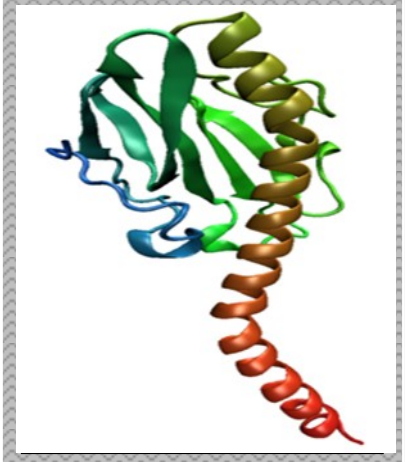

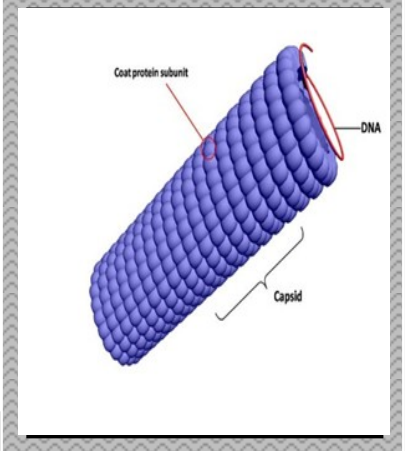

EMGEN Newsletter

Vol. 4, Issue 10, April, 2013

IN THIS ISSUE:

Eastern Mediterranean Health Genomics and Biotechnology Network (EMHGBN) was created in 2004 with collaboration of representatives of selected centers of excellence in (health related) molecular biology, biotechnology & genomics in the Eastern Mediterranean region by recommendations and efforts of WHO/EMRO.

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Genetic variants in the methylenetetrahydrofolate reductase gene in Egyptian children with conotruncal heart defects and their mothers

The article entitled "Genetic variants in the methylenetetrahydrofolate reductase gene in Egyptian children with conotruncal heart defects and their Mothers" aims to evaluate MTHFR 677C/T and 1298A/C polymorphisms in the MTHFR gene as genetic risk factors in congenital heart defects (CTDs). The study was carried out by Nagwa A Meguid; she is working at the National Research Centre, Research on Children with Special Needs Department, Cairo, Egypt; and the paper was published in the Macedonian Journal of Medical Sciences Vol. 5(1), pp. 78--84,2012.

Dr. Nagwa A Meguid

Congenital heart defects (CHDs) are the most common structural birth defects, affecting about 8 to 10 of every 1000 live births. The etiology of non-syndromic CHDs is complex, including both genetic and environmental risk factors. Conotruncal heart defects prevalence rating is about 8 per 10,000 live births. Common types are: transposition of great arteries (TGA), truncus arteriosustetralogy of fallot (TOF), double outlet right ventricle and interrupted aortic arch. All defects cause improper circulation of oxygenated and deoxygenated blood. The conjunction with periconceptional maternal folic acid use has been reported in a number of case-control studies. It has been demonstrated that folic acid intake during pregnancy results in modification in both maternal and fetal genes that code for the enzymes of the folate and homocysteine pathways.

The *MTHFR* gene is placed on chromosome 1 at 1p36.3 catalyzing the biologically irreversible reduction of 5, 10-methylenetetrahydrofolate to 5-methyltetrahydrofolate, which is the methyl donor for methionine synthesis from homocysteine.

In the present study, thirty participants with CTDs and their mothers and thirty control participants and their mothers were investigated. The mutations in *MTHFR* gene are a C to T substitution at nucleotide 677 and an A to C at nucleotide 1298. They were studied using PCR (Polymerase Chain Reaction), followed by digestion with restriction endonuclease and identification by electrophoresis.

The results showed that there were no significant differences between the two groups in any of the demographic features. As regards patients dietary findings and control mothers, these showed that only 4 patients' mothers (13.3%) used the recommended periconceptional folate intake adequately, the intake of folate in 26 patients' mothers (86.7%) was below the recommended daily allowance.

There was no statistically significant difference between patients and controls as regards the presence of homozygous or heterozygous gene polymorphism of the *MTHFR* gene at exon 4. In the patient group, 40% had no polymorphism, 46.7% had heterozygous polymorphism and 13.3% had homozygous polymorphism at exon 4. In the control group, 66.7% had no polymorphism, 26.6% had heterozygous polymorphism and about 6.7% of them had homozygous polymorphism at exon 4.

Similarly, we found no significant statistical difference between patients and controls as regards maternal *MTHFR* gene polymorphism at exon 4 C677T. 40% of the patients' mothers had no polymorphism, 53.3% had heterozygous polymorphism and 6.7% had homozygous polymorphism at exon 4. At the same time, 67.7% of the mothers of the control group had no polymorphism, 33.3% of them had heterozygous polymorphism and none of them had homozygous polymorphism at exon 4. On the other hand, there was a highly significant statistical difference in *MTHFR* gene polymorphism at exon 7 between patients and controls. 6.7% of the patients had no polymorphism, 13.3% had heterozygous polymorphism and 80% had homozygous polymorphism at exon 7, whereas 40% of the control group had no polymorphism, 53.3% had heterozygous polymorphism and only 6.7% of them had homozygous polymorphism at exon 7.

