

## NOTES

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### **Developments in Soviet Medicine\***

Towards the end of 1957, Soviet scientific press reported about interesting experiments in the supersonic treatment of malignant tumours in animals. These experiments showed that the action of ultra-sound of high intensity is capable of reducing the viability of the tumour cells and their reproductive function. The process of disintegration of the primary tumour begins at a certain time after being subjected to the effect of ultra-sound. As a result of this it either resolves completely or is replaced by a scar.

The Moscow Bulletin of Experimental Biology and Medicine reports on further experiments with ultra-sound. Eleven rabbits, which were inoculated with an experimental Brown-Pearce tumour, were observed for a long time at the Moscow Institute of Experimental Pathology and Therapy of Cancer. The primary tumour was subjected to the action of ultra-sound of high intensity. Following this treatment, the malignant process continued to develop for some time, the tumour grew and metastases were revealed. But in about two months the resolution of the primary tumour commenced, followed by the resolution of metastases. Although the latter were not subjected to the action of ultra-sound, they also gradually disappeared and were replaced by scar. No relapses of the malignant process were noted, although the experimental rabbits lived for a long time.

Experimenters came to the conclusion that evidently supersonic waves of high intensity affect not only the tumour tissue subjected to the treatment, but also cause a number of re-constructive processes in the animal body, resulting in the eradication of the tumour process as a whole.

Further investigations in this sphere are being conducted at present at the Institute of Experimental Pathology and Therapy of Cancer.

The following experiments were conducted at the Kuibyshev Medical Institute. For a certain period of time, mice were given injections of a drug containing magnesium, calcium and bromine. After this, they were inoculated with various malignant tumours and after the development of the tumours they were treated by the same medicine.

It was revealed that such prophylactic injections considerably hinder the development of the malignant neoplasms. In one of the experimental groups, the tumour developed only in 5 per cent of the animals, in another in four mice out of sixteen. Besides, the tumours developed much later than in the control group. The average span of life of the mice in which the tumour developed after administration of the medicine was prolonged two to three times as compared with the controls. It was also revealed that the prophylactic administration of sodium bromide alone retards the development of Ehrlich's experimental cancer.

\* From USSR Information Services.

Microscopic examination of the tumour section was conducted in the therapeutic-prophylactic group of animals. It was established that the processes inhibiting the development of malignant neoplasmas occur in the tumour cells under the effect of such seemingly harmless substances as magnesium, calcium and bromine.

### **Regeneration of Organs\***

At the Institute of Experimental Biology of the Soviet Medical Academy experiments for the regeneration of certain organs in mammals are being carried out.

Numerous operations on the liver and the spleen of mammals (including monkeys) have shown that if large sections of these organs are removed (up to two-thirds of the liver and nine-tenths of the spleen), they regain their normal volume within a comparatively short period (within weeks).

It has also been found that if, for example, half of an ovary or a kidney is removed, no regeneration takes place. Yet if the same organ on the other side is partly removed (let us say, after removing one kidney and half of the one on the other side), a regeneration process starts in the part of the organ that is left in place.

Some time ago the results of experiments carried out for the regeneration of the male genital glands (testes) showed the erroneousness of the opinion that this organ is incapable of regeneration. Operations on monkeys and guinea pigs showed that after small section of a testicle, it sometimes grows to the same size as before the operation. It has also been established that the nipples of the mammary glands of various animals reappear, following their complete removal.

All these experiments are of practical importance for the study of the regeneration of human organs.

### **New Substances to aid Medical Science**

The pharmaceutical manufacturer is sometimes thought to be a special kind of conjurer who manipulates the elements of nature as a magician produces coloured handkerchiefs from a hat. But with all his fascinating conjuring with roots, leaves, fruits, animal organs and the more prosaic elements, such as carbon, hydrogen, oxygen, nitrogen and phosphorus, he is pursuing a consistent and scientific line of development for the benefit of the community.

Plants are identified and sometimes cultivated carefully under controlled conditions. They are examined macroscopically and microscopically, and their active ingredients are isolated in pure crystalline form. These are examined to see how they are built up from their constituent elements;

\* From USSR Information Services.

