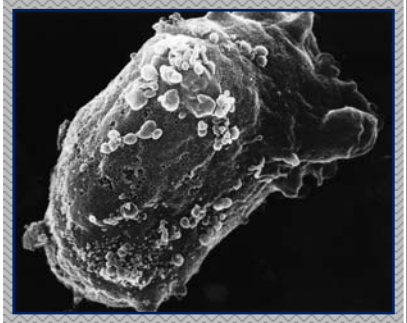

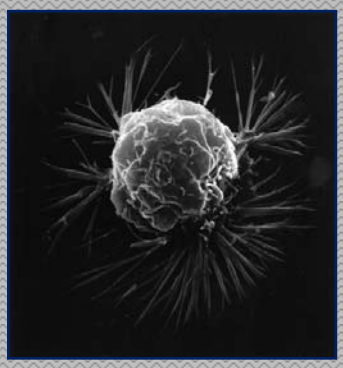

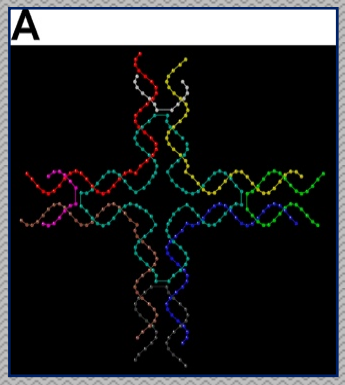

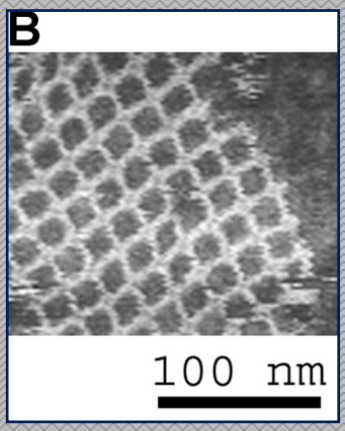

EMHGBN Newsletter

Vol. 2, Issue 2, December 20th, 2007

INSIDE THIS ISSUE:

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

Address:
Biotechnology building, #69, Pasteur Ave., Pasteur Institute of Iran
Tehran, Iran, 13164
Tel: +98-21-66954324
Fax: +98-21-66465132
E-mail: emhgbn@gmail.com, secretariat@emhgbn.net
Website: www.emhgbn.net

Prepared by:
Nasim Shadmany and Mohammad Shadmany
Page design: Nasim Shadmany, and Mohammad shadmani
Editor: Dr. S. Sardari

Comparing Transmission of *Mycobacterium tuberculosis* in East Azarbaijan and West Azarbaijan Provinces of Iran by Using IS6110 RFLP Method

The article entitled" Comparing Transmission of Mycobacterium tuberculosis in East Azarbaijan and West Azarbaijan Provinces of Iran by Using IS6110-RFLP Method" aims to determine the genetic diversity of M. tuberculosis population in East and West Azarbaijan province, and to detect the manner of transmission of the disease in these regions and comparing in East and West Azarbaijan. The study was done by Mohammad Asgharzadeh, Saber Yousefee, Hossein Samadi Kafil, Mohammad Reza Nahaei, Khalil Ansarin and Mohammad Taghi Akhi. Corresponding author of this paper, Dr. Mohammad Asgharzadeh is working in Tabriz Tuberculosis and Lung Disease Research Centre and Biotechnology Research Center, Tabriz, Iran and the paper was published in Biotechnology. 2007; 6(1):273-277. This journal is accessible through Asian Network for Scientific Information.

