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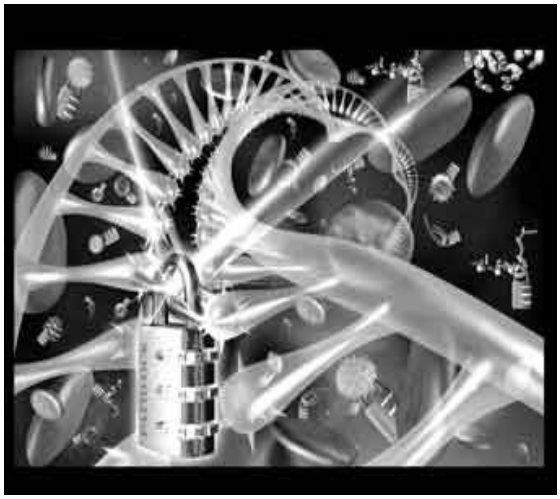
Biotechnology In Iran

http://www.iran-daily.com

The rapid pace of biotechnology's development in Iran has amazed scientists across the world. Behnaz Bakhshandeh elaborates on the so-called Big Science, its applications and status-quo in Iran in an interview with Iran Daily. Bakhshandeh is a 6th year student of direct Ph.D. of biotechnology the medical branch at the University of Tehran, for the second group of biotechnology students. She presented an article at the 6th Royan International Research Award on the Expansion and Differentiation of Umbilical Cord Blood CD 133+ Cells into Neurons. She is currently involved in several projects with the biotechnological sector.

Statistics suggest that the amount of information on the Internet on biotechnology has, in less than a year, doubled while a similar increase in engineering-related fields will take 10-30 years. How do you evaluate the share of Iranian scientists in this cutting-edge technology? Biotechnology is almost a modern technology that is developing day to day in its various applications and benefits. Referring to tables and graphs, you can touch the development of biotechnology not only quantitatively but also qualitatively.



Research for new vaccines or drugs can significantly improve community health services.

Biotechnology was established in Iran 8-9 years ago. It is fortunate for such state of the art know how to be born in a third world country.

Due to the special attention given by former president Mohammad Khatami to this technology, the development of biotechnology both qualitatively (related projects and international papers) and quantitatively (involving students and research centers) has advanced and is at an acceptable level. Hopefully we are seeing more progress under the current government.

What are the main spheres of biotechnology? Which is the most applicable/valuable in Iran?

Biotechnology is the technology of using bioscience to benefit people. This technology is a bridge between a community's demands and pure biological sciences. Maybe we can name genetic engineering as the main core of biotechnology. Biotechnology in general is divided into molecular, microbial, environmental and marine fields as well as agricultural and medical branches. Biotechnological methods can be summarized into two parts: firstly, optimization and isolation of natural favorable species and secondly production of new species via genetic modifications.

Iran is a developing country with a rather large population. Agriculture has been the main profession of Iranians due to suitable climate and productive soil. With the application of agriculture biotechnology, it is possible to isolate highly productive or qualified species of rice, wheat and other crops. On the other word, by using new modified species, which are salinity and drought compatible, we can farm on unsuitable lands or avoid wasting products in unsuitable weather conditions.

Through another technology named "Microarray Technology," we can analyze ten thousand genes or synthesized sequences on a 4cm*4cm slide, and then identify mutations or similarity between normal and sick people or among ethnic groups genetically. FONA (fiber optic nucleic acid) is another technology that by using DNA probes, which are synthesized for determined gene or specific sequence, can determine presence or absence of a favorable sequence in the defined sample. In this technology, probes contain one fluorophore and one quencher and transfer of fluorescent signals through optical fibers.

Do qualified personnel and infrastructure exist to support the use of biotech products?

Fortunately there has been invaluable effort to develop biotechnology in Iran, in recent years. There is growing awareness among the authorities concerned of the importance, capability and inevitable role of biotechnology in resolving the community's problems. Attending national biotechnology conferences every other year, holding students conference in biotechnology and biology and also conducting educational workshops with the cooperation of universities, private companies and NGOs, all indicate the importance of the science. However, this is not sufficient if we plan to top the Middle East in terms of technology.

Recently Iranians have produced transformed rice, which is resistant to some pests. Now it is in the stage of experimental culture and breeding. At the Research Center of Petroleum Industry, some projects have been designed in order to sweeten oil via microbial biotechnology. In relation to the extraction of metal and copper mines there are some projects designed to increase efficacy of extraction via

environmental and microbial biotechnology.

In the past five years, many private companies have been established for producing, importing and exporting biotechnological materials and related lab equipment. And they for sure make huge profits to the best of my knowledge.

