EMHGBN Newsletter

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Bacteria of the genus *Asaia* could be recruited to attack malaria

Wagdy Sawahel 18 May 2007 (Source: SciDev.Net)

Scientists have identified a type of bacteria in mosquitoes that carry malaria, which could be used to attack the parasite.

Guido Favia and colleagues at the University of Camerino (Italy) found that an α-proteobacterium of the genus Asaia bacteria inhabit the Anopheles stephensi mosquito. A. stephensi is an important mosquito vector of Plasmodium vivax (the parasite that causes malaria) in Asia. Asaia bacteria dominate mosquito-associated microbiota, as shown by 16S rRNA gene abundance, quantitative PCR, transmission electron microscopy and in situ-hybridization of 16S rRNA genes. In adult mosquitoes, Asaia sp. is present in high population density in the female gut and in the male reproductive tract. Asaia sp. from Anopheles stephensi has been cultured in cell-free media and then transformed with foreign DNA.

A green fluorescent protein-tagged Asaia sp. strain effectively lodged in the female gut and salivary glands, sites that are crucial for Plasmodium sp. development and transmission. The larval gut and the male reproductive system were also colonized by the transformed Asaia sp. strain. As an efficient inducible colonizer of mosquitoes that transmit Plasmodium sp., Asaia sp. may be a candidate for malaria control. The bacteria can also spread to mosquito offspring, as they were found in the eggs, ovaries and testes of mosquitoes and also in pupae and larvae.

The malaria parasite has become resistant to drugs in some areas and attempts to create a vaccine have so far been unsuccessful.

The researchers suggest that the bacterium could be genetically altered to attack the malaria parasite by producing anti-parasite molecules.

Daniele Daffonchio told "Instead of spraying chemical or biological pesticides, you could use this symbiotic bacteria that is passed on [between mosquitoes], "You don't have to spray every year."

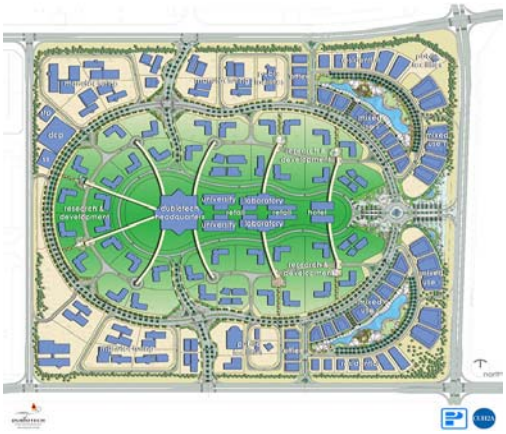
DUBIOTECH

www.dubiotech.com

The Dubai Biotechnology and Research *Park will be the Centre of Excellence in Biotechnology, bridging Research, Education and Industry through national and international collaboration. Realizing Biotechnology as one of the greatest intellectual Investments of today's world, DuBiotech's mission is built on the following objectives: 1- Create, develop and advance research and development in the region. 2- Foster biotechnology education, training and industry support. 3- Offer highly developed multifaceted infrastructure and facilities. 4- Create and provide a supportive legal and regulatory Environment. 5- Building a knowledge based bioeconomy for the region. 6- Create an environment for every stakeholder in the biotech industry to coexist and collaborate. 7- Encourage innovation through educational grants, research funds etc.*

INSIDE THIS ISSUE:

Anopheles stephensi **is an important mosquito vector of Plasmodium vivax (the parasite that causes malaria) in Asia**



DUBIOTECH Plan

As a large and dynamic business cluster, DuBiotech will provide a rich environment for networking and collaboration. The DuBiotech community will consist of a mix of key players of the ***biotechnology*** and ***pharmaceutical*** industry, as well as incubators, drug manufacturers and industry specific business support services and suppliers. This will include discovery, testing, manufacturing, marketing and distribution. To link the DuBiotech cluster with the global biotech community, DuBiotech will build ***affiliations and partnerships*** with renowned ***universities***, specialised ***medical*** institutions, ***world bodies*** and mature ***biotechnology parks and clusters***. A central focus of DuBiotech will be research, to be undertaken by both government entities and private companies. To support this R&D hub, DuBiotech has established ***The Foundation for Research and Innovation***. This Foundation will conduct government-funded research and trials in this field and offer shared facilities and equipment. Incubation facilities within the Foundation will help innovative new projects gain their foothold in the market. They will be assisted with a comprehensive administrative support, which will allow them to concentrate on their core value