Despite medical advancement, tuberculosis (TB) remains as a health problem in developing and developed countries. It is estimated that between 19 - 43% of the world's population is infected with *Mycobacterium tuberculosis*, but a few (5-10%) develop active TB. DNA fingerprinting using the insertion sequence IS6110 is a valuable tool to study TB epidemiology. Combining the DNA fingerprinting methods with conventional epidemiologic methods can improve our understanding of its transmission. From March 2004 to March 2005 totally 171 pulmonary and extra pulmonary TB patients were subjected. Four isolates of *M. tuberculosis* with insufficient DNA were excluded. Two *M. tuberculosis* was isolated from West Azarbaijan assumed to be cross- contaminated. Out of 165 isolates, 112 (67.88 %) were originated from East Azarbaijan and 53 (32.12 %) from West Azarbaijan. Clustering rate was determined on 154 isolates. This contained five or more copies of IS6110. Among these isolates, 123 different patterns were observed. RFLP typing revealed a variable number of hybridizing bands that ranged from 0-17, with the majority of strains (93.3 %) having at least five copies. The average copy number of IS6110 per strain was 7.3 that only 11(6.7 %) strain had less than five IS6110 copies which four strains were from East Azarbaijan and seven strains from West Azarbaijan. Transmission rate of West Azarbaijan patients were 23.91 %[(16-5)/46] whereas it was 18.52 %[(31-11)/108] for patients of East Azarbaijan. In East Azarbaijan females were slightly more infected with tuberculosis but in West Azarbaijan males were more infected with tuberculosis (P=0.0048). The percentage of clustered strains in East Azarbaijan was 27.68 % and in West Azarbaijan was 30.19 %, which were lower than observed in Tehran (43 %). There was some difference in clustering rate between East and West Azarbaijan. The proportion of clustered patients in West Azarbaijan was higher (34.8 %) than in the East Azarbaijan (28.7 %), suggesting a more active transmission of tuberculosis in West Azarbaijan. This may reflect the poor economic and less developed condition in West Azarbaijan. Difference between female and male patients in East and West Azarbaijan was significant (P=0.0048).

In addition, in West Azarbaijan tuberculosis was more frequent in males. It was similar with other parts of the world. However, in East Azarbaijan tuberculosis have a same prevalence in males and females.

This can be due to different factors such as social structure and different culture of these provinces, also in East Azarbaijan females are more infected by tuberculosis than females in West Azarbaijan. This might be due to deprivation of the female populations, as reflected by lower education, more poverty, and malnutrition.

Dr. Mohammad Asgharzadeh

National Measles Lab

Public Health Labs / MOH

Damascus/Syria

What follows below is a report of National Measles Lab in Syria. It was written by Dr. Mouna Alkhatib, Head of National Measles Lab.

Regarding to the program of elimination of measles in 2010 which was adopted by WHO, the lab was established in 1999 and accredited as a national lab in WHO global measles / rubella laboratory network

The lab activities include:

1- Confirmation of the diagnosis of clinically suspected cases of measles and rubella, collected by surveillance groups distributed all over the country, using IgM ELISA assays.
2- Virus isolation by culturing appropriate samples using Vero/SLAM cells and detecting CPE
3- Indirect immunofluorescence assay (IFA) for detection of measles
Virus in the cell culture

4- Quality assurance by participating in the annual proficiency test prepared by global laboratory

5- Quality control by referring selected specimens to regional reference laboratory for validation

6- Contribution with Primary Health Care in research (Determination of susceptibility to measles infection in high risk groups - Determination of susceptibility to rubella infection in women of child bearing age)

7- RT- PCR and molecular epidemiology of measles:

The sequence of the 450 nucleotides that code for the COOH-terminal 150 amino acids of the nucleoprotein (N) is the minimum amount of data required for determining a genotype of a measles virus.

-Cell lysates from measles-infected cell cultures is used as a sample to extract RNA

-RT-PCR is done using primers 60 and 63-3 :

MV60: GCT ATG CCA TGG GAG TAG GAG TGG

MV63-3: CTG GCC CTC GGC CTC TCG CAC

-Analysis of PCR product by agarose gel electrophoresis

-Purification of PCR product by PCR clean-up system.

-The efficiency of purification is determined by agarose gel electrophoresis

-PCR product is shipped to RRL (Regional Reference Lab) for sequencing

8- A research titled (Identification of measles virus genotypes from recent outbreaks in countries from Eastern Mediterranean Region) was done in 2004.