† From British Information Services. Published on July 22, 1959.

they are then copied in the laboratory as one would take a Meccano model to pieces and then put it together again with other pieces of the same material.

The chemists, physiologists and pharmacologists then begin to ask themselves: "Is all this natural structure which we have copied so faithfully really necessary?" Pieces of the structure which may turn out to be unnecessary complications of some simple central theme are lopped off and the simplified substance investigated. It is sometimes found to be just as effective—and easier and cheaper to make.

Still the scientists are not always satisfied. They often proceed to add to the simplified structure complications which do not appear in nature. They sometimes find that these alter the medicinal effect of the substance, the result being a new substance unknown in the natural state, with an effect as medicine which has never been obtainable before.

The same kind of manipulation of molecules is being carried out with substances (such as the active ingredient of thyroid glands) derived from animal organs.

In the course of all this close investigation of the structure of active drugs, knowledge is built up which leads, among other things, to the observation that certain shapes and sizes of molecules affect the human body and its diseases in certain ways. This points to lines of research whereas these particular shapes are developed into further new substances.

An example of just this kind of "molecular manipulation" will be seen at the Scottish Industries Exhibition on the stand of Britain's Department of Scientific and Industrial Research.

The story begins with the traditional isolation of atropine from the leaves of the deadly nightshade, much of which comes from the Balkans. Atropine is an alkaloid (a form of active botanical constituent) with several valuable uses in medicine (ophthamology, peptic ulcers and so on). Later it was discovered that an Australian plant, *duboisia*, also contain atropine.

Close study of the atropine molecule, however, eventually showed that it was built up from a basic substance known as tropine, and that once tropine had been obtained it was comparatively easy to "amend" it to atropine.

Work at Edinburgh eventually led to the successful synthesis of tropine on a commercial scale, and from there it was a complicated but not too difficult journey to the successful synthesis of atropine.

This work gave the chemists a deep insight into the way in which the plant world builds up, first tropine and then atropine. With this knowledge they went to work to build up substances, similar in structure to atropine but which have never existed before, naturally or otherwise.

Each of these substances was tested for its action and hundreds were discarded. One new substance has reached the doctors so far. It is called Trophenium and it has a very specialised use in that it produces a state known as hypotension (lowered blood pressure) when injected into the blood stream under general anaesthesia during a surgical operation. This lowering of the

blood pressure results in a reduction of bleeding at the site of an operation, allowing a clearer field for the surgeon to work.

Several other drugs evolving from this continuing research, are under investigation.

### **The Cancer Problem\***

Cancer is not a new disease. It is as old as life itself. Evidence of it has been found in fossilized dinosaur remains. Certainly it is no new disease of the twentieth century. Why then, it may be asked, does cancer seem to be so prevalent today? As so often happens, quite a number of factors are responsible for this. One of the most important, however, is that we are all living so much longer than our ancestors. Although cancer may occur at any age, it is predominantly a disease of the later years of life. In the 'bad old days', when so many children never survived to adult life, and when the expectation of life for those who survived childhood was much lower than it is now, the vast majority of the population died before they reached the age when cancer tends to be more common. In other words, an increased incidence of cancer is the price we have to pay for the longer life bestowed on us by the wonderful life-saving drugs like penicillin, which have been discovered during our lifetime.

The second and really important fact is that many cancers are curable. A hundred years ago all cancers were fatal. Today the position is very different and more patients with cancer are cured each year. There are several reasons for this. One is that we have better methods of treatment. The most important, however, is that we are recognizing the disease at an early stage. This is the crux of the matter, because the earlier cancer is diagnosed the more easily can it be cured.

If cancer of the mouth is treated in the early stages eighty-five per cent of cases are cured, but, if it is not treated until the later stage, only thirteen per cent are cured. In the case of cancer of the neck of the womb—one of the most important forms of cancer in women—seventy-eight per cent of cases are cured if treatment is given early, but only fourteen per cent if treatment is delayed. An actual example of what these figures mean may be quoted from the experience of the Christie Hospital in Manchester—one of the leading hospitals in Britain for the treatment. Of 2,000 patients with cancer of the neck of the womb, 860 were cured, but 1,560 could have been cured if they had come early enough. In other words, 700 women died who need not have died—simply because they did not go to see their doctors soon enough.