In Royan Research Center, Pasteur Institute of Iran, National Research Center for Genetic Engineering and Biotechnology, Tarbiat modarres University and Pharmacy Faculty of Tehran University, some useful projects on genetic analysis of Iranians, production of recombinant proteins, stem cells' capability in treatment and discovering new methods for some diseases, are currently underway.

A Comprehensive Model of Community Genetic Services Incorporating Prevention, Control and Care of Genetic Diseases

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Director of W.H.O Collaborating centre College Of Medicine, King Saud University Riyadh, Kingdom of Saudi Arabia

Over the last few decades, genetic diseases have surfaced as a major cause of morbidity and mortality in majority of the developing countries. Due to the chronic nature of these diseases and lack of definitive treatment, many prevention, control and care strategies have been proposed and applied in different countries. Basically these strategies utilize Community Genetic Services which cover a wide range of multifaceted genetic- related requirements of the individuals, the families and the community.

In Saudi Arabia, based on our experience of Community Genetic Services for over twenty years, we have developed a penta-axial SETRR model appropriate to the traditions, customs and religious believes prevalent in the population. This model for prevention, control and care of genetic diseases incorporates: Services, Education, Teaching, Registry and Research, is entertained as follows:

1.Provision of services that must reach the entire population in a country in order to provide equitable health services to all citizens. This involves establishment of genetic clinics and genetic centres, well-trained and knowledgeable family doctors, nurses and social workers and consultants.

2.Education for the health care personnel, including the family doctors as partners in these services.

3.Teaching to improve knowledge of the medical and non-medical personnel, patients, their families and the general public at large.

4.Preparation of the Registry of genetic diseases in the population.

5.Research to identify the molecular pathogenesis of the genetic diseases, establish more definitive methods for the identification and diagnosis of the genetic defect, establish appropriate management strategies and identify ways and means of prevention and control. This programme incorporates field research, laboratory investigations and clinical

trials for management of commonly encountered genetic disorders in Saudi population.

With the model in view, Community Genetic Services programme in Saudi Arabia were initiated during the early 1980s. The programme was exemplified by blood genetic disorders, where these disorders occur at a high frequency in several regions of Saudi Arabia. The programme incorporated a National Working Group and W.H.O collaborating centre.

More recently, other genetic diseases were included and additional bodies i.e. the co-ordinating National Committee was conceived at the Ministry of Health, Riyadh. Consequently, several Programmes were adopted to improve genetic services through:

1.Establishment of specialized centers and genetic clinics for care and management of patients.

2.Provision of learning and training opportunities for health personnels by way of courses, workshops and conferences.

3.Adoption of the health care personnel, scientists, patients, parents and the general public about genetic disorders by holding doctor-doctor, doctor-patient and patient- patient meeting.

This is a continuous process and new ideas and inputs from different related disciplines have been incorporated in order to achieve the ultimate goal of prevention and control.

In this presentation, the Saudi "model" will be outlined and discussed as an applicable model to the Gulf Region.

Embryos spared in stem cell creation

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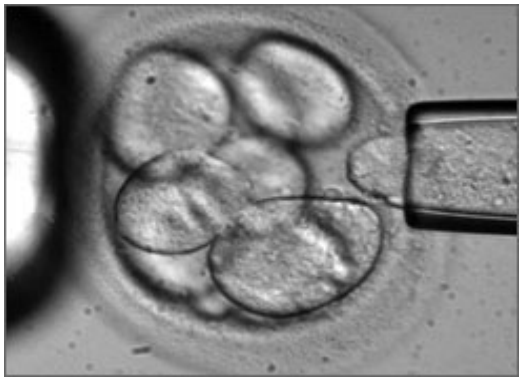

A single cell is removed from a human embryo to be used in generating embryonic stem cells. A biotech company has developed a new way of creating stem cells without destroying human embryos.

Researchers have found a way to create human stem cells from a single cell — without harming embryos.

But this discovery may not eliminate the concerns of those who have opposed stem cell research.

The alternative approach, reported in the journal *Nature*, relies on a fertility clinic method of diagnosing genetic diseases in embryos.

"We started this thinking it wasn't going to work, but it went surprisingly well," says study lead author Robert Lanza of Advanced Cell Technology, Inc. of Alameda, Calif. One of the most active and controversial players in the stem cell field, ACT is best known for announcing in 2001 that it had cloned a short-lived human embryo.

The alternative method is based on pre-implantation genetic diagnosis (PGD), which uses single cells taken

from an 8- to 10-cell embryo to check for diseases. Minus the single cell, the embryos continue dividing normally and can be implanted into a mother's womb. About 1,500 babies have been born this way nationwide, Lanza says.