Furthermore, assessment of maternal *MTHFR* gene polymorphism at exon 7 also revealed that there was a highly significant difference between mothers of patients and mothers of the control group. 6.7% had no polymorphism, 13.3% had heterozygous polymorphism and 80% of them had homozygous polymorphism at exon 7.

Interview

In this issue, we present an interview with ***Dr. Zabta Khan Shinwari*** *from the Biological Science Department, Quaid-i-Azam University, Islamabad, Pakistan. He is head of the Biotechnology Division (*Any views or opinions expressed are solely those of the author and do not necessarily represent those of EMGEN Newsletter).

Dr. Zabta Khan Shinwari

1. Dear Dr. Shinwari could you please briefly introduce yourself and explain your educational status?

I have been a merit scholarship holder from junior high school till Merit Cultural Overseas Training Award for Ph.D. (Japan) followed by Merit Fellowship for Post Doc. (1996-1998) - JIRCAS (Japan), the STA Fellow (July 1999 – Sept. 1999) Japan International Science & Technical Exchange Center and State dept/Inst. Int. Edn (USA) Leadership programme (Feb. 20th –March 18, 2006). I obtained a Master, M. Phil. and Ph. D. degrees from Peshawar, Quaid-i-Azam and Kyoto (Japan) Universities respectively.

2. Could you please tell us what your main research area is?

Fields of Specialization: Molecular Systematics, Biotechnology (Drought Tolerance), Medicinal Plants Ecology, Sustainable Development.

3. Why did you choose this field of research?

Initially I was looking for DNA bar codes to ensure standardization of herbal medicine, as 75% of the population in developing countries relies on it. I reported more than 40 genes of plants, 35 of which were sequenced to elucidate the taxonomic relationship of economically important plants 5 of which were discovered to be drought, cold, and stress tolerant. While working at the World Wide Fund for the Conservation of Nature (WWF-P), we developed ways and means to enhance the socio-economic condition of the people living in the hilly areas of Pakistan (including Northern Areas and Azad Kashmir). We introduced for the first time a concept of Applied Ethnobotany and its use in conservation and sustainable use of natural resources. These efforts led to the proper usage of under-utilized crops, improved means of collection of medicinal plants of significance, introduction of valuable exotic plants, and improving the status of primary education in such areas. These were the pioneering efforts in including Ethnobotany at M. Sc. level and opening the doors to research on medicinal plants at M. Phil. and Ph.D levels.

I also worked for COMSTECH (Ministerial Committee of S & T for OIC countries) and produced two poli-

cy documents (Biotechnology: Opportunities and Challenges in OIC member state countries (An Overview) & Biotechnology Policy options for Pakistan).

4. Do you apply any biotechnology or genomics tools in your researches and please explain how and where?

Of course, as mentioned we use biotechnology to produce transgenic crops that can tolerate abiotic stresses & secondly DNA barcodes to know exactly which plant occurs in the medicine. Now, we also work on endophytic micro-organisms to look for potential microorganisms that can be used for various application in nature (PL visit: www.molecular-systematics.org).

5. What kinds of biotechnology facilities do you have in your laboratory?

We have all the facilities from DNA extraction to PCR, electrophoresis to sequences.

6. Are there any diagnosis products that have been made in your country? (i.e. your native researchers involved in the project)

Yes.

7. Are there any late stage biological products to be commercialized in your center? Could you please explain more?

Not many, but we are working on it.

8. Are there significant biotechnology centers in your country?

Yes, there are about 30 centers that are involved in such research. Their names and addresses are to be found on our website.

9. Are there any academic training courses in biotechnology in your country? If the answer is yes, at which level and how many students are trained annually?

Yes we have many such courses as well as a degree program and more than 100 students are trained annually.

10. Are you familiar with EMRO countries and EMGEN (Eastern Mediterranean Health Genomics and Biotechnology Network)? Would you please tell us how you know the EMGEN?

One of our colleagues Dr. Afzal worked for this organization.

11. Do you have any suggestions for establishing/extending collaborations with EMRO countries?

*Yes, more interaction is needed and various workshops be organized to inter*act.

12. Are there any possibilities for young researchers from EMRO countries to participate in training courses in your biotech centers?

Yes, we work for COMSTECH also and we invited young researchers from the region.

13. What kinds of difficulties do you face, in research and commercialization of medical biotechnology in your country and the region?

Inaccessibility of quality chemicals and beaurocratic hurdles in clearing products.

14. Do you have any training courses or workshops in your research center?

Yes, we organize them periodically and display them on our website.