It is for this reason that so much attention is now being given to educating people about cancer. What we must all realize is that cancer is no more dreadful a disease than any other. Many forms of it are more curable than a lot of other diseases if only we are sensible about it and go and see our doctors early enough. Indeed, one might go even further and say that fear itself may help to induce cancer.

\* From British Information Services, published on July 21, 1959.

So impressed are the British people with the importance of convincing everyone that cancer is just an ordinary disease, and can often be cured, that instruction on cancer is now being introduced into courses of biology in English schools. The idea has been accepted with enthusiasm by many teachers. There is no question of trying to tell schoolchildren about the details of cancer. All that is done is to tell them in simple lessons what cancer is, so that when they grow up they will look upon it as a disturbance of growth—which is what it is—and realize that it is not something to be afraid of but merely yet another disease which can often be cured if it is taken in time.

There are three main methods of treatment for cancer—surgery, radiotherapy, and chemotherapy. Surgery—that is an operation to remove the growth—is much the most satisfactory method if the growth is discovered in time: that is before it has started to spread to other parts of the body. If, for instance, a cancer of the neck of the womb is discovered before it has spread, then removal of the womb will cure the condition.

Chemotherapy—that is the use of drugs which will destroy cancer cells—is still in its infancy. We have no drug yet that will kill cancer cells and not damage normal cells. Neither is there any immediate prospect of such a drug being discovered. On the other hand, there is no reason why such a drug—or drugs—should not be discovered in due course, and meanwhile research workers all over the world are striving hard to discover such a drug.

Radiotherapy, however, is playing an increasingly important part in the treatment of cancer.

### **Health Services in the USSR\***

The most striking feature of health services in the Soviet Union is its state character and free medical assistance to the entire population of the USSR.

Almost three million workers, including 360,000 doctors, over one million nurses, doctor's assistant and midwives are engaged in the country's health services. There are more than seventeen doctors and fifty-six junior medical workers to every 10,000 of the population.

The USSR has eighty medical and pharmaceutical colleges, eleven advanced training institutes for doctors and 278 other scientific medical institutions. Engaged in these institutions are more than 30,000 scientific workers including more than 2,500 doctors of science, about 12,500 masters of science, approximately 2,000 postgraduates and over 4,000 clinic interns. At the top is the Academy of Medical Sciences of the USSR, formed in 1944. Its chief task is to help extensively introduce the latest scientific achievements in health protection practice.

Tens of thousands of different medical institutions function in towns and countryside—hospitals, polyclinics, maternity homes, dispensaries and mother and child consultation centres. There are more than 1,500,000

\* From the USSR Information Services.

hospital beds which ensure clinical examination and treatment to all those in need of them.

The Soviet Seven-Year Plan provides for the construction of new hospitals with additional 530,000 beds. The total number of hospital beds in 1965 will exceed two million; there will thus be approximately 91 beds to 10,000 of the population. There will be 500,000 doctors by the end of the seven-year period. This means that there will be one doctor to every 460 inhabitants on an average. The junior medical personnel will comprise 1,500,000 people.

As many as 215,000 million roubles were spent on health protection in 1958; by the end of the seven-year period, in 1965, approximately 360,000 million roubles will be spent for this purpose. This will come to about 3,800 roubles per worker in a year. In addition to this, over 800 roubles per worker will be spent on building new houses, schools, cultural and public service buildings and medical institutions.

The death rate is constantly declining in the USSR. It has dropped by 75 per cent as compared with 1913, and among children by about 85.7 per cent. The average life span in the USSR has more than doubled as compared with pre-revolutionary times and is now 67 years.

Many infectious diseases as relapsing fever, smallpox, plague and cholera have been completely eradicated in the Soviet Union. Other infectious diseases have greatly declined and the task facing us is completely to eradicate them in the next few years.

Soviet health protection develops on the basis of planned, scientific prophylactics. The medical workers are daily assisted by the active members of the Red Cross and Red Crescent Societies, trade union organizations, etc.

