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RESEARCH ARTICLE

THE FULL 9 STEPPED CYCLE OF PROTON, ELECTRON CONDUCTANCE INSIDE HUMAN BODY, CONSISTING OF TWO BASIC PARTS

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ABSTRACT

By our suggestion the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance have been divided in two parts as A part and B part. The specifity of A part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductanceis distinguished by electron transport chain (ETC) is a series of complexes that transfer electrons from electron donors to electron acceptors via redox reactions, and couples this electron transfer with the transfer of protons (H^+ ions) across a membrane as at first : complex I-NADH: ubiquinone oxidoreductase, two electrons are removed from NADH and ultimately transferred to ubiquinone (UQ) - complex I also translocates four protons (H^+) across the membrane, thus producing a proton gradient -NADH is oxidized to NAD^+, by reducing Flavin mononucleotide to $FMNH_2$ in one two-electron step-$FMNH_2$ is then oxidized in two one - electron steps, each electron thus transfers from the $FMNH_2$ to an Fe-S cluster, from the Fe-S cluster to ubiquinone (Q) - during this process, four protons are translocated from the mitochondrial matrix to the intermembrane space, at second: Complex II-succinate-CoQ reductase, but unlike complex 1, no protons are transported to the intermembrane space, at third: Complex III -cytochrome bc_1 complex or $CoQH_2$-cytochrome c reductase, two electrons are removed from QH_2 at the Q_O site and total four protons are translocated, at fourth: Complex IV-cytochrome c oxidase, four electrons are removed from four molecules of cytochrome c and transferred to molecular oxygen (O_2), producing two molecules of water, and eight protons are removed from the mitochondrial matrix, only four are translocated across the membrane, at fifth: Complex *V* of the electron transport chain. The F_O component of ATP synthase acts as an ion channel that provides for a proton flux back into the mitochondrial matrix. The efflux of protons from the mitochondrial matrix creates an electrochemical gradient (proton gradient). In such way, all biological events, which have been occurred within first 7 stages of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance are conditioned by reaction equation as "Donators (glucose, aminoacids, fatty acids) + membrane redox potentials three-state line system + acceptor as $O_2 + ADP + Pi + H^+ + nH^+_{memb.space} = (ATP + heat\ energy) + H_2O + nH^+_{matrix} + CO_2$" The specifics of B part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance is distinguished by involvement of such reactions as $Hb\text{-}4O_2 + nH^+ <=> Hb\text{-}nH^+ + 4O_2$ and $CO_2 + H_2O <=> HCO_3^- + H^+$ in last 8 stage and 9 stage of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance .

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INTRODUCTION

It was interesting to give the answer to such principally important questions relating to as how we would describe the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance more understandable by dividing this in the interrelated two basic parts. During our investigation we have been succeeded to clarify that the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance can can be divided into two parts as A part and B part.

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The specifics of A part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance is distinguished by electron transport chain (ETC) is a series of complexes that transferelectrons from electron donors to electron acceptors via redox (both reduction and oxidation occurring simultaneously) reactions, which are conditioned by conductance of reaction equation as "Donators (glucose, aminoacids, fatty acids) + membrane redox potentials three - state line system + acceptor as $O_2 + ADP + Pi + H^+ + nH^+_{memb.space} = (ATP + heat\ energy) + H_2O + nH^+_{matrix} + CO_2$"
The specifics of B part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance is

distinguished by involvement of such reactions as Hb-$4O_2$+nH^+<=>Hb-nH^++ $4O_2$ and $CO_2 + H_2O$ <=> HCO_3^-+ H^+ .

RESULTS AND DISCUSSION

By our suggestion the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance have been divided in two parts as A part and B part.