-The samples were taken from the outbreak 2002-2003

-The results showed that the Syrian viruses belonged to genotype D4 and different from the other published sequences within this genotype.

9- Another study is going on with samples from the Outbreak 2006-2007.

Dr. Mouna Alkhatib

Targeted Nanoparticles for Cancer Therapy

Over the past decade, there has been an increasing attention in using nanotechnology for cancer therapy. The development of smart targeted nanoparticles (NPs) which are able to deliver medicines at a sustained rate directly to cancer cells may offer better efficacy and lower toxicity for treating primary and advanced metastatic tumors. We draw your attention to some potential classes of targeting molecules that are under development for the delivery of NPs.

Formerly cancer was considered an untreatable disease, but nowadays most patients diagnosed with early stage disease will survive their disease. Progresses in cancer diagnostics and therapeutics over the last few decades are mainly responsible for this remarkable improvement. This is revealed by the five-year survival rate for all cancers diagnosed between 1996 and 2002, which is 66%, up from 51% in 1975-1977. Even with these advances, cancer remains the second important cause of death in the US, exceeded by just heart disease, and accounts for one in four deaths.

Challenges in cancer treatment: rationale for targeted cancer therapy

Chemotherapy has developed into an essential component of cancer treatment for almost all cancers. In spite of the last 30 years of attempt on oncology drug discovery, conventional chemotherapeutic agents still show poor specificity in reaching tumor tissue and are frequently hindered by dose-limiting toxicity. The combination of developing controlled release technology and targeted drug delivery may present a more effective and less harmful solution to conquer the restrictions found in conventional chemotherapy.

The main consideration of drug delivery is to attain more efficient therapies while eliminating the potential for both under- and over-dosing. Other benefits of using controlled release delivery systems can include the maintenance of drug levels within a preferred range, the need for fewer administrations, optimal use of the medicine in question, and improved patient compliance.

Passive versus active cancer targeting

Strategies on delivering drug-encapsulated NPs to cancerous tissue have been concentrated on passive and active targeting. The previous approach uses the exclusive properties of the tumor microenvironment, most notably: (i) Leaky tumor vasculature, which is extremely permeable to Macromolecules relative to normal tissue; and (ii) a dysfunctional lymphatic drainage system, which causes an enhanced fluid retention in the tumor interstitial space. As a result of these traits, the concentration of polymeric NPs and macromolecular assemblies found in tumor tissues can be up to 100 xs higher in comparison with normal tissue.

The tumor-specific deposition, also considered as the enhanced permeability and retention (EPR) effect, take places as NPs extravasate out of tumor microvasculature, leading to an accumulation of drugs in the tumor interstitium. The main constraint of passive tumor targeting is the incapability of reaching a sufficiently high level of drug concentration at the tumor location resulting in little therapeutic efficacy and inducing undesirable systemic adverse effects. In comparison with passive targeting, which utilizes pharmacokinetic manipulation and NP size reduction to attain electron paramagnetic resonance (EPR), active targeting is reached by delivering drug encapsulated NPs to uniquely recognized sites while having minimum undesired effect elsewhere. Active tumor targeting is usually achieved through both local and systemic administration of NPs with targeting molecules conjugated on the particle surface that can identify and bind to particular ligands that are distinctive of cancer cells. In the case of local drug delivery, the cytotoxic drug encapsulated in the NPs can be delivered straightly to cancer cells while minimizing detrimental toxicity to non-cancerous cells contiguous to the targeted tissue.

