

Medical Biotechnology Research Journal

Innovation, synergy, excellence: to be accomplished.

Founder: Seyed-Moayed Alavian, MD
Editor-in-Chief: Hamid R. Tavangar, MD
Managing Editor: Nasser Baligh, MD
Website Manager: Taher Doroudi, MD
Contact info:

P.O. Box 14155/4656, Tehran-Iran
editor@mbr.ir

www.mbr.ir

Tel: + 98 912 1718142
+ 98 912 2708706

Fax: + 98 21 8958048

Graphic: A.Najafzadeh, Tarh Baran

Information for authors and contributors:

This journal will provide an opportunity for you to display your company alongside premier providers of medical technology and healthcare services worldwide, especially in the region. In addition to the comprehensive introduction, biotech companies will have a chance to interact directly with the key buyers and prime decision makers from the vast and remunerative markets of the Middle East and Middle Asia. Medical Biotechnology Research Journal will provide an excellent opportunity for you to connect with the local medical service providers, as well as the most established ones in the entire region.



To be covered in next issue:

- Original Article
- Review Article
- Abstracts
- Interview
- Forum
- Company News
- Product Spotlight
- Upcoming Events



Editorial

Hamid R. Tavangar, MD
Editor-in-Chief

Welcome to the first issue of Medical Biotechnology Research Journal. Once it took years for a technological advancement to reach other parts of the world. Besides, keeping information was considered to be beneficial. Those days are history now. We are alive in one of the most remarkable epochs of the expansion of the human's intellectual endeavor. It is time to take the lead, move ahead, and inform others of our improvements immediately. In other words, a moment's delay equals loss of markets, hence loss of benefits.

Most experts agree that the world cannot afford the luxury of waiting to act. By working now to put in place the technology and the infrastructure required to meet future needs, we can defeat the long-lasting, life-taking diseases in the world and improve the quality of life for people worldwide.

The goal of any researcher in biological sciences is to understand life well enough to improve it. Researchers are just beginning to see how they can seize the power of life, and they are quickly pushing the frontiers of science and technology, developing tools and techniques that harness life to solve some of human's most fundamental problems. We are here to furnish our local clients with novelties from around the world, and to present our up-to-date advances to the world in order to bridge the gap and to accommodate the special needs of each party for global strategic marketing. Such practice, we hope, brings us together as one: 'In unity, there is strength.'

'Medical Biotechnology Research Journal' focuses on biotech companies with growth potential. Through our understanding of the industry, analysis of the competitive forces, the technology in hand and market demand, we point out the leading forces that shape up biotech community. We, at Medical Biotechnology Research Journal, take the stance that biotechnology is where the computer industry was 30 years ago and like the computer, biotechnology is going to have a larger impact on our lives than we can imagine over the next 20 years.

Our mission is to generate lucrative ideas for individual/institutional investors, doctors, pharmacists, healthcare executives, stockbrokers, and investment clubs in biotechnology sector. To be the most successful, both scientific and financial investors must tolerate the volatile market and have the tenacity for the long-term. While volatility is often associated with risk, it is also a source of opportunity. Therefore, we do have one comment: look for opportunities, always.

The biotechnology sector is an exciting, yet complex and risky investment arena. Assessing the scientific basis of a new technology requires specialized knowledge. Evaluating the soundness of a drug's clinical trial results demands a strong understanding of trial design and statistical analysis. Our experts do have that skill. That is how we strive to provide our subscribers with scientific information and investment opportunities.



Why Biotechnology?

Born in 1957 in Tehran, Dr. Seyed-Mojtaba Tabatabaei spent the first years of his life in Mashad. He studied pharmacy at Tehran University, and then majored in biotechnology at Leeds University in UK. He has been a lecturer at pharmacy faculty of Tehran University of Medical Sciences since he returned home in 1991. He founded biotechnology department in pharmacy faculty in 1999. Right now, he is an associate professor at pharmacy faculty of Tehran University of Medical Sciences.

Biotechnology will find its way to us whether we are ready or not, that is: all around us will be filled with magnificent products manufactured through biotechnological procedures.

Mass media have declared the twentieth century to be 'the century of science and technology', and proclaimed that the next will be 'the biotech century'. What does biotechnology mean? Biotechnology is defined as any technique that uses living organisms (or parts of organisms) to produce or biotransfer products, to improve plants and animals or to develop microorganisms for specific uses. With this definition in mind, it is easy to see that biotechnology is an old and well established science affecting every day of our lives. Although still considered a nascent industry, the biotechnology industry has an interesting history.