15. What is your idea about genomics and its applications in improving public health?

This century is the century for biology, and genomics is the back bone of biology.

16. What is your idea about commercialization of researches in the field of bioscience?

Over the past three decades, the biotechnology industry has emerged as a vital and dynamic source of new technologies for the pharmaceutical and agricultural chemical industries. Moving beyond the overstated promise for early and widespread commercial success in the 1970s, biotechnology is now associated with a sustained flow of innovations and tools, offering dramatic improvements in human health and a compelling value proposition for health care and agricultural consumers. In 1982, the U.S. Food and Drug Administration approved the first drug developed by biotechnology: human insulin produced in genetically modified bacteria. As was the case for information technology industry two decades ago, the biotech industry is beginning to show the promise of sustained growth. The challenges faced by the industry's entrepreneur are also similar-notably a lack of funding for a poorly understood field of endeavors, and a lack of people whose talent encompasses both the technology and the business. Innovation and marketing ideas are equally important. Biotech helps in value addition of existing products. In 21st century many medical treatments are no more useful, unless we supplement it with Biotechnological input. So in third generation products, Biotechnology plays an important role. Indeed, by most standards, biotechnology innovation has been the more radical. Building on findings from the frontier of the life sciences, R&D teams employ scientists from disciplines and backgrounds distinct from those employed by the established industry.

17. What is your opinion about the development of the biotechnology and genomics in your place?

We need to promote a culture of entrepreneurship and if we will succeed there is a good chance it will grow.

18. Would you please tell us about the differences of genomics and its applications between developed and developing countries? What should we do in this regard?

There is huge gap between the two, for developing countries it is hard to get equipment and chemicals etc, hence, we have to work hard to be successful.

Thank you Dr. Zabta khan Shinwari for sharing information and your opinion with us. Also we are grateful for your kind and useful cooperation.

Riboswitches

All organisms must be able to respond appropriately to their environment stimuli; most of these responses are regulated by gene expressions of transcription factors. The gene expression in bacteria is regulated by a choice between two alternative structures in the RNA transcript. Usually, one of the structures contains a terminator transcription or a paired region covering the initiation site of the translation, while in another alternative structure this regulatory element is destroyed and consequently the gene(s) are expressed. The concentration of the target metabolite will affect folding of these structures via intermediate molecules. However, it is obvious that some small molecules called riboswitches can bind directly to the regulatory mRNA structures. In molecular biology a riboswitch is defined as a portion of an mRNA molecule that can bind to a small target molecule whose binding would affect the gene activity. Riboswitches are regulate several metabolic pathways such as biosynthesis of vitamins, amino acids and purins.

Riboswitch structure

The molecular architecture of riboswitches requires two functions:

1. Molecular recognition
2. Conformational switching

These roles rely on the ability of RNA to form a diversity of structures. Simple riboswitches include one aptamer and one expression platform. An aptamer acts as a receptor and senses a ligand while an expression platform controls gene expression and is located downstream of the aptamer, to evaluate the ligand binding status of the RNA and consequently regulating gene expression. The aptamer directly binds to the small molecule (metabolite) that affects the expression platform to undergo structural changes induced by the aptamer changes. Mostly, expression platforms turn off gene expression in response to the small molecule binding to the aptamer, but some of them turn on the gene expression.

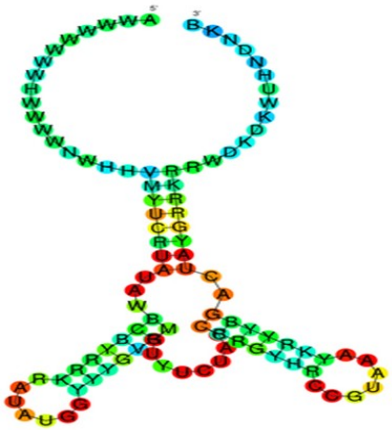

Figure1: Secondary structure of a purine riboswitch

Mechanisms

The riboswitches' structural changes due to binding with a metabolite and can be the cause of turning on or off the gene through several mechanisms. First, when the expression platform binds to the metabolite (small target molecule) a ribozyme inside the riboswitch could cleave itself, with a consequent riboswitch fold so that itcan block the ribosome-binding site for translation. The second mechanism, however, includes intrinsic termination. In the latter the riboswitch has a rich cytosine-guanine base stem-loop structure followed by a chain of uracil residues. Transcription to stall happens as a result of binding between RNA polymerase and the stem-loop. The weak interaction between DNA and mRNA at the uracil chain causes the complex to dissociate.

Classification

Riboswitches are categorized into families and classes based on two features: the type of ligand that binds to aptamer, and also their secondary structure. Riboswitches typically are categorized in a family that recognizes the same ligand. For instance, the SAM riboswitch family recognizes the S-adenosylmethionine (SAM). A family may be divided into classes of riboswitches, where each class shares a common sequence pattern (usually defining the ligand-binding pocket), or features required for folding the RNA into a three-dimensional shape. The SAM riboswitch family is divided into the five known classes that are distinguished

by their architectural features. For instance, the SAM-I class of riboswitches are unique because they form a four-way helical junction, but SAM-II forms a classic (H-type) pseudoknot.

