH and FSH, abnormal sperm, 17β-hydroxysteroid dehydrogenase, TBARs, NO, p53, TNFα and interliukin-6 in testes. The DNA damage was also analyzed by suppression of the mtTFA, induction of UCP2 gene and 8-OHdG level as indicators of genotoxicity. In conclusion, the presence of CSNPs and CurNPs with HAP NPs showed obvious improvements in the activities of the antioxidant enzymes reduced glutathione and improved sperm parameters also, alleviated its reproductive toxicity via its ameliorative effects on the fertility, testicular tissue functions, antioxidant system and hormonal status.

yousefmokhtar@yahoo.com

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Genome-wide identification, classification, and expression divergence of glutathione-transferase family in Brassica rapa under multiple hormone treatments

Nadeem Khan
Nanjing Agircultural University, China

The GSTs is one of the most important multifunctional protein families which has been playing a crucial role in the different aspects of plant growth. This extensive study about GSTs may establish a solid foundation for the brief functional analysis of BraGSTs in future. In this study, a total of 75 genes were identified in *B. rapa.* Phylogenetic analysis characterized them into eight different sub-classes, while Tau and Phi sub-class being the most numerous. The exon-intron structure and the motif composition of BraGSTs were exhibited accordingly to its sub-classes. Notably, we also investigated 15 tandem paralogous pairs of genes, which highlighted that all the pairs were purifying in nature as their synonymous values were lower than 1.00. Duplication analysis indicated that about 45.33% of genes were mainly occurred through tandem duplication in *B. rapa.* Predominately, the tandem cluster of genes in sub-class Tau was greater than other sub-classes. Furthermore, among eight multiple hormonal treatments (ABA, GA, BR, ETH, IAA, IBA, NPA and JA), most number of BraGSTs were activated by NPA, BR and ABA treatments. This analysis has provided comprehensive information about GSTs family which may assist in elucidating their exact functions in *B. rapa.*

2016104235@njau.edu.cn

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Form of nerve impulse and its terahertz wave features of propagation along the nerve fiber cells in the living systems

Pang Xiao Feng, Zeng Hong Juan, Jiang Ying Rui and **Ni Yin Jia**
University of Electronic Science and Technology of China, China

We researched and elucidated the features of transport of nerve impulse along the nerve fiber using modern theory of molecular biology, in which we first elucidated the properties of structure of the nerve cell and the features of distribution of sodium ions and potassium ions in the inner and exterior of the never cell membranes. In practice, their distributions are not uniformity, i.e., the distribution of sodium ions and potassium ions between the inner and exterior of cell-membranes are not same, the sodium ions are many in the exterior, the small in the inner, but the potassium ions are many in the inner, small in the exterior, they are just inverse. Just so, an action electro-potential is formed on the cell-membranes. But the action electro-potential, in essence, is only a static impulse; it cannot be propagated along the nerve organizations. If the nerve organizations are acted by a bio-energy, which could lead to the periodic variation of these sodium ions and potassium ions in the inner and exterior of the never cell membranes can be varied periodically under the action of the bio-energy by virtue of the works of sodium pump and potassium pump on the surface of cell membrane, then the nerve impulse can propagate along the nerve fiber membranes. Our investigations verify that the bio-energy can be obtained or provided from hydrolyses reaction of adenosine phosphate (ATP) molecules in the cells through the transport along the protein molecules, where the reaction can release the bio-energy of o.42 eV. The accepted bio-energy can be used to excite the work of se sodium pump and potassium pump in the cell-membrane. Thus the propagation of the nerve impulse can be carried out automatically in living systems. This is just the mechanism of propagation of the nerve impulse along the nerve l fiber cell -membrane. In this paper we elucidate and research in detain and deeply the mechanism of form of the nerve impulse and its features of propagation.

pangxf2006@aliyun.com

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Investigating the nexus between DNA repair pathways and genomic instability in cancer

Sonali Bhattacharjee
Cold Spring Harbor Laboratory, USA

DNA double-strand breaks are one of the most lethal lesions to a cell that can be repaired by one of the two cellular pathways; non-homologous end joining or homologous recombination. Homologous recombination genes are particularly attractive targets for precision cancer therapy because these genes have altered expression patterns in cancer cells when compared with normal cells and these genetic abnormalities can be targeted for selectively killing cancer cells while leaving normal cells unscathed. Synthetic lethality is thought to be the new frontier of cancer therapeutics because it overcomes the limitation of chemotherapy, which is unable to discriminate between cancer cells and normal cells. Two genes are synthetically lethal when simultaneous disruptions of both genes gives rise to a lethal phenotype, while the disruption of either gene alone is viable. Many homologous recombination genes have synthetic lethal relationships with oncogenes and tumor suppressor genes, which can be targeted for the development of cancer therapy- an approach referred to as combination therapy. In the presentation, author will summarize recent progress in understanding both the functioning and the regulation of the DNA repair machinery and elaborate on the clinical applications of these proteins in cancer therapy.

bhattacharjee@cshl.edu

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Using the derivatives of pyrimidine, pyrazole, isoflavones, pyridine, oxazolopyrimidine and oxazole as new substitutes of auxins and cytokinins for regulation of plant growth

Tsygankova Victoria Natolyivna, Andrusevich Ya V, Shtompel O I and **Brovarets V S**
Institute of Bioorganic Chemistry and Petrochemistry–NASU, Ukraine

The auxin-like and cytokinin-like activity of chemical low molecular weight heterocyclic compounds, derivatives of pyrimidine, pyrazole, isoflavones, pyridine, oxazolopyrimidine and oxazole was studied. The specific bioassay on auxin-like activity conducted on the leaf petioles isolated from seedlings of haricot bean (*Phaseolus vulgaris* L.) cultivar Belozernaya showed high stimulating effect of the chemical heterocyclic compounds, derivatives of pyrimidine, pyrazole, isoflavones, and pyridine used at the concentration 10-8M on the formation of adventitious roots on the 14th-day-old leaf petioles isolated from seedlings of haricot bean (*Phaseolus vulgaris* L.) cultivar Belozernaya, which was similar or higher of the effect of plant hormones auxins IAA and NAA used at the same concentration 10-8M. The specific bioassay on cytokinin-like activity conducted on the cotyledons isolated from seeds of muscat pumpkin (*Cucurbita moschata* Duch. ex Poir.) cultivar Gilea showed the high stimulating effect of chemical heterocyclic compounds, derivatives of pyrimidine, pyrazole, isoflavones, pyridine, oxazolopyrimidine and oxazole used at the concentrations 10-8M and 10-9M on the growth of biomass of 16th-day-old cotyledons isolated from seeds of muscat pumpkin (*Cucurbita moschata* Duch. et Poir.) cultivar Gilea, which was similar or higher of the effect of plant hormone cytokinin kinetin used at the same concentrations 10-8M and 10-9M. The obtained results confirmed the inducing auxin-like and cytokinin-like effect of synthetic heterocyclic compounds on plant cell elongation, division and differentiation that are the basic processes of plant growth.

vTsygankova@ukr.net

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