The genome sequence of *A. aegypti* represents a significant technical achievement that will throw light on the interactions at the molecular level between the mosquitoes and the pathogens they spread

Scientists crack mosquito code

www.scidev.net

The draft sequence of the genome of Aedes aegypti, the mosquito that spreads dengue fever, yellow fever and chikungunya have released. The sequence is published online on May 17 in the journal Science by Nene and et al from institute for genomic research, medical center drive, USA.

Scientists believe that the genetic information could finally help control mosquito populations and the spread of disease. They expect that the genome sequence will accelerate basic research in the mosquito biology, particularly the ability of A. aegypti to transmit yellow fever, dengue and chikungunya. The authors wrote that the genome sequence of A. aegypti represents a significant technical achievement that will throw light on the interactions at the molecular level between the mosquitoes and the pathogens they spread. For example, the researchers expect it will help identify the genetic code of the receptors in A. aegypti's gut that the dengue virus attaches to. The researchers were able to compare the A. aegypti genome with that of Anopheles gambiae, the mosquito that transmits malaria. Nene believe scientists can now begin to address questions such as why does A. gambiae transmit the malaria pathogen and A. aegypti the yellow fever, dengue and chikungunya pathogens. Genetic differences may also explain their blood feeding preferences, the kind of hosts they seek and individual abilities to transmit certain pathogens.

Nene's team also compared the A. aegypti genome with that of the fruit fly Drosophila melanogaster and say the differences could shed light on which genes and gene activities are specific to mosquitoes. They hope this will allow them to identify potential target genes to use in mosquito control.

In addition, information about the genes that control sex determination means that mosquito sex ratios could be manipulated, which may be useful for population control.

According to the World Health Organization, there are 50 million cases of dengue fever each year. Yellow fever is a major problem in Africa and South America, with over 200,000 cases each year, and 30,000 deaths.

Outbreaks of chikungunya have been reported in Gabon, India, the Maldives, Pakistan and Sri Lanka, with 1.25 million cases in India alone in 2006.

The conference will focus on the recent developments in the field of Biotechnology and related fields.

The following areas of basic and applied biotechnology will be covered in the form of plenary lectures, invited talks, oral and poster presentations.

Agricultural Biotechnology
Food Biotechnology
Environmental Biotechnology
Pharmaceutical Biotechnology
Industrial Biotechnology
Bioinformatics
Nanobiotechnology

Golden Jubilee (1956 - 2006)

Coimbatore Institute of Technology

(Autonomous Institute Affiliated to Anna University and Accredited by NBA, New Delhi.)

Coimbatore - 641 014

&

Tamil Nadu Agricultural University

Coimbatore - 641 013

Announce
A
Two-Day Conference
on
BIOTECHNOLOGY FOR HUMAN WELFARE

CIT-BIOTECH 2007

20th & 21st July 2007

First Announcement

3rd International Congress on Persian gulf countries Health Awareness

By Slogan:

Regional consolidation & health improvement

October 29-31

Manama-Bahrain capital city

Topics:

- Health improvement and consolidation in Persian gulf countries
- Fight against infectious diseases and their causative agents
- Regional co-operation on health improvement
- Workshop on expansion of national agencies active in health improvement
- Research on the basis of international experiences

