The Prime Cause and Prevention of Cancer with two prefaces on prevention

Revised lecture at the meeting of the Nobel-Laureates on June 30, 1966 at Lindau, Lake Constance, Germany

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1965 Preface to the Second Revised German Edition of the Lindau Lecture

(The way to prevention of cancer)

Since the Lindau lecture of June 1966 many physicians have examined - not unsuccessfully - the practical consequences of the anaerobiosis of cancer cells. The more who participate in these examinations, the sooner will we know what can be achieved. It isa unique aspect of these examinations that they can be carried out on human patients, on the largest scale, without risk; whereas experiments on animals have been misleading many times. The cure of human cancer will be the resultant of biochemistry of cancer and of biochemistry of man.

A list of selected active groups of respiratory enzymes will soon be published, to which we recently added cytohemin and d-amino- Levulinic acid, the precursor of oxygen-transferring hemins. In the meantime commercial vitamin preparations may be used that contain, besides other substances, many active groups of the respiratory enzymes. Most of these may be added to the food. Cytohemin and vitamin B 12 may be given subcutaneously. (A synonym of “active group” is prosthetic” group of an enzyme.)

There exists no alternative today to the prevention of cancer as proposed at Lindau. It is the way that attacks the prime cause of cancer most directly and that is experimentally most developed. indeed millions of experiments in man, through the effectiveness of some vitamins, have shown, that cell respiration is impaired if the active groups of the respiratory enzymes are removed from the food; and that cell respiration is repaired at once, if these groups are added again to the food. No way can be imagined that is scientifically better founded to prevent and cure a disease, the prime cause of which is

an impaired respiration. Neither genetic codes of anaerobiosis nor cancer viruses are alternatives today, because no such codes and no such viruses in man have been discovered so far; but anaerobiosis has been discovered.

What can be achieved by the active groups, when tumors have already developed? The answer is doubtful, because tumors live in the body almost anaerobically, that is under conditions that the active groups cannot act. On the other hand, because young metastases live in the body almost aerobically, inhibition by the active groups should be possible. Therefore, we propose first to remove all compact tumors, which are the anaerobic foci of the metastasis. Then the active group should be added to the food, in the greatest possible amount, for many years, even for ever. This is a promising task. If it succeeds, then cancer will be a harmless disease.

Moreover, we discovered recently a} in experiments with growing cancer cells in vitro that very low concentrations of some selected active groups inhibit fermentation and the growth of cancer cells completely, in the course of a few days. From these experiments it may be concluded that de-differentiated cells die if one tries to normalize their metabolism. It is a result that is unexpected and that encourages the task of inhibiting the growth of metastases with active enzyme groups. a) In press in Hoppe-Seylers Zeitschrift fir Physiologische Chemie 1967. 10 g riboflavin per ccm or 10 g d-Aminolevulinic acid inhibit

in vitro growth and fermentation completely but inhibit respiration less. As expected, ascites cancer in vivo is not cured. As emphasized, it is the first precondition of the proposed treatment that all growing body cells be saturated with oxygen. It is a second precondition that exogenous carcinogens be kept away, at least during the treatment. All carcinogens impair respiration directly or indirectly by deranging capillary circulation, a statement that is proved by the fact that no cancer cell exists, the respiration of which is not impaired. Of course, respiration cannot be repaired if it is impaired at the same time by carcinogens. it has been asked after the Lindau lecture why the repair of respiration by the active groups of the enzymes was proposed as late as 1966, although the fermentation of the cancer cell was discovered as early as 1923. Why was so much time lost?

He who asked this question ignored that in 1923 the chemical mechanism of enzyme action was still a secret of living nature alone. The first active group of an enzyme, “Iron, the Oxygen-Transferring Part of the Respiratory Enzyme" was discovered in 1924. There followed in two decades the discoveries of the 02-transferring metalloproteins, the flavoproteins and the pyridine proteins, a period that was concluded by the “Heavy Metals as Prosthetic Groups of Enzymes” s"3) and by the "Hydrogen Transferring Enzymes"4) in 1947 to 1949. Moreover, during the first decades after 1923 glycolysis and anaerobiosis were constantly confused, so that nobody knew what was specific for tumors. The three famous and decisive discoveries of DEAN BURK and colleagues) of the National Cancer Institute at Bethesda were of the years 1941, 1956 and 1964: first, that the metabolism of the regenerating liver, which grows more rapidly than most tumors, is not cancer metabolism, but perfect aerobic embryonic metabolism; second, that cancer cells, descended in vitro from one single normal cell, were in vivo the more malignant, the higher the fermentation rate; third, that in vivo growing hepatomas, produced in vivo by different carcinogens, were in vivo the more malignant, the higher the fermentation rate.

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