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INNOVATIONS THAT WILL SOON BECOME A REALITY

Medicine is one of the most conservative professions. But more and more innovative technologies are being introduced into daily clinical practice, radically changing the approach in the diagnosis and treatment of many diseases.

1.Broadband Medical Radar for Breast Cancer Diagnosis

Mammography - one of the most common screening technologies for detecting breast cancer can go away in the past. This technique is one of the forms of X-ray. The device is switched on and breast tissue is exposed to low-dose ionization irradiation.

The main drawbacks of the technique are its relative high cost and the harmful effects of radiation on the patient and the medical staff.

Scientists believe that cumbersome mammography in the near future can replace the medical radar, which uses radio waves instead of ultrasound or rigid radiation. Electromagnetic waves of a similar range are emitted by a microwave oven or mobile phone.

This is a simple and fast procedure that takes a few minutes. Scan of the mammary gland is performed by radio waves at frequencies from 4 to 10 GHz.

In addition, the economic benefits of the new methods should be noted. The digital X-ray mammography costs a quarter of a million dollars, while the radar price is one tenth of a million.

2.3-D printer for biological tissues

Just imagine - a full-function kidney, created from its own cells of patients.

At the initial stage, a colloidal mixture of patient cells is created. Then the cells are deposited on a stroma (base), on which a layer on a layer forms a biological tissue or organ. At the last stage, the tissue is incubated until the body or part of the body becomes viable.

At the end of 2016, one company already presented the created liver tissue, which was successfully implanted for an experimental animal.

More realistic prospects are the wide introduction of blood transplants, muscle patches on the heart and nerve fibers. Printing tissues from the patient's own cells will create ideal conditions for the development of transplantation medicine.

3.S.M.A.R.T. sensors and S.M.A.R.T. scalpels

S.M.A.R.T. sensors and scalpels are intended for detection and removal of different types of tissues. The main objective of this technology is: using microsurgery, to treat cerebral aneurysms, to create anastomosis of blood vessels, to remove brain tumors, etc.

Great success in this area was achieved by the Livermore National Laboratory, Massachusetts Institute of Technology and Sandia National Laboratory.

Livermore developed a sensor that can distinguish between healthy and cancerous tissues. Optical, electric, and chemical sensors on the sensor tip make it possible to see a clear difference between different fabrics.

The smart scalpel, developed in the Sandia Laboratory, has a size of 10 cent coins and has the working name "biological microcoagulant laser". Investigation of tissue, cut line and vascular pattern is carried out using optical reflex spectroscopy. Removal of malignant tumors is carried out by a laser.

4.Electromagnetic acoustic visualization

The new diagnostic method is based on the combined use of high-frequency electromagnetic waves and acoustic radiation. During stimulation, different tissues react differently. Each layer of biological tissue vibrates with a unique frequency, and this frequency can be captured by an ultrasonic sensor and converted into an image.

The conductivity of the cancerous tumor is 50 times greater than that of normal tissue. In addition, electromagnetic energy has a greater penetrating power than ultrasound and light. This makes electromagnetic acoustic imaging an excellent method for diagnosing tumors, regardless of their localization. The technology is quite safe, economically beneficial and can detect tumors up to 2 millimeters in diameter.

5.Treatment of stroke with nanorobots

The reason for stroke is blockade of blood vessels that deliver fresh blood and oxygen to the brain cells. Lack of oxygen leads to the rapid death of neurons. Nanotherapy, the treatment of the causes of the disease at the molecular level, is already used in the treatment of infectious diseases and oncology. Now, researchers are planning to create nanorobots that will break the blood clots and deliver medicines directly to the stroke area.

Scientists are studying the possibility of creating nanorobots that would be covered with tissue plasminogen activator, the most effective solvent of blood clots. Specialists believe that nanorobots for the treatment of stroke can appear in clinical medicine after 2 - 3 years.

Today, medicine is on the verge of introducing several exciting technical innovations. New miniature S.M.A.R.T. technologies open a qualitatively new level of diagnosis and treatment of many diseases.

REFERENCES

1. Birnbaum, P. H. 1984. The choice of strategic alternatives under increasing regulation in high technology companies. Academy of Management Journal 27(3):489–510. [PubMed]

2. Friar, J. H. 1986. Technology Strategy: The Case of the Diagnostic Ultrasound Industry. Ph.D. dissertation. Sloan School of Management, Massachusetts Institute of Technology, Cambridge.

3. Hauptman, O., and E. B. Roberts. 1987. FDA regulation of product risk and its impact upon young biomedical firms. Journal of Product Innovation Management 4(2):138–148.

4. https://scienceukraine.com/allnews/health/meds/5-innovatsii-v-medytsyni-iaki-nezabarom-stanut-realnistiu/
5. http://medicalfuturist.com/20-potential-technological-advances-in-the-future-of-medicine-part-i/