

MEDICINE

Oxygen Affects Cancer

Experiments with mice have shown that oxygen starvation affects cancer cells adversely, while the animal's body as a whole seems to be able to adjust to lowered oxygen amounts.

► **SUFFOCATION** of tumor cells by means of lowered oxygen supplies in patients' rooms may become a possible cancer treatment, it was foreseen.

Mice experiments have shown that some types of tumors can be inhibited by oxygen starvation of cancer cells after the animals' bodies become accustomed to the low oxygen supply, Dr. Samuel Graff told a group attending the International Cancer Congress in London. (See pp. 35, 38, 47.)

Dr. Graff's theory proposes that cancer cells are unable to adjust, as do the normal cells, to reduced oxygen supplies, that simply stop the normal growth process. Since oxygen is essential for growth, he said, cancer cells must grow or die.

Normal cells can adjust to a reduced supply of oxygen, maintaining themselves, but not growing. Cancer cells, under these same conditions, cannot grow, so they die, he explained.

Dr. Graff's one terminal patient showed that a sick person can become accustomed to lowered oxygen supplies. An average reduction of one-half the normal oxygen equivalent, or the amount of oxygen found at 21,000 feet, is the necessary effective amount, he said.

In addition, he reported, the tolerance for low levels of oxygen increases with the increased size of species. Therefore, presumably, humans could tolerate lower oxygen levels than the experimental mice. Still to be determined is the exact length of time humans might remain acclimated to a reduced oxygen supply without ill effects and how long it would take to kill cancer cells. Associated with Dr. Graff are A. Barach, H. A. Bickerman, J. G. Beck and M. Eisenberg.

New chemical knowledge concerning the nature of cancer and normal cell differences was also introduced by Dr. M. Earl Balis of the Sloan-Kettering Institute in New York.

The difference involves the cell's incorporation of guanine, an essential component of growth and heredity controlling chromosomes.

Contrary to former thinking, he said, guanine, when present in large quantities, is absorbed in greater quantity by cancer cells than normal tissue. Therefore, if the deadly chemical can be altered, it could be used to interfere with cancer cell function and retard or stop the disease process without causing undue harm to the normal cells.

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the intensity of the beam of ions before it is injected into the giant circle around which the protons are sped, and the vacuum.

Prof. Votruba, a Czechoslovakian, and others from the Soviet delegation also refused to speculate concerning when the ten Bev machine would be working at full power.

The conference was sponsored by CERN, the European Organization for Nuclear Research, consisting of 12 nations banded together in a joint effort to learn more about the structure of atomic nuclei. One CERN project is to build a 25 Bev accelerator, now scheduled for completion within two years.

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PHYSICS

Russians Test Accelerator

First results of research conducted with the world's largest atom-smasher, a ten billion electron volt accelerator built by Russian scientists, have been reported.

► **RUSSIAN SCIENTISTS** reported the first results of experiments with their atom-smasher, the world's largest, to the 1958 Annual International Conference on High Energy Physics in Geneva, Switzerland. (See p. 37.)

Their studies showed the hard core of a proton, a fundamental particle of the atomic nucleus and a building block for all matter, shrinks at high energies. Using their atomic accelerator at close to its full power of ten billion electron volts, they bombarded a target of protons with a beam of protons.

The hard, central part of the nucleus when smashed with particles at energies of nine billion electron volts is only eight-tenths of a barn, compared to 2.7 barns at the low energy of 100,000,000 electron volts. A barn is the unit used by physicists to measure the area over which atomic

nuclei react. It is equal to about 40 million-billion-billionths of an inch.

None of the Russians in the 19-man delegation would comment concerning their proposed 50 billion electron volt (Bev) accelerator. One reason is believed to be the difficulties Soviet scientists have had in getting their ten Bev machine to work properly. Although it could now be operated at its full power, the beam intensity would be extremely weak so they are concentrating their efforts on increasing beam intensity.

Prof. Vaclav V. Votruba, co-director of the Joint Institute for Nuclear Research, told SCIENCE SERVICE there were "many problems" still to be licked before the world's highest energy accelerator would be working properly. He said they were trying to improve the focus of the magnetic field of the machine's huge magnets,