ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 11, Issue, 01, pp. 43508-43512, January, 2021
https://doi.org/10.37118/ijdr.20797.01.2021

RESEARCH ARTICLE OPEN ACCESS

GLYCOLYSIS IS STARTING PART OF THE MEMBRANE REDOXY POTENTIAL THREE STATE DEPENDENT 9 STEPPED FULL CYCLE OF PROTON CONDUCTANCE IN THE HUMAN BODY

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ARTICLE INFO

Article History:
Received 18th October, 2020
Received in revised form
29th November, 2020
Accepted 17th December, 2020
Published online 30th January, 2021

Key Words:
The full 9 stepped cycle of proton conductance, Glycolysis

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ABSTRACT

Glycolysis and the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us have a strong interconnection in the transferring of electron and protons, creation of proton gradient, ATP, NADH. The inner mitochondrial membrane is impermeable to NADH formedduring glycolysis, followed by Krebs cycle but by using two "shuttles" to transport the electrons from NADH across the mitochondrial membrane as the malate-aspartate shuttle and the glycerol phosphate shuttle, the malate then traverses the inner mitochondrial membrane into the mitochondrial matrix, where it is reoxidized by NAD^+ forming intra-mitochondrial oxaloacetate and $NADH^+$, which are very important parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. The glycerol phosphate shuttle of electrons, protons formed during the glycolysis followed by Krebs cycle takes place on the inner mitochondrial membrane, allowing $FADH_2$ to donate its electrons directly to coenzyme Q (ubiquinone) which is part of the electron transport chain have been participated in transferring of the electrons to molecular oxygen (O_2), with the formation of water, also in releasing of energy eventually captured in the form of ATP, which are also inseparable parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance having a closed loop figure.

Citation: ***Ambaga, M., Tumen-Ulzii, A. and Buyantushig, T. 2020.*** "Glycolysis is starting part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance in the human body", *International Journal of Development Research*, 11, (01), 43508-43512.

INTRODUCTION

Glycolysis is an oxygen free metabolic pathway, which are widely occurred indicating that it is an ancient metabolic pathway have been played the important role in the generation of more ATP, NADPH (8–38 ATPs per glucose). Glycolysis is a sequence of ten enzyme-catalyzed reactions, this metabolic pathwayconverts glucose $C_6H_{12}O_6$, into pyruvate, CH_3COCOO^- (pyruvic acid), and a hydrogen ion, H^+, the free energy released in this process is used to form the high-energy molecules ATP (adenosine triphosphate) and NADH (reduced nicotinamide adenine dinucleotide). *J. E. Walker (1982)* clarified the three-dimensional structure of the enzyme, which consists of one protein group (the F_0 portion) embedded in the inner membrane and connected by a sort of protein stalk or shaft to another protein group (the F_1 portion) . The passage of hydrogen ions through the membrane causes the F_0 portion and the stalk to rotate, and this rotation changes the configuration of the proteins in the F_1 portion. *J. E.* Walker's results supported Boyer's "binding change mechanism," which proposed that the enzyme functions by changing the position of its protein groups in such a way as to change their chemical affinity for ATP and its precursor molecules.

RESULTS AND DISCUSSION

At first time, we revealed that the full 9 stepped cycle of proton conductance inside human body, which starts as release of proton, electron from food substrates under the undirect action of oxygen released from membrane surroundings of erythrocyte in the 9 stage by a closed loop figure .