NP carriers for targeted therapy

Active targeting can be reached by the functionalization of NPs with ligands such as antibodies, peptides, nucleic acid aptamers, carbohydrates, and small molecules. Some of these therapeutic conjugates are currently under clinical development or in clinical practice at present. Several classes of materials have been developed for targeted NPs, including biodegradable polymers, dendrimers, nanoshells, nucleic-acid-based NPs, and liposomes. Here we only discuss about polymers and nanoshells. Descriptions of other classes of materials could be found in original paper. Polymeric NPs can be prepared to encapsulate hydrophilic or hydrophobic small drug molecules, and macromolecules such as proteins and nucleic acids. These NPs can be utilized to discharge the encapsulated medicines at a controlled rate by surface or bulk erosion, diffusion, or swelling followed by diffusion, in a time- or condition-dependent manner. The rate of drug release can be controlled by alteration of the polymer sidechain, development of new polymers, or creation of copolymers. In general, these biodegradable polymer systems can supply drug levels at an optimum range over a longer period of time than other drug delivery methods, thus maximizing the efficacy of the drug and increasing patient compliance, while improving the capability of using highly toxic, poorly soluble, or relatively unstable drugs. Targeted therapeutic approaches would considerably benefit from the combination of targeted delivery with controlled release technology. This could permit a large quantity of drug to be delivered to cancer cells per targeting biorecognition event, and make it feasible to reach a steady state cytotoxic drug concentration at the tumor location over an extended period of time. Moreover, the combination of targeted delivery and controlled release could reduce the possibility of considerable systemic toxicity because the drug is encapsulated and biologically inaccessible during transportation in systemic circulation. Liposomes are prepared of amphiphilic unilamellar/multilamellar membranes of natural or synthetic lipids.

Lipids are distinguished by a hydrophilic head group and a hydrophobic tail. Hydrophobic and hydrophilic molecules have been encapsulated into liposome NPs. Doxorubicin-encapsulated liposome (Doxil) was the first to achieve US Food and Drug Administration (FDA) approval in 1995 and has effective antineoplastic activity against a wide variety of human cancers including Kaposi's sarcoma and ovarian cancer. Even with the clinical success of liposomes, these nanocarriers are restricted by suboptimal stability and drug release profiles *in vivo*.

Targeting molecules for the development of targeted NPs

Potential targeting molecules for the development of targeted NPs are: Monoclonal antibodies, nucleic acid aptamers, Oligopeptide-based targeting molecules, Folate-based targeting molecules, Affibody molecules, Nanobodies and AdNectins. Here we describe nucleic acid aptamers as one of the interesting class of targeting molecule.information about other classes could be found in original paper.

Aptamer targeting molecules

A new class of molecules, referred to as nucleic acid ligands (aptamers), has been developed that may rival antibodies in its potential for therapeutic and diagnostic applications. Similar to antibodies, aptamers can be prepared to bind target antigens with high specificity and affinity. The application of aptamers as targeting molecules has multiple potential benefits over antibodies. Aptamers with high affinity for a target can be reached through *in vitro* selection; a process called systemic evolution of ligands by exponential enrichment (SELEX). SELEX is essentially reiterative rounds of *in vitro* selection and amplification to augment aptamers present in a library of ~1015 random oligonucleotides. Aptamers separated with the SELEX procedure are small (~15 kD compared with ~150 kD for antibodies), lack immunogenicity, and are expected to have better tumor/plasma distribution and tumor-penetration properties in comparison with antibodies. In addition, as the SELEX procedure is a chemical one that does not involve animals, nucleic acid ligands can be prepared to bind to any target in spite of the toxicity or immunogenicity of the target. Moreover, nucleic acid ligands recognized through the SELEX process can be produced by means of chemical oligonucleotide synthesis, which has been revealed to scale-up well, with little or no difference from batch to batch in binding affinity. This is in contrast to antibodies, which frequently exhibit batch-to-batch variation in quality during scale-up production. Conjugating aptamers to NPs has shown to result in more effective targeted therapeutics or selective diagnostics than nontargeted NPs.