The medical and sanitary services of large industrial enterprises constitute an entire complex of medical and prophylactic institutions. For example, four professors, 108 doctors in various specialities, more than 200 doctor's assistants, midwives and nurses are engaged in the medical centre maintained by the Likhachov Automobile Works in Moscow. This centre includes a hospital, polyclinic, seventeen first aid stations in shops, four night sanatoria, holiday homes and sanatoria near Moscow, on the Riga coast and Transcaucasia.

The natural conditions of the Soviet country make it possible to set up holiday homes and sanatoria everywhere. These resorts have accommodation for more than half a million people. Every year over five million people spend their holidays in sanatoria and holiday homes. They are ordinary working people. Eighty per cent of the accommodation acquired by the trade unions is distributed among the workers at 30 per cent of the cost, and the other twenty per cent, free of charge. The trade unions acquire a large number of accommodation passes to the health centres and present them to the best workers, invalids, pregnant women, mothers of large families and those who attend factory training and vocational schools.

Soviet medical workers have made experimental researches in the field

of transplanting organs, thoracic surgery, particularly surgery of the heart, blood vessels and lungs.

The medical industry is manufacturing the latest products, such as original instruments for suturing vessels, nerves, soft tissues and intestines, an apparatus for artificial blood circulation, equipment for operation theatres and others.

### **Care of Children in the U.S.S.R.\***

The nurseries in Soviet Union look after children from two months to three years, and the kindergartens take care of children from three to seven years. All these are usually housed in bright spacious buildings surrounded by gardens with playgrounds. The beautiful arbours, wooden slides, mushroom-like tents and merry-go-rounds tell the passersby that the structures beyond the fence belong to youngsters. Nurseries are under the jurisdiction of the Ministry of Public Health, and kindergartens under the Ministry of Education. Children up to three years are in need of medical attention, proper care and food, while the older children need, in addition to all this, proper education which is provided by specially trained teachers.

The nursery is managed by an experienced physician, who is doing everything possible so that the children develop properly. The tiniest lie in comfortable cots, while the older ones learn to crawl and walk in play pens.

In the infants' group the mothers come to nurse their children twice a day. Mothers have the right to leave at definite hours for this purpose. Nursing mothers receive special dinners, the cost of which is included in the fees for the maintenance of the child in the nursery. The sum paid by the women for the upkeep of their children depends upon their earnings and those of the members of their family, but it is quite small.

The children are divided into age groups in the nurseries. From the young groups they are transferred to the medium, and then to the older. Children in the older group are gradually taught to do things independently. At dinner and breakfast they eat by themselves and behave nicely at the table.

The teachers in the nurseries have a secondary medical education. They are quite familiar with the sanitation and hygienic conditions for bringing up children and with the specific features of their proper development. The children in the nurseries are under the observation of experienced doctors. The slightest deviation from normal development is immediately noticed by the doctor who finds out the causes and renders timely assistance. The children develop very well in the nurseries. In three years they already memorise and recite short poems, sing songs, and dance and play to music.

In the kindergarten, the children develop on a new level. Here they acquire knowledge according to their age. Children get accustomed to play and do things together and to help one another. The chief task of the kindergarten is to help in the physical and mental development of the children.

\* From "News and Views from the Soviet Union," published on May 27, 1959.

They are taught to observe the regime and they acquire cultural and hygienic habits. Special attention is paid to strengthening the organism of a child by gymnastics, games and sleeping out in the open air.

Mental training is effected by all kinds of games, lessons, and observation of nature. The children are taught to share toys, to help one another, to respect the elders and their labours, to understand what is good and what is bad, what may be done and what must not be done.

Artistic education plays a big role in the kindergartens such as singing, listening to music, reading of children's literature, drawing, modelling and designing.

All the teachers in the kindergartens have a secondary teachers' education and some even a higher.

The children's institutions conduct extensive work, not only with the children, but with the mothers as well. The mothers are taught how to bring up, feed and dress the children properly. Lectures are delivered to parents, exhibitions are arranged of literature on bringing up children, and models of children's clothes are displayed. Mothers become acquainted with the children's kitchen and are taught how to prepare various dishes.

In the regional departments of public education and public health, the affairs of the kindergartens and nurseries are managed by experienced workers with a higher medical and pedagogical education.

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1. Franklin et al., Jour. Am. Med. Assn., Nov. 14, 1935, (1958).

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