Applications

Tools for regulated gene expression

Ligand-inducible expression is one of the important genetic tools for commonly used organisms such as *E. coli* and *B. subtilis*. However, these inducers (such as IPTG) are too costly at an industrial scale. Therefore, natural riboswitches that are activated by amino acids make them a suitable alternative for such applications. Tandem glycine riboswitch from *B. subtilis* is an example of this application and it is used for glycine-inducible production of β-galactosidase in *B. subtilis* cells.

Antimicrobial targets

It was recently discovered that some antibiotics whose mechanisms of action were unknown may act by targeting the riboswitches. For example, mutation within an FMN aptamer sequence of some roseoflavin-resistant strains of *B. subtilis* indicated that this naturally-occurring antimicrobial binds the FMN riboswitch as a major target.

Riboswitches as Boolean logic gates

Most natural riboswitches are include a single aptamer domain and expression platform, but some natural riboswitches are more complex, since they have two aptamers. These two aptamers work together (such as the tandem glycine riboswitch from *B. subtilis)* and produce a more digital response than riboswitches with a single aptamer.

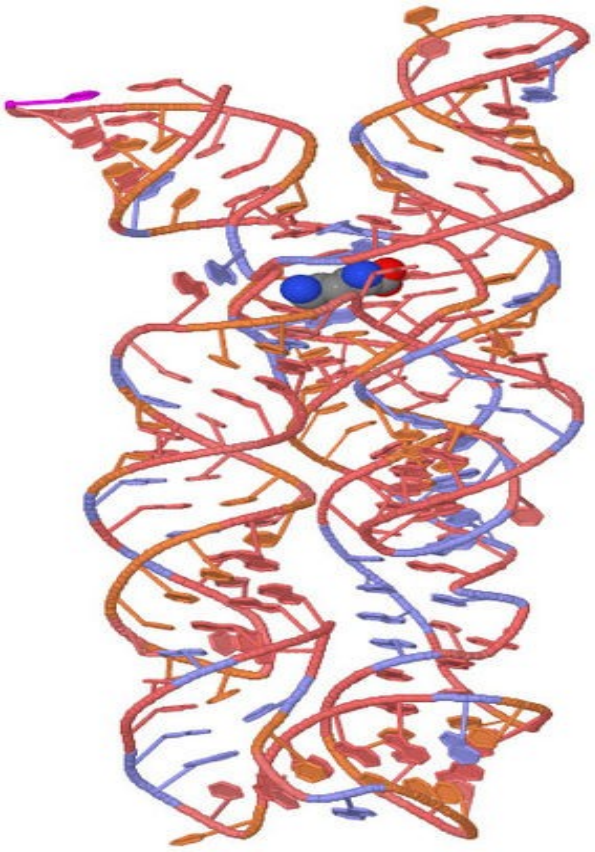

Figure2:A 3D representation of the lysine riboswitch

Riboswitch-based control of bacterial behavior

Riboswitches are important tools for controlling gene expression in bacteria, therefore they can be used to reprogram the bacterial behavior in such a way that they will be more useful at an industrial level. The ability to improve bacterial motility in response to arbitrary chemical signals can become a new tool for bioremediation and drug delivery based on the hypothesis of reprogramming of the *E. coli* chemotaxis system by placing a key chemotaxis signaling protein (cheZ) under the control of a theophylline-sensitive riboswitch. The migration upwards Shelvy of this ligand by reprogrammed cells, followed by autonomously localization at regions of high theophylline concentration, is a behavior that cannot be achieved by the natural *E. coli* chemotaxis system.

Riboswitches inhibitors have minimal side effects

Compounds designed to inhibit riboswitches would cause minimal side effects in humans based on two main reasons. First of all, riboswitches are missing in mammals, so these kind of drugs do not act on mammalian mRNA. Secondly, some riboswitches are recognized to bind their cognate ligand in fundamentally different ways compared to the mammalian proteins that recognize the same ligand. Consequently, there is reason to assume they will not interfere with ligand binding in mammalian systems.

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Stem Cell Therapy

Definition of Stem Cell

Stem cells are biological cells that are found in all multicellular organisms and are categorized in two types: embryonic stem cells, that are isolated from the inner cell mass of blastocysts, and adult stem cells, that are found in various tissues.

Stem cells are able to differentiate into different cell types within the body during early life as well as adult life. Furthermore, they serve as a kind of internal repair mechanism in many tissues by dividing essentially without any limitation to replace damaged cells. After a stem cell has divided, each new cell can remain a stem cell or differentiate into other types of cells with specific function, for example, become a brain cell, red blood cell, or muscle cell.

