

Influence of Quinone on Oxidation Processes, Proliferative Activity and Longevity of Yeast.

G. LEJHANEK, I. A. PARFENTJEV AND B. SOKOLOFF.

(Introduced by Leo Loeb.)

From the Department of Pathology, Washington University School of Medicine, St. Louis, Mo.

Devrient, Thyssen, and Sokoloff¹ have shown that various substances originate as a result of decomposition of adrenalin, some of which have a specific action on cells. Among these substances is p-quinone which possesses a strong oxidizing power. We determined the influence of p-quinone on the longevity, cell multiplication, and metabolism of yeast cells.

We measured the influence of quinone on the oxygen consumption of yeast cells, using the differential manometer of Barcroft-Drastich.² The yeast was either in the form of a 36% suspension in water, or a 5% suspension in nutritive solution of Euler and Svanberg. We found that p-quinone in the concentration of 1:500,000 increases the oxygen consumption of yeast cells and that this increase is relatively higher when the yeast cells are suspended in the nutritive solution.

We investigated the influence of quinone on the multiplication and longevity of the yeast cells. For the study on proliferative activity we used yeast suspended in nutritive solution, in which the conditions for cell multiplication are optimal, and the effect of quinone on longevity was studied when cell multiplication was minimal.

In the first experiments we determined the influence of quinone in the concentration of 1:500,000, which according to Kisch and Leibowitz,³ is optimal as far as the effect on the stimulation of oxygen consumption of normal kidney tissue is concerned. We found a diminution in the number of yeast cells when compared with controls. This diminution was manifest in the experiments in which cells multiplied as well as in those in which they failed to multiply.

In the second series of experiments the effects of different quinone concentrations from 10^{-6} to 10^{-4} were examined. In general,

¹ Devrient, Wm., Thyssen, St., and Sokoloff, B., *PROC. SOC. EXP. BIOL. AND MED.*, 1930, **28**, 80.

² Drastich, L., *Biochem. Z.*, 1927, **188**.

³ Kisch, B., and Leibowitz, J., *Biochem. Z.*, 215.

quinone in the concentration of 10^{-6} and lower has no effect on the multiplication of yeast cells. But with the increase in the concentration to 10^{-4} the depressing effect on the multiplication of yeast cells increases. This effect is most marked on the first day, becoming subsequently less marked because yeast cells are able to reduce quinone to hydroquinone and quinhydrone (Luers⁴), substances which according to the experiments of Hinteregger⁵ with frog muscles are not so toxic as quinone.

Our experiments have shown that quinone in a very dilute solution (1:500,000) tends to increase the oxygen consumption of yeast cells and at the same time to shorten the life of these cells and to inhibit their multiplication.

It is of great interest to note that quinone exerts its influence in concentrations so low that it may be considered as oligodynamic.

⁴ Luers, *Biochem. Z.*, 179.

⁵ Hinteregger, *Archiv. f. Exp. Pharm. and Pathol.*, 1930, 156.