[**Ref**: Frank X. Gu, Rohit Karnik, Andrew Z. Wang, Frank Alexis, Etgar Levy-Nissenbaum, Seungpyo Hong, Robert S. Langer and Omid C. Farokhzad, Targeted nanoparticles for cancer therapy, Nano Today, Volume 2, Issue 3, June 2007, Pages 14-21]

The 1st International Congress on Health Genomics and Biotechnology

November 24-26 2007, Tehran, Islamic Republic of Iran

Introduction

Pasteur Institute of Iran and Eastern Mediterranean Health Genomics and Biotechnology Network organized the First International Congress on Health Genomics and Biotechnology in Tehran, Iran at a prestigious Summit Meeting Conference Hall from 24-26 November 2007. This congress was held in order to introduce the related new research findings in the region, strengthening the relationship among researchers of EMRO member countries through discussion and debate among the health-related scientists, to draw the attention of research and training centres and executive organization of Health Genomics and Biotechnology, recognition of the Genomics and biotechnology potentials and capabilities in member countries, distribution of developed international collaboration culture in technology transfer and Research and Development activities among the Islamic countries institute companies organizations and also induce collaboration in production, training, research and development and recognition of challenges and obstacles in advancement of Genomics and Biotechnology in regional countries as well as the world.

We welcomed all organizations and Genomics as well as biotechnology- focused scientist to take an active role in the forth coming international congress which attracted more than 2200 scientists from all over the world in order to exchange health-related information in Genomics and Biotechnology.

The congress was inaugurated by: Dr. Kamran Bagheri Lankarani, his Excellency the Minister of Health and Medical Education of I.R. Iran.

Chairman of the congress

Dr. Abdolhossein Rouholamini Najafabadi, General Director of Pasteur Institute of Iran.

Topics

Genomics and Biotechnology in non-communicable diseases

Genetics of Human Pathogens

Biopharmaceuticals and Genetic Technology

Bioethics, Bio safety, in Genomics and Biotechnology Research and Application and Policy and Regulation, Networking and Management.

Organizers

Eastern Mediterranean Health Genomics and Biotechnology Network (EMHGBN)-Pasteur Institute of Iran.

Supporters

Organization of Islamic Conference-Iranian Society of Medical Genetics

Iranian Molecular Medicine and Biotechnology Networks.

National Institute for Genetic Engineering and Biotechnology

Department of Biotechnology, University of Tehran SOHA/Health Iran Medical Devices Co.

Iranian Genetics Society.

Genetic Research Centre.

Co-Organizer

Iranian Incorporation for Contemporary international Conferences and Fairs (IICIC)

Subject headings of the congress

1- Genomics and biotechnology in non-communicable diseases cancer genetics, cytogenetic clinical genetics and counselling gene and genome analysis Prenatal and Perinatal genetics PGD, prenatal diagnosis, and gene therapy, immune genetics, epidemiology and population genetics, others

2- Genetics of human pathogens, molecular detection and characterization genomics of human pathogens (viral, bacterial, parasitic, etc) and host interaction genomics of drug response and resistance, others.

3- Biopharmaceutics and genetic technology recombinant proteins diagnostic technology monoclonal antibody therapy regenerative medicine (cell, stem cell technology and tissue therapies) clinical trial in bio pharmaceutics vaccine development drug discovery design bioinformatics gene, drug delivery systems gene silencing model organisms, transgenesis nanomedicine pharmacogenomics integrative applications in genomics biotechnology, others.

4- Bioethics ethics in genomics and biotechnology, research Islamic views in genomics and biotechnology, others.

5- Biosaftey in genomics and biotechnology research and applications gene and genome technology gene therapy transgenic human infection control biomedical laboratories, others

6- Policy and regulation, networking and management prevention of genetic disorders, communicable diseases genomics, biotechnology development plan networking funding in genomics, biotechnology development clinical trial in bio pharmaceutics human resource management, project management capacity and resource building trends in bio pharmaceutics in EMRO, others.