Stem cells are different from other cells owing to two important properties:

- First of all, they are undifferentiated cells that have the potential to renew themselves (self-renew) through cell division even after long periods of inactivity.
- Secondly, under certain conditions, e.g. experimental, such as experimental conditions, they can be induced to differentiate to become specific as to tissue or organ. In some organs, for example bone marrow, they divide regularly to repair and replace the damaged tissue. In contrast, in some organs such as the heart, they divide under special conditions.

Stem cells are important for organisms because of many reasons. In the 3 to 5 days embryo that called a blastocyst, the inner cells differentiate into many specialized cell types and organs such as the lung, heart, skin, eggs and other tissue that eventually develops into the entire body of the organism. In some adult tissues, such as brain, bone marrow and muscles, adult stem cells repair and replace cells that are lost through injury or disease. Based on the unique potential abilities to regenerate into a new cell type, stem cells offer new potentials for treating diseases like heart disease and diabetes.

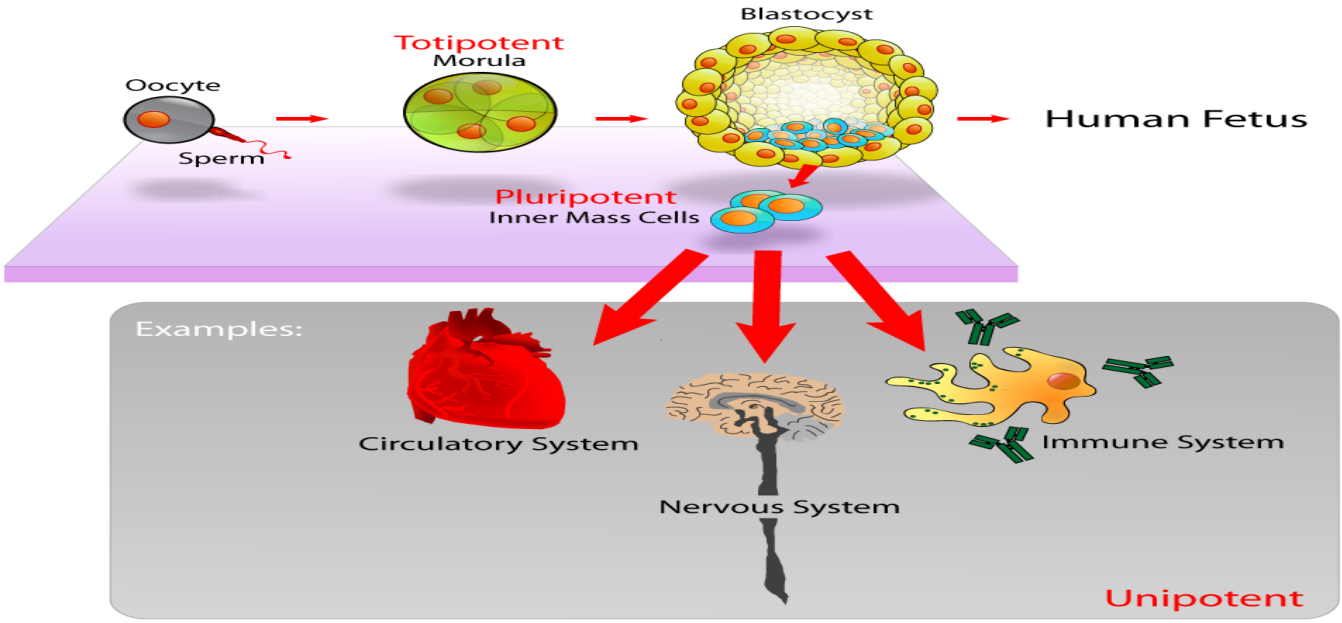

Figure1: Pluripotent, embryonic stem cells originate as inner cell mass (ICM) cells within a blastocyst and can generate any tissue in the body, including a placenta. Cells from an earlier stage of the embryo, called the morula, are totipotent and are able to make all tissues in the body and the extraembryonic placenta.

Stem cell therapy

There is the greatest motivation to discover and develop a viable source of tissues that would be capable of generating any cell type and that would avoid the problem of transplant rejection. Recent research indicates that human stem cells can differentiate into many different types of cells, for instance muscle cells, nerve cells, heart cells, blood cells, etcetera. They enhance the possibility, therefore, of major advances in healthcare. For instance, stem cells could be used to replace dead or injured cells and tissues in order to treat many diseases and conditions, including Parkinson's disease, Alzheimer's disease, leukemia, stroke, heart disease, diabetes, multiple sclerosis, rheumatoid arthritis, spinal cord injury and skin conditions, including burns. Stem cells may also offer a change in drug testing to insure their safety and efficacy by testing in e.g. liver or skin cell cultures that are derived from stem cells before being tested on humans. Further research on stem cells is needed to improve our knowledge of the complexities regarding normal human development.