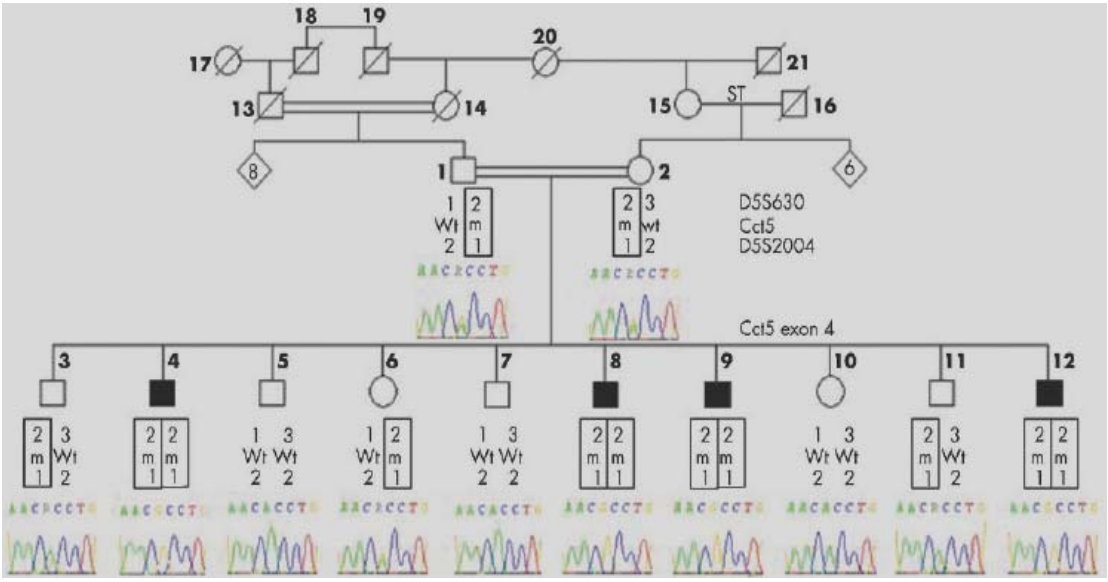
For more information please contact health office
Fax: 17279546 **Web site:** www.he.moh.gov.bh

Mutation in the Cct5 gene causes Mutilating sensory neuropathy with spastic paraplegia

A Bouhouche, A Benomar, N Bouslam, T Chkili and M Yahyaoui. (2006) *J Med Genet. 43: 441-443*

Mutilating sensory neuropathy with spastic paraplegia is a very rare disease with both autosomal dominant and recessive modes of inheritance

Mutilating sensory neuropathy with spastic paraplegia is a very rare disease with both autosomal dominant and recessive modes of inheritance. We previously mapped the locus of the autosomal recessive form to a 25 cM interval between markers D5S2048 and D5S648 on chromosome 5p. In this candidate interval, the Cct5 gene encoding the epsilon subunit of the cytosolic chaperonincontaining t-complex peptide-1 (CCT) was the most obvious candidate gene since mutation in the Cct4 gene encoding the CCT delta subunit has been reported to be associated with autosomal recessive mutilating sensory neuropathy in mutilated foot (mf) rat mutant.



Segregation of the mutation A492G in the pedigree of the IDR family displaying autosomal recessive mutilating sensory neuropathy with

Methods: *A consanguineous Moroccan family with four patients displaying mutilating sensory neuropathy associated with spastic paraplegia was investigated. To identify the disease causing gene, the 11 coding exons of the Cct5 gene were screened for mutations by direct sequencing in all family members including the four patients, parents, and six at risk relatives.*

Mutilating hereditary sensory neuropathy with spastic paraplegia is a very rare disease with both autosomal dominant1–3 and autosomal recessive4–7 modes of inheritance. The autosomal recessive form is characterized by progressive distal sensory neuropathy, often complicated by severe infections, osteomyelitis, and amputations, and by a relatively mild paraplegia related to bilateral upper motor neuron involvement. Some clinical characteristics differentiate the patients described by Cavanagh et al4 from those described by Thomas et al5 in terms of disease onset, atrophy of the spinal cord, and defects in upper limbs, suggesting the existence of genetic heterogeneity in this group of disorders.

We recently mapped the disease locus in a consanguineous Moroccan family (family IDR) with mutilating sensory neuropathy associated with spastic paraplegia to a 25 cM genetic interval between markers D5S2054 and D5S648.8. In this genetic interval, where more than 90 genes and pseudogenes have been mapped, the most obvious functional candidate gene seems to be the Cct5 gene encoding the epsilon subunit of the cytosolic chaperonin-containing tcomplex peptide-1 (CCT complex) since chaperones have been associated with neurodegenerative disease.9 Also, mutation in the Sprague-Dawley rat Cct4 gene, which encodes the delta subunit of the CCT complex, has been shown to be associated with mutilating sensory neuropathy,10 whereas mutation in the CCT gamma subunit has been reported to cause degeneration of retinal neuroepithelial cells in zebrafish.