Lanza's team started with 16 frozen embryos donated by fertility clinic patients and removed a single cell, or blastomere, from each one. From the blastomeres, they grew two cell colonies, or lines.

If confirmed, the study authors hope the experiment will offer an alternative to the standard technique for generating human embryonic stem cells, allowing them to be created as a side benefit of PGD performed now at a few fertility clinics. "It's not often that technology offers a solution to an ethical dilemma, but this could be one," says bioethicist Ronald Green of Dartmouth's Ethics Institute, a member of ACT's unpaid research advisory panel.

University of Wisconsin researchers first isolated human embryonic stem cells in 1998. Biomedical researchers have long hoped the cells — capable of turning into nearly any tissue — could be grown into replacement organs for patients suffering diseases ranging from diabetes to Parkinson's.

However, opponents of the research, such as Richard Doerflinger of the U.S. Council of Catholic Bishops, object to the destruction of embryos needed to create the cell lines. Citing such concerns, President Bush in 2001 limited federal funding of embryonic stem cell research to then-existing cell lines, less than two dozen in practice. Bush vetoed a Senate bill expanding funding in July.

"It is encouraging to see scientists at least making serious efforts to move away from research that involves the destruction of embryos," said White House spokeswoman Emily Lawrimore in a prepared statement.

Stem cell scientists, such as Lawrence Goldstein of the University of California, San Diego, voiced muted enthusiasm for the alternative method. "For scientists, it's a moderately important step forward," he says. "Scientifically, it's good to have another source of embryonic stem cells," Goldstein says.

Among opponents, Doerflinger says by e-mail, the study "raises more ethical questions than it answers," citing concern about the long-term health of children born through fertility treatments.

First Pan Arab Human Genetics Conference 4-6 April 2006 - Dubai, UAE

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The scientific program of the conference has been preceded by a workshop organized by the Department of Health and Medical Services (DoHMS) in association with the Centre for Arab Genomic Studies on **Fundamental Approaches in Molecular Diagnosis of Hemoglobinopathies** (April 4, 2006) at the Genetic and Thalassemia Center, Dubai. Experts with extensive experience of molecular detection of hemoglobin disorders conducted the course. The laboratory workshop program focuses on genome analysis in

various monogenic disorders starting from basic DNA detection to PCR, RFLP, restriction enzyme digestion, DNA fingerprinting, reverse dot-blot hybridization, and automated DNA sequencing followed by interpretation of results. Workshop seminars included lectures on molecular medicine, methods and techniques in molecular biology, and molecular characterization of hemoglobinopathies.

The scientific program of the **First Pan Arab Human Genetics Conference** included 23 lectures given by 20 speakers distributed in 4 sessions from 5 to 6 April 2006 at Al Bustan Rotana Hotel, Dubai. Topics that have been covered in the conference included: Population genetics, genetic disorders in the Arab World, clinical and molecular basis of human disease, genomics, cancer genetics, genetics of blood disorders, cytogenetics, consanguinity, and bioethics. Speakers in the conference included a faculty of renowned Arab and International scientists. Arab speakers included members of the executive committee of CAGS as well as all members of the newly formed **Council of CAGS** representing 9 Arab countries. Despite the fact that the conference is Pan Arab, international speakers are also numerous and represent important institutes active in human genetics: The

Human Genome Organisation, University College London (UK), Cambridge University (UK), Max-Planck Institute for Molecular Genetics (Germany), University of Bonn (Germany), Russian Academy of Science (Russia), and the European Neuromuscular Center (The Netherlands).

Click here for further information

First Pan Arab Human Genetics Conference Key Note Speakers

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Arab World Speakers

- **Prof. Adekunle D. Adekile** (Department of Pediatrics, Kuwait University, Kuwait)
- **Prof. Andre Magarbane** (Unit of Medical Genetics, University Saint-Joseph, Lebanon)
- **Prof. Habiba Chaabouni** (Hospital Charles Nicolle, Tunisia)
- **Prof. Hanan Hamamy** (National Center for Diabetes, Endocrinology & Genetics, Jordan)
- **Prof. Laila Zahed** (American University of Beirut Medical Center, Lebanon)
- **Prof. Lihadh Al-Gazali** (Department of Pediatrics, UAE University, UAE)
- **Prof. Lotfi Chouchane** (Faculty of Medicine of Monastir, Tunisia; Weill Cornell Medical College, Qatar)
- **Prof. Rabah M. Shawky** (Society of Human Genetics, Ain-Shams University, Egypt)
- **Prof. Riad A. Bayoumi** (Sultan Qaboos University, Oman)
- **Dr. Aida I. Al Aqeel** (Armed Forces Hospital, Saudi Arabia)
- **Dr. Erol A. Baysal** (Genetics and Thalassemia Center, Al-Wasl Hospital, UAE)
- **Dr. Ghazi Omar Tadmouri** (Centre for Arab Genomic Studies, Dubai, UAE)
- **Dr. Mohammed Naveed** (Centre for Arab Genomic Studies, UAE)
- **Dr. Shaikha Al Arrayed** (Salmaniya Medical Complex, Ministry of Health, Bahrain)