Biotechnology began when primitive man became domesticated enough to breed plants and animals; gather and process herbs for medicine; make bread and wine; create many fermented food products including yogurt, cheese and various soy products; create septic systems to deal with their digestive and excretory waste products, and to create vaccines to immunize themselves against diseases. Archeologists keep discovering earlier examples of each of the uses of organisms by man, but examples of most of these processes go back to between 5,000 and 10,000 BC.¹

Between the evolution of ancient biotechnology techniques and today's modern biotechnology industry that uses recombinant DNA to produce recombinant protein is a huge chunk of history that includes: the discovery of penicillin in 1928, the discovery of the structure of DNA in 1953, the deciphering of the genetic code in 1961, the isolation of DNA in 1869, the first recombinant DNA experiments in 1973, the creation of the first hybridomas in 1975, the start of Genentech (the first biotechnology company) in 1976, the production of the first monoclonal antibodies for diagnostics in 1982, and the production of the first human therapeutic protein (humulin) in 1982.²

In 1950's and 60's, pharmaceutical companies turned toward finding new sources for drug production. An important turning point in this industry was the ability to transfer genes from one microorganism to another in 1970's; in other words, the development of gene manipulation, which created a novel source for drug production. In this way, hormones such as human insulin and growth hormone were released in the market. Another major breakthrough in 1980's was the ability to produce any protein by recombinant methods in any amount needed.

Why proteins?

Based on scientific findings in basic biochemistry and molecular biology in the second half of the twentieth century, proteins were found to have a key role in metabolism. In fact, most of diseases occur as a result of underproduction, overproduction or malproduction of one or several proteins. Diabetes mellitus and factor VIII deficiency serve as good examples. Herewith, the new science of 'proteomics' was born in order to investigate the role of proteins in vital processes.

As a matter of fact, biotechnology is the fruit of understanding molecular basis of diseases and appearance of DNA recombination. This, you might say, is nothing new, but why it took so long before biotechnology really worked. One reason is that we could not produce drugs by traditional ways in an economical manner. As it was previously mentioned, all these precious molecules had already been known by the middle of the twentieth century, but they were hard to produce until recently. For instance, 1 mg of erythropoietin, which has a known role in enhancing blood production, could be extracted from 1000 liters of urine of someone who had hypoxia!

In short, we have turned our attention toward understanding the mechanisms that our body uses to heal itself. We, as a consequence of understanding the human genome, are moving medicine from simply being a descriptive empirical discipline to one in which we can actually elucidate mechanisms by understanding the molecular basis of biological processes and what is going wrong in diseases, i.e. creating for industry the ability to dissect disease processes to identify new targets for diagnostics, therapeutics and vaccines in a much more rational way. So in the future, pharmaceuticals for example still play a major role in human health, but the utilization of drugs will be much more tailored against the genetic background of the patient.

Nowadays, we have the facilities and the capacity to produce literally any kind of protein at economical costs. There are two sources to facilitate this production: intact microorganisms, and genetically engineered ones. These microorganisms are not just bacteria, but yeast, fungi and even cultivated animal cells. To emphasize the importance of all these revolutionary changes in pharmaceutical industry, I would like to draw your attention to the following facts. In 1982, just one drug, human insulin, could be produced by genetically modified microorganisms. It took three years for another drug, growth hormone, to be released. In 2000, about twenty recombinant proteins were approved while in 2005, about sixty recombinant proteins will be available in market.

Right now nearly 400 drugs are in the third and fourth phase of clinical trial. Even if just 20% of these can enter the market, we will have around 140 drugs by the year 2010. Considering all essential drugs to be 200-250, you would be amazed by the effect of biotechnology on production of new medicines and also on modern methods for treatment of diseases. To sum up, if we do not advance toward biotechnology, it will impose itself to us, at a great cost.

References:

1. Yuan, Robert and Michael Hsu 1996 Herbal medicines-High tech or traditional, Part 1. Genetic Engineering News, June 1996.
2. Yuan, Robert and Michael Hsu 1996 Herbal medicines-High tech or traditional, Part 2. Genetic Engineering News, August 1996.



Interview

Born in 1966, Dr. Abbas Kebriaeezadeh entered pharmacy faculty of Tehran University of Medical Sciences in 1985. He received his PhD in pharmacology and became a lecturer and assistant professor at the same faculty in 1996. Right now, he is an associate professor at Tehran University of Medical Sciences, faculty of pharmacy and an advisor of health minister in biotechnology and biologic products.

Please tell us about the history of biotechnology in the world and in Iran.

In contrast with the common belief, biotechnology is not a new science. It is as old as history. What we are concerned with these days is actually modern approach to biotechnology, which employs modern techniques to obtain the desired outcome in science. If we put it this way, biotechnology in Iran dates back to more than 80 years ago when Razi and Pasteur institutes were established. Little by little, these institutes grew in such a way that in early 1970's Iran was among the top ten countries in the world producing vaccines, and the second to Japan in Asia. However, in early 1980's, there was a slump in the activities of these institutes, but after a few years, in 1986, the new planning proved helpful in creating an upward trend in their activities.

In 1994, biotechnology department was founded in Tehran University of Medical Sciences, Razi institute and Pasteur institute in order to organize activities regarding this novel issue, and providing scholarships for training skilled individuals in the field.

Other milestones in biotechnology were the contract between Iran and Cuba to produce hepatitis vaccine in Iran, and the contract with ICEGB.