In the present study, we report a missense mutation in exon 4 of the Cct5 gene as the cause of mutilating sensory neuropathy with spastic paraplegia.

In the Department of Neurology and Neurogenetics, Ho^pital des Spe´cialite´s (Rabat, Morocco), we identified a Moroccan consanguineous family (IDR) with four affected males displaying a mutilating sensory neuropathy with spastic paraplegia. The disease onset was in early infancy with spastic paraplegia and progressive sensory loss leading to mutilating acropathy

involving both upper and lower limbs. Magnetic resonance imaging revealed severe atrophy of the spinal cord predominantly in the posterior tract. Blood samples were obtained with the informed consent of all IDR family individuals in accordance with study protocols approved by the university ethics committees. Genomic DNA was extracted using standard procedures. The Cct5 gene (ENSG00000150753) consists of 11 exons, and exon specific intronic primers were designed covering the splice sites at both ends of the exons (table 1). Both strands were sequenced with the BigDye dRhodamine Terminator Reaction Kit (version 1.1) according to the manufacturer's instructions using an automated ABI 310 DNA sequencer. The collected chromatogram data were analysed with SeqScape software version 2.0 (all from Applied Biosystems, Foster City, CA).

In this genetic interval, where more than 90 genes and pseudogenes have been mapped, the most obvious functional candidate gene seems to be the Cct5 gene encoding the epsilon subunit of the cytosolic chaperonin-containing tcomplex peptide-1 (CCT complex)

Results: Squence analysis of the Cct5 gene revealed a missense A492G mutation in exon 4 that results in the substitution of a highly conserved histidine for arginine amino acid 147. Interestingly, R147 was absent in 384 control matched chromosomes tested.

Conclusion: This is the first disease causing mutation that has been identified in the human CCT subunit genes; the mf rat mutant could serve as an animal model for studying these chaperonopathies.

Interview

Dr Bouhouche Ahmed one of famous researchers in Service de Neurologie et de Neurogénétique from morocco answers our questions

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

The research area of our Department, Neurology and Neurogenetics of Rabat, Morocco (Pr Mohamed Yahyaoui, Head of the Department) concerns the study of the hereditary neurological diseases (Neurogenetics): abnormalities in chromosomal localization, identification of genes and mutations, genetic diagnosis and genetic conselling. The second area concerns the clinical trials in Neurology.

Would you tell us what you know about the EMHGBN?

It is a recent biotechnology and genomics network of the Eastern Mediterranean countries, sponsored by EMRO.

what are your suggestions for the EMHGBN development ?

- Find sufficient financial resources
- Develop research collaboration between EMHGBN members on the specific resources of this region which have an important biodiversity and genetic variability in order to safeguard them in this region.
- Develop communication bridges between researchers and the policy deciders of all member countries.
- give priority to R&D researches

What is your opinion about the development of the biotechnology & genomics in your country?

Development of the biotechnology & genomics in Morocco is recent and knows many difficulties such as the lack of the high technology in the laboratories, lack of consequent financial resources, …. Recently, a National political strategy of research begin emerging, since the Moroccan Ministry of Education and Research (minrecherche.gov.ma/politique/33.htm) created many national research networks (Pôles de Compétences) on some national priority research axes. Four of them are related to biotechnology & genomics: Pôle de Compétences en Neurogénétique (PCNG) ; Pôle de Compétences Microbiologie du Sol et Biotechnologie des Plantes (MISOBIOP) ; Réseau Marocain des Plantes Médicinales et Aromatiques (REPAM) ; Pôle de Compétences Pharmacochimie (PHARCHIM).

Would you tell us what the differences of biotechnology improvement between developed & developing countries are?

Developing countries have certainly many high quality researchers but have not the same working conditions as their colleagues in developed countries. So, many of them leave their own country to the developed ones. With the EMHGBN, these researchers will have the opportunity to remain in the Mediterranean countries by moving from one to the other instead to the occidental countries.

Do you have any suggestion for increasing the relationship in the field of biotechnology & genomics among Eastern Mediterranean countries?

- To develop RTC network which will give opportunities to researchers and students of these countries to follow live web courses or to communicate with each other without requiring them to invest time and resources for travel.

