

PLASMA MEMBRANE AS A REDOX GATE

G. BARTOSZ

University of Łódź and University of Rzeszów, Poland

Plasma membrane is a barrier separating the more reducing cell interior from the more oxidizing extracellular environment. Maintaining this barrier is critical for cell functioning. However, this redox barrier is not absolutely tight and the plasma membrane allows for redox exchange of low-molecular weight substrates and contains transplasma electron transport systems. Exchange of low-molecular weight substrates is important, i.e., for recycling of substrates, such as ascorbate, oxidized in blood plasma or other body fluids, and optimization of redox properties of extracellular medium under cell culture conditions.

Transmembrane electron transport systems perform a similar role with respect to compounds which cannot be easily transported, enable reduction of substrates which can be taken up by cells in the reduced form (like iron ions), maintaining redox balance and signaling. Their roles in the invasiveness of parasites, tumor progression and effects of calorie restriction have been postulated. If so, they may perhaps be seen as a target for anticancer drugs. A specialized transmembrane redox system is the NADPH oxidase, allowing for extracellular reduction of oxygen to form superoxide radical anion. This system is used for defense purposes by phagocytosing cells but also for signaling in many other cell types.

Apart from NADPH oxidase, other systems not employing oxygen as a substrate, are present in plasma membranes of various cells. Their molecular identity still awaits elucidation. An isoform of porin (VDAC) has been identified as a transmembrane redox system in mammalian cells. We found no such a role for porin in the yeast *Saccharomyces cerevisiae* where ferric reductase seems to be the main but not the only component of the transmembrane electron transport system.