

Dr. Otto Warburg's Address to Nobel Laureates, June 30, 1966 at Lindau, Lake Constance, Germany. Dr Warburg won the Nobel Prize in Medicine in 1931 for his discovery of the oxygen transferring enzyme of cell respiration

Editor's Note : What follows below is even more interesting when tied in to what Dr. Hidemitsu Hayashi, M.D. Director, Water Institute of Japan, has stated: "When taken internally, the effects of reduced water are immediate.Ionized Water inhibits excessive fermentation in the digestive tract by reducing indirectly metabolites such as hydrogen sulfide, ammonia, histamines, indoles,phenols and scatoles, resulting in a cleaner stool within days after reduced wateris taken on a regular basis". In 1965, just before Dr. Otto made the following speech the Ministry of Welfare of Japan announced that reduced water obtained from electrolysis can prevent abnormal fermentation of intestinal microbes.

There are prime and secondary causes of diseases. For example, the prime causeof the plague is the plague bacillus, but secondary causes of the plague are filth,rats, and the fleas that transfer the plague bacillus from rats to man. By the primecause of a disease, I mean one that is found in every case of the disease.

Cancer, above all other diseases, has countless secondary causes. Almost anything can cause cancer. But, even for cancer, there is only one prime cause. The prime cause of cancer is the replacement of the respiration of oxygen ...in normal body cells by fermentation of sugar. All normal body cells meet their energy needs by respiration of oxygen, whereas cancer cells meet their energy needs in great part by fermentation.

All normal bodycells are thus obligate aerobes, whereas all cancer cells are partial anaerobes. From the standpoint of the physics and chemistry of life this difference between normal and cancer cells is so great that one can scarcely picture a greater difference. Oxygen gas, the donor of energy in plants and animals, is dethroned in the cancer cells and replaced by the

energy yielding reaction of the lowest livingforms, namely the fermentation of sugar.

In every case, during the cancer development, the oxygen respiration always falls, fermentation appears, and the highly differentiated cells are transformed intofermenting anaerobes, which have lost all their body functions and retain only the now useless property of growth and replication. Thus, when respiration disappears, life does not disappear, but the meaning of life disappears, and what remains are growing machines that destroy the body in which they grow....

To prevent cancer it is therefore proposed first to keep the speed of the bloodstream so high that the venous blood still contains sufficient oxygen; second, to keep high the concentration of hemoglobin in the blood; third, to add always to the food, even of healthy people, the active groups of the respiratory enzymes; and to increase the doses of these groups, if a precancerous state has already developed. If at the same time exogenous carcinogens are excluded rigorously, then much of the endogenous cancer may be prevented today.

These proposals are in no way utopian. On the contrary, they may be realizedby everybody, everywhere, at any hour. Unlike the prevention of many other diseases, the prevention of cancer requires no government help, and not much money.

Many experts agree that one could prevent about 80% of all cancers in man, if one could keep away the known carcinogens from the normal body cells. But how can the remaining 20%, the so-called spontaneous cancers, be prevented? It is indisputable that all cancer could be prevented if the respiration of body cells were kept intact.

Nobody today can say that one does not know what the prime cause of cancer is. On the contrary, there is no disease whose prime cause is better known, so that today ignorance is no longer an excuse for avoiding measures for prevention. That the prevention of cancer will come there is no doubt. But how long prevention will be avoided depends on how long the prophets of agnosticism will succeed in inhibiting the application of scientific knowledge in the cancer field. In the meantime, millions of men and women must die of cancer unnecessarily.

Excerpts from Follow-Up Lecture by Otto Warburg, Director, Max Planck-Institutefor Cell Physiology, Berlin-DahlemEnglish Edition by Dean Burk, National Cancer Institute, Bethesda,

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If a lowered oxygen pressure during cell growth may cause cancer, or, more generally, if any inhibition of respiration during growth may cause cancer, then a next problem is to show why reduced respiration induces cancer. Since we already know that with a lowering of respiration fermentation results, we can re-express ourquestion: Why does cancer result if oxygen-respiration is replaced by fermentation? The early history of life on our planet indicates that life existed on earth before the earth's atmosphere contained free oxygen gas. The living cells must therefore have been fermenting cells then, and, as fossils show, they were undifferentiated single cells. Only when free oxygen appeared in the atmosphere - some billion years ago - did the higher development of life set in, to produce the plant and animal kingdoms from the fermenting, undifferentiated single cells.The reverse process, the dedifferentiation of life, takes place today in greatest amount before our eyes in cancer development, which is another expression for dedifferentiation. To be sure, cancer development takes place even in the presence of free oxygen gas in the atmosphere, but this oxygen may not penetrate in sufficient quantity into the growing body cells, or the respiratory apo-enzymes of the growing body cells may not be saturated with the active groups. In any case, during the cancer development the oxygen - respiration always falls, fermentation appears, and the highly differentiated cells are transformed to fermenting anaerobes, which have lost all their body functions and retain only the now useless property of growth. Thus, when respiration disappears, life does not disappear, but the meaning of life disappears, and what remains are growing machines that destroy the body in which they grow. But why oxygen differentiates and why lack of oxygen dedifferentiates? Nobody would dispute that the development of plants and animals and man from unicellular anaerobes is the most improbable process of all processes in the world... But according to the thermodynamics of Boltzmann, improbable processes require work to take place. It requires work to produce temperature differences in a uniformly temperatured gas; whereas the equalization of such temperature differences is a spontaneous process that does not require work. It is the oxygen - respiration that provides in life this work, and dedifferentiation begins at once when respiration is inhibited in any way. In the language of thermodynamics, differentiation represents a forced steady state, whereas dedifferentiation - that is, cancer - is the trueequilibrium state. Or, illustrated by a picture: the differentiated body cell is like a ballon an inclined plane, which, would roll down except for the work of oxygen respiration always preventing this. If oxygen respiration is inhibited, the ball rollsdown the plane to the level of dedifferentiation. In Summary:

• Impairment of respiration is more frequent than impairment of fermentation because respiration is more complicated than fermentation.

• The impaired respiration can be easily replaced by fermentation, because both processes have a common catalyst, the nicotinamide.

• The consequence of the replacement of respiration by fermentation is mostly glycolysis, with death of the cells by lack of energy. Only if the energy of fermentation is equivalent to the lost energy of respiration, is the consequence anaerobiosis. Glycolysis means death by fermentation, anaerobiosis means life by fermentation.

• Cancer does not arise, because respiration can maintain and create the high differentiation of body cells.The physicist Manfred Von Ardenne recently discovered that cancer cells owing to their fermentation, are more acid - inside and on their surface - than normal cells.