TRAINING

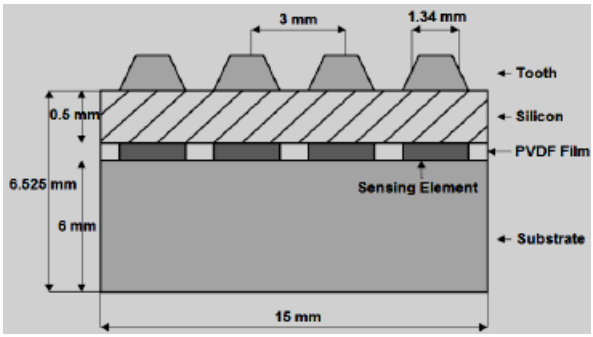
Tactile sensing and biological tissues

Siamak Najarian, a Professor in Amirkabir University of Technology, Tehran, Iran.

Design and fabrication of different artificial tactile sensor were suggested which can measure the compliance of the sensed object based on piezoelectric or piezoresistive characteristics

There are five main sensing modalities, i.e., sight, sound, smell, taste, and touch. It is important to briefly compare them to gain insight into the development of tactile sensing.

Computer vision systems are now commercially available and widely used for industrial inspection, recognition, monitoring, and many other application areas. Human speech analysis and speech recognition are currently very active research areas and have identified a wide range of applications. Even the senses of smell and taste have their electronic analogies. Devices known as electronic noses are now readily available for the detection of a range of molecules, and chemical tests can be implemented to automatically analyze across particular spectrums in a simulation of taste tactile sensing can be defined as a system that can measure a given property of an object or contact event, through physical contact between the system and the object.



Here, the sense of touch seems to have received less attention comparing to visual and auditory senses. A considerable number of research reports in tactile sensing exist, but it is simply not as much as the research in the other sensory modalities.

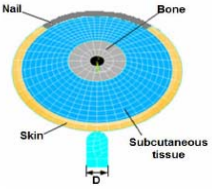
Potential application areas for tactile sensing are robotic surgery through minimally invasive surgery (MIS), rehabilitation procedures, service robotics, MEMS research, agriculture, and food processing.

Tactile sensors are utilized to sense a wide range of stimuli in various biomedical engineering and medical robotics applications, such as detection of the presence or absence of a grasped tissue/object or even mapping of a complete tactile image. From a biomedical engineering point of view, surgery is probably the most interesting and fastest-developing area of research in which the use of tactile and visual sensing is of critical importance A surgeon should be able to feel the tissues and detect the presence of blood vessels and ducts during a procedure. This ability is especially important during controlled manipulation tasks such as grasping internal organs, gentle load transferring during lifting, removing tissues (e.g., gall bladder in laparoscopic surgery and loose bodies in knee arthroscopy), and suturing tissues together. These capabilities, coupled with the ability to detect various tactile properties, demonstrate the importance of tactile sensing in minimally invasive surgery.

Applications of these sensors on surgical graspers showed the reliability of the artificial tactile sensing technology

Tactile sensors could be incorporated into the surgical tools to detect and control the contact of the tools with delicate biological structures.

Professor Siamak Najarian designed, fabricated and tested different piezoelectric and piezoresistive tactile sensors used in endoscopic tools for detecting compliance and softness of the biological tissues are being presented. In the comparison made between the experimental data and the results obtained from the finite element analysis of the systems, it was found that there is a reasonable correspondence between these two methods for every sensor. Also, they propose and test a novel method to investigate the effects of the tumor existence that appear on the surface of a biological tissue. Finite element analysis provided properties such as the shape, depth, and location of the tumor which are all important parameters for physicians to pinpoint the correct condition of the patients. They obtained good agreements between the numerical and experimental results received from various artificial tactile sensing systems.



Finite element model of fingertip Showing essential anatomical structures of a finger

The First International Congress on Health Genomics and Biotechnology will take place on 22-27 Nov. 2007 in Tehran, Islamic Republic of Iran

The congress will cover more than 40 different topics including:

- Genomics and Biotechnology in non communicable diseases
- Genetics of Human Pathogens
- Biopharmaceutics and Genetic Technology
- Bioethics, Biosafety in Genomics and Biotechnology Research, Application, Policy, Regulation, Networking and Management

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