Stem cells have the potential to multiply unlimitedly. They can differentiate into new stem cells with the same potential, and more specialized daughter cells. This unique feature could allow the making of tissue banks of both undifferentiated and specialized cells as well as tissues. Also treatment of diseased or damaged tissue by involving transplanting new cells or tissue, such as replacement of cardiac cells in heart disease, into the patient. Recently animal research showed that stem cells injected into the heart settled in the heart muscle and were found to beat in synchrony with the host heart.

There are different forms of stem cells with varying abilities to develop into specialized tissues. *Multipotent* stem cells can be multiplied and maintained in culture, but while they do not have an infinite capacity for renewal. This kind of stem cells can be isolated from fetuses and exist through life but in progressively decreasing numbers in adults. Researchers have tried to show whether multipotent stem cells of a specific type (such as neural cells) could be developed into other types of stem cell. The use of fetal stem cell lines would decrease the amount of fetal tissue used in therapy. For instance, instead of the neural tissue from six fetuses being required to treat one patient with Parkinson's disease, the neural stem cells from one fetus could be used to create a stem cell line that would allow the possibility to treat many patients.

Pluripotent stem cells have the potential to differentiate into other types of cells of an adult animal. In the case of cells that are derived from an embryo, they are called embryonic stem (ES) cells, while they are derived from primordial germ cells in a fetus they are termed embryonic germ (EG) cells. Currently research is focused on ES cells because attempts to create all kinds of adult cells from EG cells in mice have failed and led to abnormalities. Created cell lines that can replicate indefinitely currently use ES and EG cells obtained from embryos and fetuses respectively. As progress in research is expected to lead to the creation of stem cell banks, it would reduce the need for embryonic and fetal tissue as the stem cell lines will be self-replicating. This potential technology and the range of its applications are extensive. The first developments are likely to be the creation of tissue banks from undifferentiated and differentiated cells and tissues for transplantation. In the case of organ transplants, the use of these cells may cause transplant rejection.

The degree of rejection is highly dependent on the type of tissue transplanted: neural stem cells are protected to some extent because of the brain's unique immunological status. In the case of muscle, skin and pancreatic cells, rejection will be more of a problem. A potential solution to the problem of cell transplant rejection is the development of comprehensive pluripotent stem cell collections that are comprised of cells compatible with almost any transplant recipient. However, there are very many different immunological genotypes.

It has also been proposed that the nucleus of a donated oocyte could be removed and replaced with the nucleus of a somatic cell from a patient. This is called somatic cell nuclear transfer (SCNT). In animals, embryos formed by SCNT can, in a small amount of cases, undergo normal development. If it proves possible in humans to create a blastocyst in vitro by SCNT, any pluripotent stem cells cultivated from the resulting embryo would be genetically almost identical to the patient and, if injected, would not stimulate immune rejection. Although the formation of these cells would necessitate the creation of an embryo, once it has been determined how the oocyte reprograms adult somatic nuclei, researchers may be able to create pluripotent cell lines directly from patients, circumventing the embryo stage. This approach still requires a good deal of further research before it can be considered a serious option.

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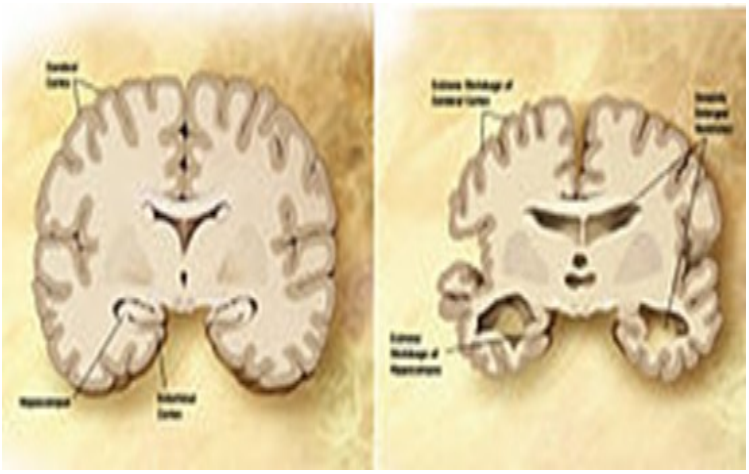
Blood Pressure Drugs Reduce the Risk of Dementia

Researchers at the American Academy of Neurology in Jan. 7, 2013 have found that using beta blockers– lowering of blood pressure – decreases the possibility of catching types of dementia diseases like Alzheimer.

Alzheimer disease refers to devastating conditions that cause malfunction or death of nerve cells in the brain. These brain changes result in loss of memory, decrease of capability to think coherently and changes in basic bodily behavior factors like swallowing and walking, and eventually death.