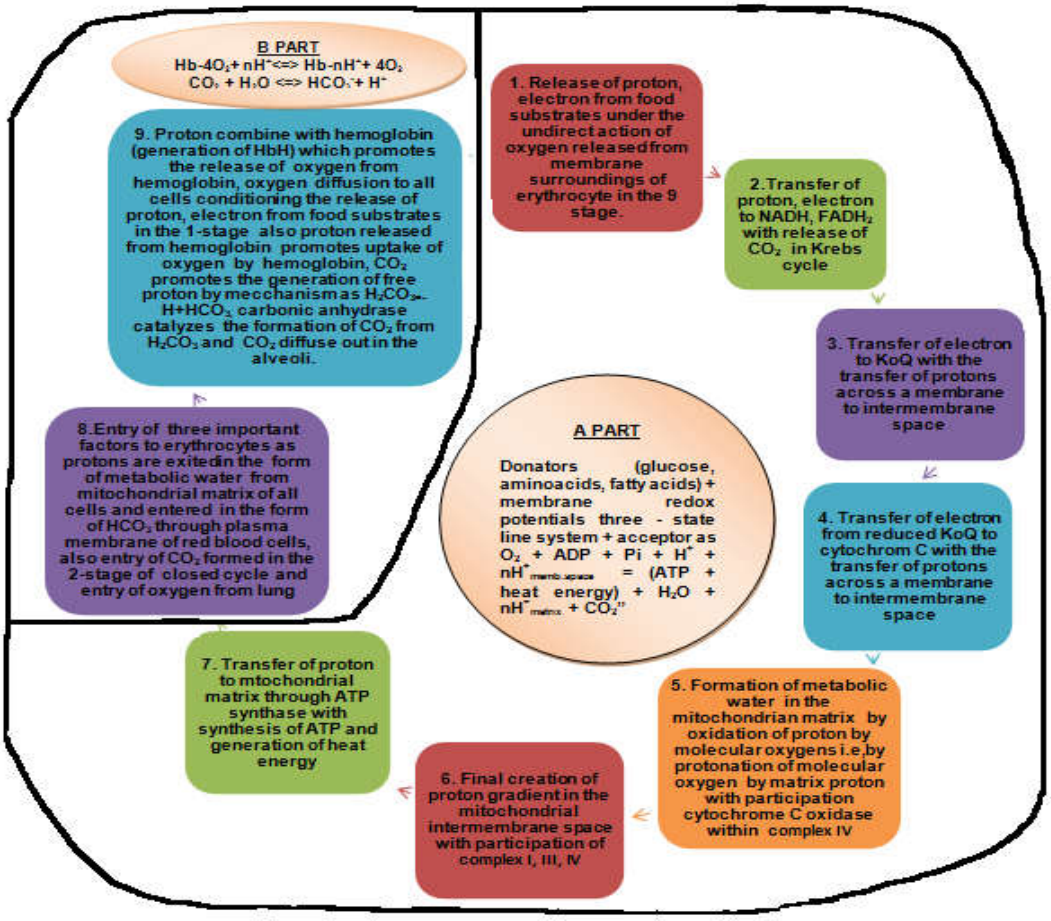
Figure 1. The final variant of closed cycle of proton conductance inside human body

In the framework of biological events as "the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance" would be conducted a following processes as:

1. First stage -Release of proton, electron from food substrates under the undirect action of oxygen released from membrane surroundings of erythrocyte in the 9 stage
2. Second stage -Transfer of proton, electron to NADH, $FADH_2$ with release of CO_2 in Krebs cycle
3. Third stage -Transfer of electron to KoQ with the transfer of protons across a membrane to intermembrane space
4. Fourth stage -Transfer of electron from reduced KoQ to cytochrom C with the transfer of protons across a membrane to intermembrane space
5. Fifth stage -Formation of metabolic water in the mitochondrian matrix by oxidation of proton by molecular oxygens i.e, by protonation of molecular oxygen by matrix proton with participation cytochrome C oxidase within complex IV
6. Sixth stage -Final creation of proton gradient in the mitochondrial intermembrane space with participation of complex I, III, IV
7. Seventh stage - Transfer of proton to mtochondrial matrix through ATP synthase with synthesis of ATP and generation of heat energy
8. Eighth stage - Entry of three important factors to erythrocytes as protons are exited in the form of metabolic water from mitochondrial matrix of all cells and entered in the form of HCO_3 through plasma membrane of red blood cells, also entry of CO_2 formed in the 2-stage of closed cycle and entry of oxygen from lung
9. Ninth stage - Proton combine with hemoglobin (generation of HbH) which promotes the release of oxygen from hemoglobin, oxygen diffusion to all cells conditioning the release of proton, electron from food substrates in the 1-stage also proton released from hemoglobin promotes uptake of oxygen by hemoglobin, CO_2 promotes the generation of free proton by mecchanism as H_2CO_{3-} = $H+HCO_3$, carbonic anhydrase catalyzes the formation of CO_2 from H_2CO_3 and CO_2 diffuse out in the alveoli.

It is more interesting that the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance including Glycolysis , followed by Krebs cycle (after glycolysis, pyruvate is converted into acetyl CoA in order to enter the citric acid cycle because glycolysis-the cellular

degradation of the simple sugar glucose to yield pyruvic acid and ATP as an energy source) is functioned normally with the passage of hydrogen ions through the membrane causes the F_0 portion and the stalk to rotate, and this rotation changes the configuration of the proteins in the F_1 portion confirmed by J.Walker and P. D. Boyer. It may be say that the final part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance including Glycolysis should be connected with "binding change mechanism," which proposed that the enzyme functions by changing the position of its protein groups in such a way as to change their chemical affinity for ATP and its precursor molecule confirmed by J.Walker and P. D. Boyer. Glycolysis is an oxygen free metabolic pathway,which are widely occurred indicating that it is an ancient metabolic pathway have been played the important role in the generation of more ATP, NADPH (8–38 ATPs per glucose) in the reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, by conductind without using oxygen.



