Entner-Doudoroff pathway

- The Entner–Doudoroff pathway describes an alternate series of reactions that catabolize glucose to pyruvate using a set of enzymes different from those used in either glycolysis or the pentose phosphate pathway.
- This pathway was first reported in 1952 by Michael Doudoroff and Nathan Entner.
- The Entner–Doudoroff pathway has a net yield of 1 ATP for every glucose molecule processed, as well as 1 NADH and 1 NADPH. By comparison, glycolysis has a net yield of 2 ATP and 2 NADH for every one glucose molecule processed.
- This pathway used two specific enzymes ie. 6-phosphogluconate dehydratase and KDPG aldolase.
- The Entner-Doudoroff pathway is generally found in *Pseudomonas, Rhizobium, Azotobacter, Agrobacterium,* and a few other gram-negative genera. Very few Gram-positive bacteria have this pathway, with *Enterococcus faecalis* being a rare exception.

Steps:

1. At first glucose is phosphorylated to glucose -6-phosphate by the enzyme hexokinase.
2. Glucose-6-phosphate is then oxidized to 6-phosphogluconolactone releasing a molecule of NADPH. This reaction is catalyzed by the enzyme glucose-6-phosphate dehydrogenase.
3. Hydrolase enzyme converts 6-phopshogluconolactone to 6-phosphogluconate.
4. 6-phosphogluconate undergoes dehydration reaction catalyzed by 6-phosphogluconate dehydratase to form 2-keto 3-deoxy 6-Phosphogluconate (KDPG).
5. KDPG splits to form pyruvate and glceraldehyde-3-phosphate. It is catalyzed by KDPG aldolase enzyme
6. Glyceraldehyde-3-phosphate is then metabolized by glycolysis to form pyruvate.