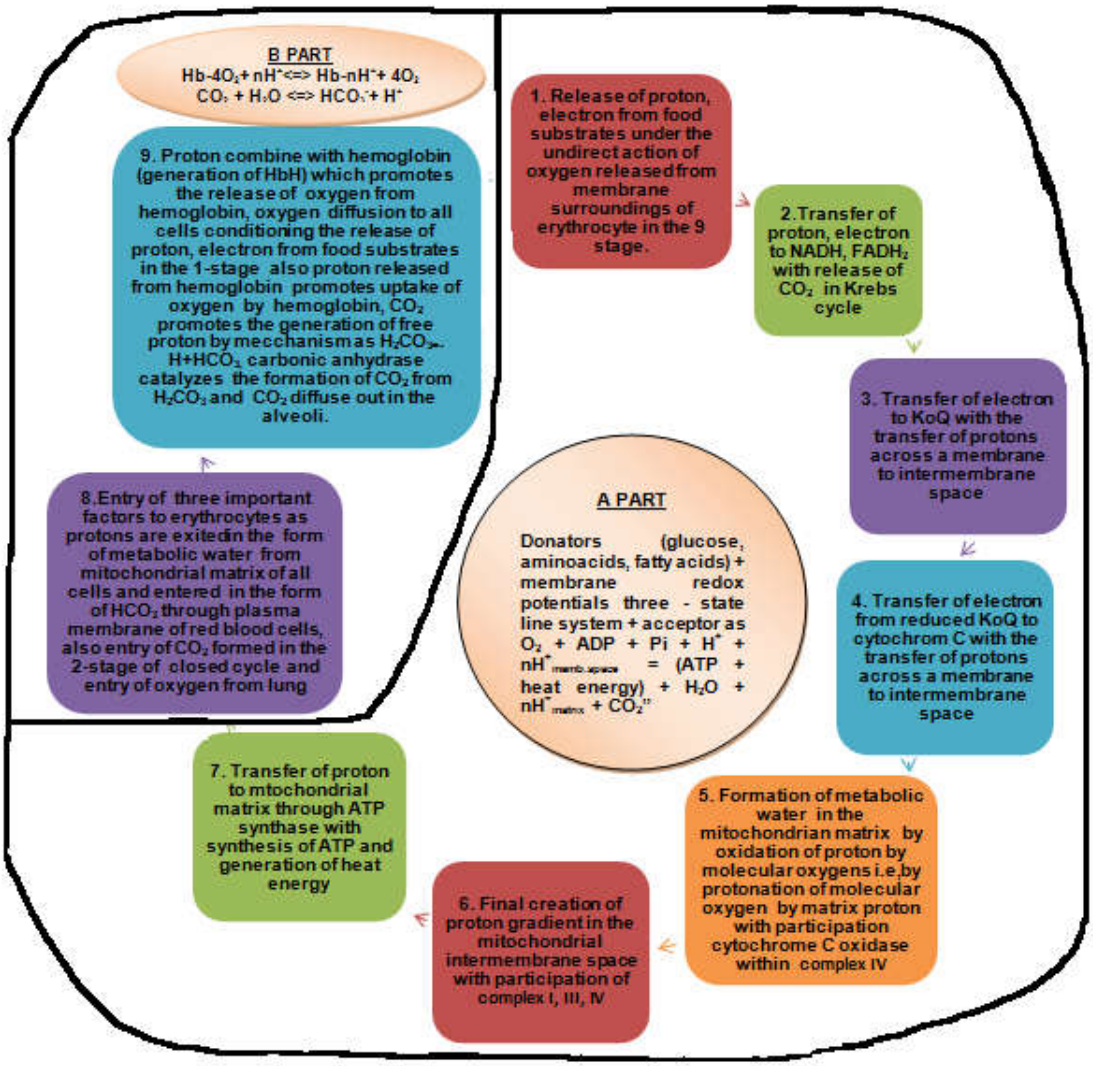

Figure 1. The final variant of closed cycle of proton conductance inside human body, consisting of two parts