HUGO Speakers

- **Prof. Hans-Hilger Ropers** (Member, HUGO Council; Director, Max-Planck Institute for Molecular Genetics, Berlin, Germany)
- **Prof. Nick K. Yankovsky** (Chairperson, The HUGO Education Committee; Head, Genome Analysis Laboratory, Institute of General Genetics, Russian Academy of Science, Russia)
- **Prof. Sue Povey** (Chairperson, The HUGO Gene Nomenclature Committee; Department of Biology, University College London, UK)

International Speakers

- **Prof. Geoff Woods** (Department of Genetics, Cambridge University, UK)
- **Dr. Jon Andoni Urtizberea** (Research Director, European Neuromuscular Center, The Netherlands)
- **Dr. Osman El-Maarri** (University of Bonn, Germany)

Training

Cancer

http://www.moh.gov.ae

What really causes cancer? Is it a virus or genetic code, the effect of carcinogens on cellular growth, or a weakened immune system? Is it a poor, "cancer-promoting" diet? Or does it have to do with the psychological factors influenced by stress, poor attitude, or low self-esteem?

We do not really know; cancer seems to be linked to all of these factors.

Family history is definitely a factor, and if someone in our families has had cancer, that should increase our watchfulness for this disease as well as encourage us to use early detection procedures.

Cancer: Key Risk Factors

1. Smoking

2. Dietary excesses—fats (mainly saturated, fried polyunsaturated oils, and cholesterol); protein; obesity (calories)

3. Under nutrition—deficient fiber and nutrients such as vitamins C and E, beta-carotene, selenium

4. Occupational chemicals

5. Food chemicals—pesticides, additives, hormones

6. Air and water pollution

7. Excess sunlight and radiation

8. Certain pharmaceutical drugs—estrogen, metronidazole (Flagyl), lindane (Kwell), or griseofulvin

9. Alcohol

10. Viruses

11. Psychological influences—such as personal changes, loss of loved one, grief, divorce

Possible Food Carcinogens:

Additives: food colors, flavors, nitrates, and nitrites.

Saccharin: implicated (still unclearly) in bladder cancer.

Hormones: in meat, possibly even DES, which was recently banned.

Pesticides: sprayed on foods before and after harvesting.

Aflatoxin: produced by molds on peanuts, other legumes, and possibly other foods; may cause liver cancer.

Coffee: questionably implicated in bladder cancer. Decaffeinated coffee may be treated with carcinogens such as trichloroethylene or methyl chloride.

Sugar: may weaken immunity and increase cancer risk.

Nitrates and nitrites: common in preserved and smoked meats, such as ham, bologna, salami, corned beef, hot dogs and bacon; may convert to carcinogenic nitrosamines.

Pickled or salt-cured foods: may influence stomach and digestive lining.

Barbecuing: creates protein changes and production of benzopyrene, a mild carcinogen. Charbroiled meats and burnt toast may also be concerns.

Mushrooms: may contain toxic hydrazines.

Potatoes: when bruised or green.

Other foods: cottonseed oil, cocoa, mustard, black pepper, horseradish, fava beans, parsley, celery, alfalfa sprouts, parsnips, and figs all may contain mild carcinogenic substances. (Some of the agents produced by these plants may act as natural pesticides.)

Let us now explore some of the anticancer nutrients. There are three main avenues for defense against cancer, and each has specific nutrients that will support that function:

1. Strengthening the immune system—vitamins C and E, vitamin A and beta-carotene, zinc and copper, and the B vitamins folic acid, riboflavin, pyridoxine, and pantothenic acid.

2. Avoiding or neutralizing carcinogens—vitamins C and A, selenomethionine, and the amino acid L-cysteine.

3.Preventing DNA and cellular damage—vitamin A, vitamins C and E, beta-carotene, and the minerals selenium, zinc, and manganese.

With our new knowledge, we can clearly now do something about the threats of cancer and our future. Caring for ourselves and others as if we really love life and have a desire to live will win over all possible disease!

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