List of congress workshops

- Two dimensional electrophoresis and proteomics genetic diagnosis of muscular disorders
- Introduction to advanced muscular and cytogenesis techniques:
- Application in clinic NF-KB transcription factor activity assay by DNA-based ELISA to obtain the latest information about congress workshops

News

Steering Committee Election for Eastern Mediterranean Health Genomics and Biotechnology Network

A meeting for electing steering committee of Eastern Mediterranean Health Genomics and Biotechnology Network (EMHGBN) was held at summit meeting conference hall, Tehran, Iran on November 24th, 2007 coincided with the first international congress on health genomics and biotechnology.

The participants were representatives of selected centres of excellence in health-related biotechnology and genomics in the Eastern Mediterranean Region. The meeting was sponsored by EMHGBN network secretariat and Pasteur Institutes of Iran. Professor Hassar (Morocco) was introduced as the chairperson. Dr Sardari (Iran) and Professor Hassar made some reminders about the election procedure. All the participants agreed that the secretariat of the EMHGBN network would rest with Iran due to its recent activities and existing expertise in networking. Dr Sardari (Iran) was introduced as the general director of the EMHGBN network. Afterwards the participants voted for 7 members; 2 members from the industry and 5 members from the academia.

The results were announced as following:

Two members from the industry: Dr Sonia Abdelhak (Tunisia), Dr Fereidoun Mahboudi (Iran).Five members from the academia: Dr. Shaikha Salim Al Arrayed (Bahrain), Dr. Wagida Anwar (Egypt), Dr. Abdelhamid Barakat (Morocco), Dr. Habiba Chaabouni (Tunisia), Dr. Anna Rajab (Oman).

Interview with invited focal person:

First of all it is our pleasure to have you here in our congress. I am from EMHGBN newsletter. I want to ask some question to have short interview. Would you please introduce yourself and your background to research and the research area you are interested and you are working at the moment?

I am Wajida Anwar. I am professor of community medicine at the University of Egypt and I am the director of genetic engineering and cancer biotechnology in university. My interest as a public cancer specialist is to prevent diseases. I have experience to investigate the effect of environmental pollution on the cells of human being to change the chromosomes and genetic material which cause mutation for example in cancer. So we have some studies on Molecular Epidemiology. By using molecular techniques in Epidemiology we have evaluated exposures of certain chemical, physical or biological events which induce cancer. Also we use Biomarkers in our research for example, Biomarkers of exposure and biomarkers of changing chromosomes. I am interested in application of genomics and Biotechnology in public health, because in several ways, it can help the public health such as vaccine development, drug development and diagnostic techniques. Our other goals are to clean the environment from pollutant such as pesticides and genetically modified food.

What are the strong and weak points have you considered in holding the first international congress in the field of health genomic and biotechnology?

It is very important congress which is covered by the media to make attraction for politicians in medical biotechnology spot. This field of science requires special concentration from government particularly in terms of financial support and needs opportunity for training, travelling abroad and having exchange or visiting, and all these needs approval from our institution, having this gathering international is really important to share experience between different nations and different cultures. Also I believe that small meetings and workshops can be more effective for the scientists to have close communication in common interests which these congresses cover up those criteria.

Interview

I want to get your opinion about the future of biotechnology in EMRO countries especially Iran and the role of such congress in promoting health biotechnology?

This congress will improve the collaboration among EMRO countries. If somebody has experience should transfer it to the others. So it is important to have exchanges of views and I believe in north to south cooperation. You know cooperation can be north to south or south to north. North means countries which are have experience and south are the countries which are still developing, so here we want to share the experience among ourselves.

Do you have collaboration with Iranian research centres?

No, not yet but I hope

Did you start to find some research centres or company in Iran to start collaboration with them?

Not yet but I collected some brochures and I am searching for Iranian production and companies but the quality of Iranian company is very good and I think that the prices are reasonable for us. So our country will prefer to buy Iranian products, because they are more cost-effective than products of other countries and also marketing among EMRO countries help their economy to grow faster.

Thank you very much for taking your time and it was very kind of you.