The specifics of A part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance is distinguished by electron transport chain (ETC) is a series of complexes that transfer_electrons from electron donors to electron acceptors via redox reactions, and couples this electron transfer with the transfer of protons (H^+ ions) across a membrane as at first: complex I-NADH: ubiquinone oxidoreductase, two electrons are removed from NADH and ultimately transferred to ubiquinone (UQ) - complex I also translocates four protons (H^+) across the membrane, thus producing a proton gradient-NADH is oxidized to NAD^+, by reducing Flavin mononucleotide to $FMNH_2$ in one two-electron step-$FMNH_2$ is then oxidized in two one - electron steps, each electron thus transfers from the $FMNH_2$ to an Fe-S cluster, from the Fe-S cluster to ubiquinone (Q) - during this process, four protons are translocated from the mitochondrial matrix to the intermembrane space, at second:Complex II-succinate-Co Qreductase, but unlike complex 1, no protons are transported to the intermembrane space, at third: Complex III - cytochrome bc_1 complex or $CoQH_2$-cytochrome c reductase, two electrons are removed from QH_2 at the Q_O site and total four protons are translocated, at fourth: Complex IV-cytochrome c oxidase, four electrons are removed from four molecules of cytochrome c and transferred to molecular oxygen (O_2), producing two molecules of water, and eight protons are removed from the mitochondrial matrix, only four are translocated across the membrane, at fifth : *Complex V* of the electron transport chain. The F_O component of ATP synthase acts as an ion channel that provides for a proton flux back into the mitochondrial matrix. The efflux of protons from the mitochondrial matrix creates an electrochemical gradient (proton gradient).

This gradient is used by the F_OF_1ATP synthase complex to make ATP via oxidative phosphorylation. In such way, all biological events, which have been occurred within first 7 stages of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance are conditioned by equation as "Donators (glucose, amino acids, fatty acids) + membrane redox potentials three-state line system + acceptor as O_2 + ADP + Pi + H^+ + $nH^+_{memb.space}$ = (ATP + heat energy) + H_2O + nH^+_{matrix} + CO_2"

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 in first 7 stages as:

- **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
- **Second stage:** Transfer of proton, electron to NADH, $FADH_2$ with release of CO_2 in Krebs cycle
- **Third stage -** Transfer of electron to KoQ with the transfer of protons across a membrane to intermembrane space with participation of complex I-NADH: ubiquinone oxidoreductase, during which two electrons are removed from NADH and ultimately transferred to ubiquinone (UQ) - complex I also translocates four protons (H^+) across the membrane and also under influence of complex III -cytochrome bc_1 complex or $CoQH_2$-cytochrome c reductase two electrons are removed from QH_2 at the Q_O site and total four protons are translocated.
- **Fourth stage:** Transfer of electron to cytochrom C and oxygen with the transfer of protons across a membrane to intermembrane space with participation of Complex IV-cytochrome c oxidase, during which four electrons are removed from four molecules of cytochrome c and transferred to molecular oxygen (O_2), producing two molecules of water, and eight protons are removed from the mitochondrial matrix, only four are translocated across the membrane.
- **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 of cytochrome C oxidase within complex IV, during which four electrons are removed from four molecules of cytochrome c and transferred to molecular oxygen (O_2), producing two molecules of water, and eight protons are removed from the mitochondrial matrix, only four are translocated across the membrane
- **Sixth stage:** Final creation of proton gradient in the mitochondrial intermembrane space with participation of complex I, III, IV
- **Seventh stage:** Transfer of proton to mitochondrial matrix through ATP synthase with synthesis of ATP and generation of heat energy

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The specifics of B part of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance is distinguished by involvement of such reactions as Hb-$4O_2$+nH^+<=>Hb-nH^++ $4O_2$ and $CO_2 + H_2O$ <=> HCO_3^-+ H^+ in last 8 stage and 9 stage of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance.

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 in last 8 stage and 9 stage as:

- **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
- **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, arbonic anhydrase catalyzes the formation of CO_2 from H_2CO_3 and CO_2 diffuse out in the alveoli.

In such way, the new conception relating to existence of the membrane redoxy potential three state dependent 9 stepped full cycle of proton conductance in two parts as A part and B part eventually describes the continuity of proton conductance inside human body, starting from food substrates, containing sum of electron, protons, ending by erythrocyte membrane surroundings containing last portions of protons, released from food under action of oxygens passing previous 9 stages.

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