It should be say that Glycolysis is participated in the the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance in the human body with participation of components s correspond to glucose (GLU), glucose 6-phosphate (G6P), fructose 6-phosphate (F6P), fructose 1,6-bisphosphate (F16BP), dihydroxyacetone phosphate (DHAP), glyceraldehyde 3-phosphate(GA3P), 1,3-bisphosphoglycerate (13BPG), 3-phosphoglycerate (3PG), 2-phosphoglycerate (2PG), phosphoenolpyruvate (PEP), pyruvate (PIR), and lactate (LAC) , which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. Also, Glycolysis is conducted in the the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance in the human body to hexokinase (1), glucose-6-phosphate isomerase (2), phosphofructokinase-1 (3), fructose-bisphosphate aldolase (4), triosephosphate isomerase (5), glyceraldehyde-3-phosphate dehydrogenase (5), phosphoglycerate kinase (7), phosphoglycerate mutase (8), phosphopyruvate hydratase (enolase) (9), pyruvate kinase (10), and lactate dehydrogenase (11) , which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. Glycolysis, contrary to all remained reactions of the the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance in the human body is an oxygen-independent metabolic pathway, widely occurred indicatig that it is an ancient metabolic pathway, firstly occur under the oxygen-free conditions of the Archean oceans, also in the absence of enzymes, which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. Beside ,Glycolysis is a sequence of ten enzyme-catalyzed reactions, this metabolic pathwayconverts glucose $C_6H_{12}O_6$, into pyruvate,

CH_3COCOO^- (pyruvic acid), and a hydrogen ion, H^+, the free energy released in this process is used to form the high-energy molecules ATP (adenosine triphosphate) and NADH (reduced nicotinamide adenine dinucleotide) , which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. The glycolysis, followed by Krebs cycle have two phases:as the preparatory (or Investment) phase – where in ATP is consumed it acts to keep the glucose concentration low, promoting continuous transport of glucose into the cell through the plasma membrane transporters, and the pay off phase – wherein ATP is produced,characterised by a net gain of the energy-rich molecules ATP and NADH, each reaction in the pay-off phase occurs twice per glucose molecule, yields 2 NADH molecules and 4 ATP molecules, leading to a net gain of 2 NADH molecules and 2 ATP molecules from the glycolytic pathway per glucose, further aerobic reactions use pyruvate, and NADH + H^+ from glycolysis, which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us.

It is interesting that, glucose converted by glycolysis to pyruvate, which enters the mitochondrion where it is converted into acetyl-CoA and then into citrate, which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. The inner mitochondrial membrane is impermeable to NADH formed during glycolysis, followed by Krebs cycle but by using two "shuttles" to transport the electrons from NADH across the mitochondrial membrane as the malate-aspartate shuttle and the glycerol phosphate shuttle, the malate then traverses the inner mitochondrial membrane into the mitochondrial matrix, where it is reoxidized by NAD^+ forming intra-mitochondrial oxaloacetate and $NADH^+$, which are very important parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us. By using glycerol phosphate shuttle, a electrons, protons contained in the cytosolic NADH formed during the glycolysis, followed by Krebs are transferred to dihydroxyacetone to form glycerol-3-phosphate which readily traverses the outer mitochondrial membrane and glycerol-3-phosphate reoxidized to dihydroxyacetone, donating its electrons to FAD instead of NAD^+, which are main parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance, described by us.

The glycerol phosphate shuttle of electrons, protons formed during the glycolysis followed by Krebs cycle takes place on the inner mitochondrial membrane, allowing $FADH_2$ to donate its electrons directly to coenzyme Q (ubiquinone) which is part of the electron transport chain have been participated in transferring of the electrons to molecular oxygen (O_2), with the formation of water,also in releasing of energy eventually captured in the form of ATP, which are also inseparable parts of reaction medium as "Donators + membrane - redox potentials three - state line system + O_2 + ADP + Pi + H^+ + nH + membrane space = (ATP + heat energy) + H_2O + nH + matrix + CO_2" which is belong to the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance having a closed loop figure.

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