Reporter: Abolfazl Dashtbani

Next Wave of Innovation

Over the past 10 years, a wave of scientific advances and new technologies has dramatically changed how medicines are discovered. "Screening" tools, which help researchers sort through millions of compounds in a short period, have drastically reduced the time and cost associated with discovering compounds that might have use as medicines. Other technologies are enabling more efficient delivery of drugs to the patient and greater knowledge of how diseases work at the genetic and molecular level has allowed researchers to pursue new targets for therapy and better predict how certain biopharmaceuticals will affect specific groups of people.

Automation and Robotics

The process of drug discovery relies heavily on innovation, insight, and a lot of hard work. But in the past decade, a new industrial revolution has entered the laboratory. The introduction of automation and robotics into the drug discovery process has greatly enhanced the ability to explore and identify new drug candidates. Now, millions of chemical compounds can be manufactured in a matter of weeks. By mixing and matching these compounds like Lego® blocks, scientists are able to find the best combination that might one day become a drug candidate.

Using liquids, chemicals and sample plates, robotics can run tests on thousands of these compounds on biological samples for potential therapeutic activity. Walk into a modern research facility and you might be surprised to find that in some places, it looks more like a manufacturing plant. The large amounts of data produced are fed into computer systems for analysis and used by the researcher for another round of innovation and discovery.

Bioinformatics

You may have heard of megabytes and gigabytes in relation to computer storage. Drug discovery produces an amount of information that needs even larger measurement terms — terabytes (a thousand gigabytes) and beyond. It would be easy to get buried in all that data if it were not for key advancements in a field called bioinformatics.

Bioinformatics uses systems and mathematical models to advance the scientific understanding of living systems. At its simplest level, bioinformatics involves the creation and maintenance of biological databases, including DNA sequences. But bioinformatics also includes calculation tools. These tools can decipher the molecular

Pathways of disease, find patterns in the way genes respond to drugs, interpret the three-dimensional structure of important proteins, and enable the computer-aided design of new drugs. By linking data between research laboratories and the clinic, bioinformatics has become a crucial tool in moving discoveries more rapidly to the patient.

Biomarkers

Picture yourself in a routine physical exam. The doctor takes a few samples of blood and urine or even asks you to spit in a cup. A drop of each sample is placed on a microchip and positioned in a tabletop machine in the doctor's office. The rest of the samples are sent off to a clinical laboratory. Your molecular profile has just been read.

Every disease leaves a signature of molecular "biomarkers" in our body — genes turn on and off or proteins released into the bloodstream. Biomarkers measured in blood and other samples can tell us the state of our health and how we might respond to treatment. They are powerful tools that can detect certain diseases at their earliest stages before symptoms appear, when they are most treatable. Biomarkers can also guide the physician to prescribe an effective drug that will be free of side effects. Biomarkers represent the future of medicine, in which disease diagnosis, treatment, monitoring and prevention will be guided by a continual readout of our molecular make-up.

Molecular Targeting

The idea behind molecular targeting is to design drugs that specifically attack the molecular pathways that cause disease, without disrupting the normal functions in our cells and tissues. Drugs developed using this approach can be less toxic and more effective than current medicines. Already, for certain types of cancer, targeted drugs have demonstrated superior effectiveness in reducing or eliminating tumours. They have also allowed patients to maintain their quality of life without the side effects of chemotherapy.
How does one develop a targeted drug? The key comes from a better understanding of the molecular pathways as if they were part of a complex network or "circuit" of interactions. If the Network can be understood, and then a drug may be found that can shut down one critical pathway without disturbing others

Nanotechnology

You can't see it, but soon it will be everywhere. Nanotechnology is the science of building microscopic devices at the molecular and atomic levels. In medicine, nanotechnology will be used to help with diagnosing and treating diseases. For example, tiny gold-coated "nanoshells" could act like smart bombs, zeroing in on a tumour, entering cancer cells, and lying in wait until an infrared beam or radio wave signals the particles to release an intense, deadly dose of heat energy that destroys the cancer cells.

