

The Future of Medical Technology

For centuries, the art of medicine has been dominated by bumps, bruises, or other symptoms felt by the patient or discovered by the physician, with eyes ever-magnified by increasingly sophisticated scanning technology: the microscope, the x-ray, and eventually the MRI. But the underlying model remained the same. To find the illness doctors first had to look for the symptom. To diagnose the cancer they had to see the tumor. To find a drug they had to undergo a long costly and laborious process of trial and error, testing millions of natural compounds on animals to find one that seemed to work. [1]

This approach to medicine may be coming to an end. As drug discovery becomes an information-based science, speeded by rapid increases in computer processing power and “the marriage” of test tubes with microchips, we are transforming the way we diagnose and treat many of the worst human diseases. New drugs currently in clinical trials are no longer scattershot one-size-fits-all affairs, but carefully targeted to the molecular fingerprints of specific diseases. Some of these drugs are even targeted to a patient’s unique DNA profile. In a breathtaking paradigm shift, medicine is moving from the species level — the ingrained assumption that drugs and diseases work similarly in all human beings — to the individual level, unlocking new healing possibilities in the minute differences between seemingly similar diseases and their individual victims. The result will be a new age of medical therapy, dominated not by cell, tissue, and organ replacements but by early diagnosis and individualized drug treatments.

The development of medical technology tends to ensure that people can monitor their health on their own. Today every home can have sphygmomanometers. Patients with diabetes mellitus use portable blood glucose meters. Devices for measurement of pressure, scales, and other portable equipment are equipped with wireless transmitters that allow the data once transferred to a computer keep a record of their health.

Some companies like Healthy Wear Company are engaged in development of “smart clothes”, which collects data on the human health condition, heart rate, body temperature, respiratory rate. Such smart clothes with built- in chips not only take measurements, but also allow you to transfer data to your mobile phone.

Japanese scientists have developed an intelligent toilet that during a morning visit to the restroom can diagnose the health of the user. This device makes it possible not only to quickly do the analysis of urine, but also measures pressure, body temperature and weight. This toilet is connected to a home network and can transmit health data to the user’s computer. The person has an excellent opportunity to monitor their state of health for a long time, since all the data is kept and can be displayed in graph form on which you can observe the dynamics. In case of deterioration analyzes, the system notifies the owner [1, 1].

The development of mobile technology reduces the size of diagnostic devices. Already today for mobile phones there are more than 20 thousand applications with medical orientation. Of course, many of them double each other, but there are also some interesting solutions. For example, Skin of Mine program allows the user to define dermatological diseases on the photos. This service also allows you to consult a dermatologist via the Internet. Skin Scan program is designed to scan the moles on your body. With this software, you can keep an eye on moles and monitor their growth, which makes it possible to keep track of oncological diseases of the skin.

However, any device can be placed in the cell phone. Therefore, many developers of medical devices are trying to integrate their invention of mobile phones. CellScope company is engaged in the development of devices that work in tandem with mobile phones. They have developed a microscope that displays the image on the phone screen. The company has developed a device that can diagnose tuberculosis using fluorescence microscopy. Developed by CellScope it allows the study of blood smears. Thanks to the device it will be possible to examine the ocular fundus, throat, ear, nose and skin without leaving home. Survey data will be sent through a network doctor.

According to most experts predicting the development of science and technology, the 21st century is to become “the century of communication” that includes widespread use of global information systems. The use of such systems in medicine opens up new opportunities:

- providing interaction of regional clinics with major medical centers;
- operational obtaining of the latest research;
- preparation and retraining.

These capabilities can be characterized in a general concept – telemedicine. Telemedicine is a complex of modern diagnostic and treatment methods that provides remote health information management. The emergence of telemedicine is usually associated with medical supervision during space flights. Originally, it was to measure parameters in animal waste on the spacecraft, then the astronauts.[3, 7-9]

With the advent of network technology, telemedicine has received a powerful impetus to the development. The specific cause of a breakthrough in the practice of telemedicine was the rapid development of communication networks, as well as methods of working with information, enabling bilateral and multilateral exchange of video and audio information, and any accompanying documentation. The simplest case of implementation of telemedicine is a quick access to the necessary medical background information. The main application of telemedicine is to serve those populations, which are far from medical centers or have limited access to health services. Another important object of telemedicine is a system of diagnostic centers in the region, when necessary operational link between the doctor and the doctor-diagnostician, who are in different hospitals, often separated by long distances. Another important area of telemedicine is the situation of rescue and complicated cases that require urgent consultation of experts from the central medical facilities in order to save the patient or to determine treatment strategies in difficult situations, including in the world’s largest medical centers.

The next direction is remote medical education. The most promising trend in the development of modern information systems can combine the concept of

“architecture due to modeling» (MDA). The philosophy behind this approach is that in a complex system, it is impossible to foresee all possible scenarios for the future development of the system, etc. Therefore, it is advisable to develop some common to all participants object models and to determine the principles of its building and integrating applications in system. MDA solves these problems by separating the design and implementation problems. This allows you to quickly develop and implement new interaction specification, using new technologies deployed, based on proven models reliably.

Modern information systems are usually deployed in global networks such as the Internet. And telemedicine systems are not exception. In the US and Europe servers represent striking imagination of the number of medical resources. Anatomical multimedia atlases, electronic versions of medical journals, materials of numerous conferences and symposia, results of various research and achieving practical medicine, extensive database on drugs, telemedicine – this is not a complete list of destinations that are presented on the Internet.

There is a large number of medical bibliographic and library systems. The most powerful of these are the Medline system, Search Med Web, Medscape, and the system of the National Medical Library of the United States. The most powerful Library of Medicine is the US National Medical Library. Accordingly, the task of creating a modern information systems is much more complex and requires much more specialists of high qualification. Figuratively speaking, to date in the field of telemedicine there should be demanded experts with a global systems thinking, owning the latest technological advances [2, 5].

References :

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