The research was performed on 774 elderly men, 610 of whom had high blood pressure or were being treated with medicines to decrease their blood pressure. Of about 350 participants, 15 % using blood pressure decreasing medicines, took only a beta blocker, 18 percent took a beta blocker plus other medicines, and the rest of the participants took different blood pressure medicines. Research indicated that in all cases blood pressure treatment turn out to be definitely better than no treatment at all. However, those who took beta blockers as the only blood pressure medicine showed fewer brain damages in their brains compared to men who had not been treated for their high blood pressure, or who took different blood pressure medicines. The brains of men who had taken beta blockers plus other medicines showed an intermediate reduction in the number of brain damages.



Comparison of a normal aged brain (left) and the brain of a person with Alzheimer's (right).

Source:

http://www.sciencedaily.com/releases/2013/01/130107161353.htm

http://en.wikipedia.org/wiki/Alzheimer disease

New Stem Cell Approach for Blindness, Successful in Mice

The study was lead by Professor Robert MacLaren in the Nuffield Department of Clinical Neurosciences at the University of Oxford, together with Dr Mandeep Singh, an eye surgeon from the National University Hospital of Singapore who is currently undertaking PhD studies in Oxford. The findings are published online in the Proceedings of the National Academy of Sciences, Jan. 7, 2013.

The study involved mice that were blind as a result of complete damage of the light-sensing photo-receptor cells in their retinas. After two weeks, obtained it was found that cells implanted into the mice eye had reconstituted a full light-detecting layer on the retina resulting in the mice regaining the ability to see. The cells employed were mouse 'precursor' cells on an initial pathway towards extending into retinal cells. After the experiment of pupil constriction researchers found that, among the 12 mice studied, there were 10 with improved pupil constriction in response to light. This indicates that the mice photoreceptor cells were sensing the light again.

Source: http://www.sciencedaily.com/releases/2013/01/130107160413.htm

Researchers Identify a New Gene with a Key Role in Obesity and Diabetes

Scientists from the Joslin Diabetes Center, of the Harvard University found that inhibiting the expres-sion of the gene TRIP-Br2 regulates the body burn fat, obesity and insulin resistance. They compared normal mice that had the gene TRIP-Br2 with mice that were missing the gene TRIP-Br2. The researchers rapidly found that mice lacking the gene did not gain weight, even on a high-fat diet. On the other hand, the mice that still produced protein gained weight and extended problems like obesity, insulin resistance and type 2 diabetes. The research findings were published in the online edition of the journal *Nature,* Jan. 10, 2013.

Source: http://www.sciencedaily.com/releases/2013/01/130110094756.htm

Journal of Genetic Engineering and Biotechnology

The Journal of Genetic Engineering and Biotechnology (JGEB) published by the National Research Center of Egypt (NRC) in collaboration with the Egyptian Academy of Scientific Research and Technology (ASR) is now published by Elsevier since 2011. JGEB is a biannually open access journal for Egyptian, African and Arab researchers, research institutions and universities. Its content is devoted to the most relevant research in all fields of biotechnology. The Journal will accept articles ranging from agricultural biotechnology to those covering biophysics, biochemistry as well as computer applications in biological systems.

The following fields are covered in the Journal:

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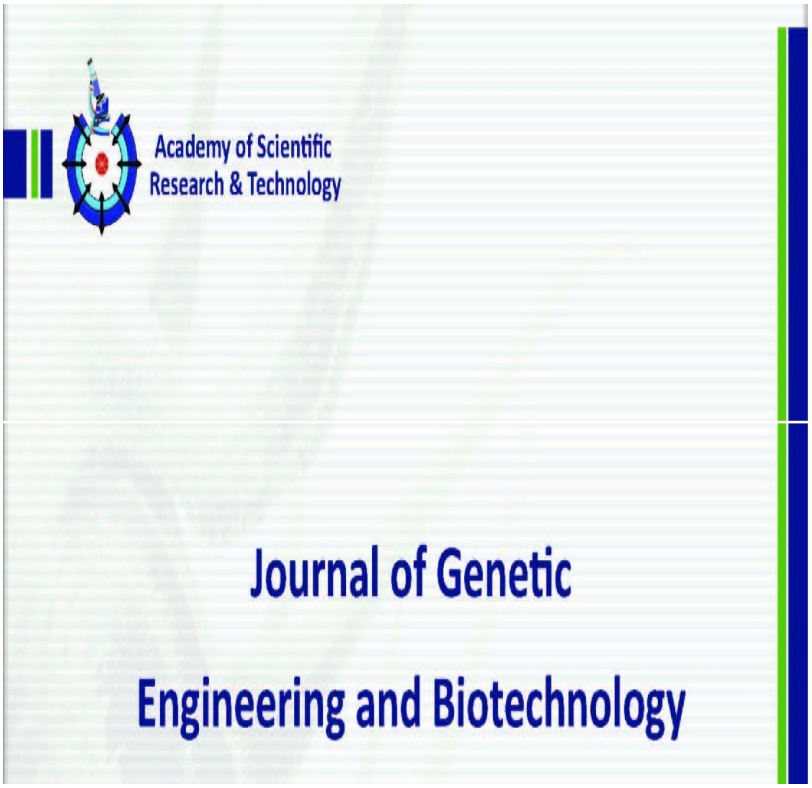
- Environmental Biotechnology
- Industrial Biotechnology
- Medical Biotechnology
- Microbial Biotechnology
- Bioenergy/Biosafety
- Genomic/Proteomic and Bioinformatics.



