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What it costs to develop a drug

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SEVERAL issues on the pharmaceutical industry were in the news earlier this week. One was the report by the US-based consumer group Public Citizen that the industry was overstating the cost of developing new drugs.

Since a 1994 study by Tufts University, US$500 million (RM1.9 billion) is thought to be the average amount spent by pharmaceutical firms to develop and put a new drug on the market. This figure has been consistently quoted in order to justify the need for high prices of their products.

But now Public Citizen is disputing the seven-year-old study because it failed to take into account federal tax incentives, reimbursing drug companies for 34 cents of every dollar spent on research and development. Upon reassessment, the consumer group estimated that the true amount invested per drug is about US$110 million.

According to its report, the cost of drugswas inflated due to the manufacturers' spending US$177 million to employ an "army" of 625 lobbyists, more than one for each member of the American Congress, to influence lawmakers.

A further US$85 million was spent on advertisements and as campaign contributions during the recent elections.

Prior to the Public Citizen's claims, another consumer group, Families USA, contended that top drug companies dished out twice as much on marketing, advertising and administration as they did on research and development.

However, officials of the pharmaceutical trade have criticised the consumer groups' findings and methodology, although some were supportive of reforms in the industry.

Regardless of whether it costs US$500 or US$110 million to design, develop and push a new drug into the market, the present entry level to the pharmaceutical industry is still too high for developing nations.

The other factor that keeps pushing this level higher is the control over scientific knowledge by the developed world.

An example is the basic knowledge of developing drugs derived from materials of biological origin or biopharmaceuticals.

The last decade marked a high level of activity in biopharmaceutical research and development in the West. In 1993 there were drug companies with up to 70 per cent of their research projects based on biopharmaceuticals.

By the year 2000, there were more than 300 new biopharmaceuticals in the US market. It is estimated that, today, 85 per cent of all new drugs are of a biological nature.

Biopharmaceuticals are popular as the diseases that can be treated with them include some that are difficult to manage, such as, hepatitis B, diabetes, AIDS-related cancers, human growth hormone deficiency in children, kidney transplant rejection and haemophilia.

Pharmaceutical companies are also making good use of gene discoveries to develop an array of new biopharmaceuticals.

For instance, the successful completion of the human genome project that profiles all the important genes in the human body has provided a much bigger opportunity for research and development of biopharmaceuticals.

Each of the 50,000 or so human genes consists of a coded chemical

message that directs cellular machinery to produce a particular protein necessary either for body structure or for a metabolic process.

After researchers have zeroed in on a gene and learned its sequence of code letters, they can identify its protein and, eventually, the role of that protein in the body.

Advances in biotechnological techniques have allowed, among others, the isolation, identification and production of these proteins, found in the extracellular fluids of the body.

It is known that proteins are made up of chains of amino acids. Once the nature and sequence of their amino acids are determined, then they can be reproduced in the laboratory. Proteins as biopharmaceuticals may be prepared by inserting DNA containing a needed gene into bacterial cells, which reproduce. The cells then churn out proteins that can be given to patients as conventional drugs.

One product known as MPIF-1 could help protect bone-marrow cells from toxic effects of chemotherapy. Another protein, called KGF-2 may speed up wound healing.

Genetic disorders may also, in the future, be treated with drugs supplied by animals. Endowed with the appropriate human genes, animals could produce human hormones and other proteins for genetically deficient patients. Large sets of such protein are manufactured, and then tested, one at a time, seeking one that performs the same function as a missing or defective protein, and without side effects.

The other benefit of human gene mapping is the identification of disease genes, for example, genes causing Alzheimer's disease and Huntington's disease.

Seizing upon the flood of new findings about disease genes and their functions, drug companies are moving rapidly to develop biopharmaceuticals that will either neutralise the effects of dangerous genes or substitute for vital proteins that are missing because of defective genes.

These biopharmaceuticals will be used as a form of preventive medicine.

Equally promising from the human genome project is the development of a technique that may well cause an historic change in the practice of medicine: gene therapy, the introduction of genes into human cells to prevent or cure a wide range of diseases.

Gene therapy is based on a simple idea. Since genes direct the assembly of every cell in the body, it should be possible to treat chronic health problems by slipping corrective genes into patients.

But getting the body to adopt and express these healthy substitute genes has been extremely difficult. Research is under way to improve on this technique.

One other important source of biopharmaceuticals is from natural resources, such as plants and herbs.

Hence, there are now alkaloids, enzymes and steroids derived from biotechnology. Plant cell culture methodology, for example, may offer products in high quantity and perhaps quality.

It is true that the entry level, in terms of both money and knowledge, to the pharmaceutical industry is prohibitively high.

However, developing countries cannot remain as perennial buyers and users of drugs, as the drug prices keep on spiralling. Hence, realising this sorry state of affairs, Malaysia has taken the first step to address the issue.

Prime Minister Datuk Seri Dr Mahathir Mohamad last Thursday launched the Pharmaceutical Industry Action Plan. Among others, the Plan proposes the setting up of a Council to look after the national interests in pharmaceutical and related fields.

A non-profit centre is also proposed. It reflects an industry-government

smart partnership functioning as a one-stop centre for all matters pertaining to the pharmaceutical and related industries.

Looking at the monumental challenges of the pharmaceutical industry, the decision to enter the fray is a most courageous one. Let us hope that our pharmacists and scientists will be able to endure this most difficult journey.