In short, biotechnology in Iran is an emerging industry with a highly educated community of scientists and researchers, government support and a growing infrastructure base. Furthermore, Iranian biotechnology companies have expertise in bioinformatics, manufacturing and genetics, as well as more traditional sectors of the industry including fermentation technology, industrial enzymes and vaccines.

What is our position in the world of biotechnology?

Compared with other countries in the Middle East, we are on top of the list because a few countries have the infrastructure to go through all stages of production. What they usually do is mostly a kind of filling rather than producing. In Asia, we are in a good position after Japan, China, Korea and India. What can help us develop is not to wait, and to start production at any stage we can afford. This is the key to a promising enterprise in biotechnology.

How is biotechnology infrastructure in Iran?

About 300 people are actively involved in biotechnology in Iran. We have the ability to work with cells and cell cultures even in our universities, which is a fundamental task in biotechnology. Honestly speaking, producing cells is in good condition, but still needs some improvement. Furthermore, we have excelled in cell culture, and we are really good at purification. As far as drug production concerns, we are leading the countries in the region.

Since Razi institute, in my opinion, is the one which has the most experience and the best background in this field, I would like to talk about this institute. Razi institute is considered Iran's leading center for biological research and production. It manufactures 21 human and veterinary vaccines in commercial quantities and several other biological substances. The institute exports human and animal vaccines to more than 16 countries (mostly Moslem countries) as part of Iran's humanitarian aid program. According to the director of the institute, it produces 1.7 billion doses of 57 types of vaccines, serums, and antigens annually. The biotechnology department's three main pillars are the production of a new generation of vaccines for livestock, birds, and humans; the genetic diagnosis of livestock and bird diseases and the production of transgenic animals. The department is currently attempting to create recombinant vaccines through genetic engineering, as well as developing antigens and diagnostic kits for medical and veterinary labs.

Could you please elaborate on Iran's successful experiences in producing biotech products?

As I mentioned before, we have a lot of biotech products, mass produced for a long time such as different kinds of vaccines. To introduce our latest products; I should mention interferon alpha, GCSF and erythropoietin, which are produced by Tehran University of Medical Sciences and Pouyesh Darou Co jointly; interferon gamma, produced by Shafaye Sai Co, and interferon beta, a product of Cinnagen Co. These serve as just a few successful products. As far as I know, there are more than five independent groups in private sector involved in producing high profile pharmaceutical biotech products, and there are a lot more products under trial.

What are the problems in biotechnology and how can we improve biotechnology in Iran?

I reckon the first and most important issue to provide our qualified workforce with is to believe in their abilities so as to boost up their efficiency and to fill the gap between industrial countries and us. We should trust our experts at least as much as we trust foreign companies, if not more. Unfortunately, we approve whatever foreigners produce and facilitate their import, but do not give the opportunity to our local producers to grow. What we need in Iran is not hardware infrastructure, but the desirable support to our studious workforce to flourish. The only way to overcome this problem is a helping hand stretched from key

policy makers in government. In short, I recommend the following:

1. Prioritizing software infrastructure to hardware; that is spending more on human resources than on equipment.
2. Facilitating approval procedure of domestic products so that investors would rather invest in production than in import.
3. Internalizing teamwork as the only way to achieve our national and individual goals.
4. Implementing policies to remove obstacles placed in the path of production and approval plus changing price setting policies in order to make this business more lucrative.
5. Respecting investors in that they get intrigued to invest more and earn more. I mean we should erase the misconception that the rich are blood-suckers; consequently, making them invest their money in production.
6. Emphasizing the importance of human resources and the fact that scientists do not like to be away from their academic and research environment, I would like to propose a resolution to join governmental and private sectors so that scientists can have more active role in a more secure environment.

Have we worked with any foreign countries besides Cuba?

The contract between Iran and Cuba is a governmental one, but we have cooperation with many countries such as Italy, Germany and Australia in private sector. Actually, interferon alpha, GCSF and erythropoietin are the result of collaboration with ICEGB.

What are the active biotech companies in Iran?

There are many companies involved in biotechnology, but the ones with some products in market are as follows: Razi institute, Pasteur institute, Pouyesh Darou Co., Cinnagen Co., Shafaye Sai Co., National Genetic Center, Daroupakhsh Co. There are some other companies whose products are not yet available, but will shortly be.

What is the prospect of biotechnology in Iran?

Biotechnology development plan has been revised and all aspects of this field including education, research, infrastructure and production have been precisely devised. With the new attitude toward science and scientists, I believe we can advance much faster than before. All the latest triumphs in different aspects of science, especially in biotechnology, are clear evidence for a better and more prosperous tomorrow.

What do you think of Medical Biotechnology Research Journal?

Although it is too soon to judge, the subject of biotechnology and the objectives are properly selected. Since biotechnology is a growing field, we need an internationally accepted journal to represent our efforts in the field, and to open the doors of international markets to our products. I wish you success. I would like to thank you for what you have done so far.