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Bionanotechnology: Biological Self-assembly and its Applications

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Editor: Bernd H. A. Rehm

Institute of Molecular BioSciences, Massey University, New Zealand

Publication date: February 2013

ISBN: 978-1-908230-16-4

Bacterial Gene Regulation and Transcriptional Networks

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Turku Centre for Biotechnology

In this issue, we would like to introduce the Turku Centre for Biotechnology website (http://www.btk.fi/home/main). Turku Center for Biotechnology is located in BioCity, Turku, Finland. This website is a very useful portal, consisting of seven different information sections:

Research: This section gives interesting information about molecular cell biology, structural bioinformatics and systems biology, cancer and stem cell biology, molecular immunology, molecular neuroscience and bioenergy.

Microarray and sequencing: The Finnish Microarray and Sequencing Centre (FMSC) provides research activities and services in the fields of bioinformatics, transcriptomics, epigenomics and genomics. These services cover a wide range of options depending on the customer's requirements.

Cell imaging: The Cell Imaging Centre provides state of the art light microscopy equipment and flow-cytometry services for researchers in the larger area of Turku.

Proteomics: The Turku Proteomics Facility is involved in the development and application of proteomics and spectrometry methods in various fields of life science research. This center provides research activities in the fields of Biological mass spectrometry, Imaging mass spectrometry, Protein separation, Post-translational modification analysis, Quantitative proteomics and Bioinformatics. The center is supported by Biocentre Finland and a spearhead in mass spectrometric methods for quantitative examination of proteins and proteomes, and structural examination of PTMs.

Crystallography: The Protein Crystallography Core Facility helps researchers with identifying the 3-D structure of biological macromolecules and their function.

Bioinformatics: The bioinformatics center is divided into two sections: Structural Bioinformatics and High-output Bioinformatics laboratories.

Viral vectors: The Viral Vector Facility produces recombinant Lentiviruses and propagate of *Adenoviruses* for research applications. Virus purification, titration and concentration is also presented as a service.

Reference: http://www.btk.fi/home/main

Announcement

http://www.molecular2013.org

http://www.fip.org/dublin2013

http://www.bio.org/events/conferences/world-congress

Announcement

http//www.molecular-life-sciences.de

https://selectbiosciences.com/conferences

http://www.pharmatechnology-summit.com

Title: Pilin protein of *Neisseria gonorrhoeae*

Pilin is a class of fibrous proteins that were detected in pilus structures of bacteria. Bacterial pili or fimbriae play an important role in the exchange of genetic material during bacterial conjugation, and a short pilus called a fimbrium is detected to be a cell adhesion element. Bacterial pathogens often attach to the host cells by their fimbriae. Gram-positive bacteria often have polymerized pilin molecules, while in gram-negative bacteria, where pili are more common, individual pilin are binded by noncovalent protein-protein interactions.

Source: http://en.wikipedia.org/wiki/Pilin

Title: Bioluminescent tobacco

Bioluminescence is a process involving production and emission of light in living organisms. Bioluminescence is a generally occurring form of chemiluminescence, describing chemical reactions are the cause of releasing energy in the form of light emission. Some living organisms like fireflies and anglerfish are capable of producing luciferin pigment that reacts with oxygen to generate light. They also produce luciferase enzyme that acts as a catalyst to increase the velocity of the reaction and is sometimes activated by cofactors like calcium ions or ATP. The chemical reaction generally occurs either inside or outside the cell. In bacteria, an operon, i.e, the Lux operon, controls the expression of genes related to bioluminescence. Bioluminescence produces less than 20% of the light by thermal radiation.

Source: http://en.wikipedia.org/wiki/File:Glowing_tobacco_plant.jpg

Title: 3D model of Helical capsid structure

A capsid is a protein enveloping viruses. It is composed of several oligomeric protein subunits called protomers. The 3-dimensional protein subunits, which are similar to individual proteins, are called capsomeres. The capsid encircles the genetic material of the virus. They are classified according to their structure. Most of the viruses are composed of capsids with helical or icosahedral structures. A few viruses like bacteriophages (viruses that infect bacteria), have formed more complex structures due to quality of electrostatics and elasticity. The icosahedral capsids have 20 equilateral triangular forming a polyhedron, while the helical capsids are cylindrical. The capsid faces may be composed of several protein subunits, such as the foot-and-mouth disease virus that has three protein subunits (VP1–3).

Source: http://en.wikipedia.org/wiki/Capsid