It was shown\(^1\) that phosphorylation of glucose in kidney extract is linked with the oxidation of succinic to fumaric acid and it was suggested that other substrates whose oxidation involves fumaric acid catalysis may be concerned with phosphorylation. In the experiments with a dialyzed kidney extract presented in the accompanying table addition of a small amount of fumaric acid catalyzes the oxidation of both glucose and pyruvic acid if no fluoride is present. When fluoride is added, fumaric acid no longer catalyzes the oxidation of glucose, while it still does so in the case of pyruvic acid.

The explanation is that glucose in order to be oxidized by this system must first be transformed to pyruvic acid, a reaction which involves an initial phosphorylation of the glucose molecule, followed by dephosphorylation to pyruvic acid and inorganic phosphate. Fluoride inhibits dephosphorylation and thus prevents the formation of pyruvic acid, the oxidation of which is necessary for the phosphorylation of glucose.

The experiments show that phosphorylation of glucose precedes its oxidation and that fumaric acid catalysis is an essential link.

between phosphorylation and oxidation. The dependence of glucose phosphorylation on the oxidation of pyruvic acid has also been demonstrated in a brain extract.

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