Cancer patients often undergo radiation or chemotherapy treatments to kill cancer cells. But in the process, normal cells are killed as well, leaving the patient's immune system weak. Nanoparticles are able to "target" cancer cells, delivering the radiation or drugs to only these cells, while leaving normal cells untouched.

"Quantum dots" are miniscule fluorescent signals that can light up tumours and lymph nodes. This enables surgeons to remove the complete tumour or node during surgery. By using different colour dots scientists can create a "barcode" to instantly classify the type of tumour found. Other tiny devices built onto microchips use nanotechnology to read single strands of DNA, much like a ticker tape. The technology is small, but the possibilities are enormous.

Personalized Medicine

After researchers sequenced the human genome, they had a "map" of the human genes in DNA. This new genetic knowledge opens up the possibility of developing "targeted" therapies for people with specific gene sequences, and it can help physicians choose from among existing medicines the treatments that best meet individual genetic, lifestyle, and environmental differences.

In addition, researchers are developing genetic tests that can tell us if we are susceptible to certain types of cancer, atherosclerosis, stroke, osteoporosis, vision and hearing loss, or even cavities. The patient and physician can use this information to establish a program of health management, including monitoring, as well as lifestyle, nutrition or protective drug therapy.

[**Ref**: http://www.innovation.org/index.cfm/FutureofInnovation/NextWaveofInnovation]

Announcement

5th International Symposium on Nanomanufacturing (ISNM-5)

THEME:

Nanomanufacturing of Devices/Products for the Biomedical and Life Sciences Industries

Welcome to the official site for the **5th International Symposium on Nanomanufacturing (ISNM-5)**. ISNM-5 will be hosted by the Singapore-MIT Alliance in **Singapore** from 23 - 25 January 2008.This Symposium follows the highly successful ISNM-1 in 2003 at MIT in the USA, ISNM-2 in 2004 at KAIST in Korea, ISNM-3 in 2005 at the University of Cyprus, Cyprus and ISNM-4 in 2006 at MIT. The ISNM was created to foster interaction between the well-established manufacturing community and the emerging nanotechnology community. Through the ISNM, scholars, engineers and members of the business community address basic research, education, dissemination, implementation and cooperation issues related to the manufacture of devices/products that utilize the characteristics of nano-scale features/components/phenomena.

[Ref: http://isnm2008.org]

Cover Pictures Description (Up to Down)

Title: AIDS: Pathology: SEM: Lymphocyte with HIV Cluster
Description: Shows six different SEM images of a lymphocyte with HIV cluster.
Source: Cecil H. Fox
Title:
Pathology: SEM: Breast Cancer Cell
Description:
Pictured is a breast cancer cell, photographed by a scanning electron microscope, which produces 3-dimensional images. This picture shows the overall shape of the cell's surface at a very high magnification. Cancer cells are best identified by internal details, but research with a scanning electron microscope can show how cells respond in changing environments and can show mapping distribution of binding sites of hormones and other biological molecules.
Source: National Cancer Institute
Description:
The DNA structure at left (schematic shown) will self-assemble into the structure visualized by atomic force microscopy at right**.** (A) DNA "tile" structure consisting of four branched junctions oriented at 90° intervals. These tiles serve as the primary "building block" for the assembly of the DNA nanogrids shown in (B). Each tile consists of nine DNA oligonucleotides as shown. (B) An atomic force microscope image of a self-assembled DNA nanogrid. Individual DNA tiles self-assemble into a highly ordered periodic two-dimensional DNA nanogrid. DNA lattices have applications as a substrate for:
A_ layout of molecular electronic circuit components
B_ surface chemistry_ for example ultra compact annealing arrays
C_ molecular robotics_ for manipulation of molecules using molecular motor devices
Source: Wikipedia encyclopedia. http://en.wikipedia.org/wiki/Main_Page
Strong M: Protein Nanomachines. PLoS Biol 2/3/2004: e73.
http://dx.doi.org/10.1371/journal.pbio.0020073
Author: (Images were kindly provided by Thomas H. LaBean and Hao Yan.)