Oxidative Medicine and Cellular Longevity

Hindawi

Special Issue on

Cellular Membranes as Target and Source of Reactive Species in Cancer

CALL FOR PAPERS

Cancer cells are characterized by metabolic reprograming as well as alterations in constitutive production of reactive oxygen and nitrogen species (ROS/RNS) and their subsequent signaling events. While a large body of evidence is available regarding intracellular consequences of these alterations, the role of cellular membranes as both target and source of ROS/RNS is less understood. Cell membranes are the gatekeepers of inside-out and outside-in transport of (bio)molecules, primordial for several homeostatic processes for life, including production and elimination of ROS/RNS. For example, some key ROS/RNS-generating enzymes are members of the NADPH-oxidase (NOX) family or myeloperoxidases. Many types of cancer are associated with elevated levels such as enzymes in the cell membrane, leading to increased concentrations of ROS/RNS capable of inactivating and/or functionally altering cell surface proteins and receptors. ROS/RNS can also be generated in a paracrine manner by other cell types or by technologies aiming at therapeutic production of ROS/RNS such as photodynamic therapy or cold physical plasma. Moreover, several types of cancer show higher levels of constitutive ROS production, which corroborates with increased expression of antioxidant proteins and enzymes, such as catalase, at their cellular membranes. In addition, aquaporins are described to be enhanced in tumor cell membranes. These channels are not only described to facilitate the passive diffusion of water but also of small noncharged oxidants, such as hydrogen peroxide. Finally, recent work highlighted the role of cell surface receptors on immune cells recognizing oxidatively damaged ligands as a “danger” signal. This may be of relevance in the onset of antitumor immunity. Considering the importance of cell membranes in all these processes, membranes and redox interventions have been an important focus in preclinical research to identify new therapeutic avenues.

In light of these findings, we invite investigators to contribute original research and review articles that highlight the role of cell membranes both as target and as source of ROS/RNS in cancer cells. All sources of ROS/RNS, i.e., paracrine (other cells or types of cells as well as microvesicles) and autocrine (e.g., by enzymes in cell membranes, cytosols, and mitochondria), can be the focus of the investigation.

Potential topics include but are not limited to the following:

- Mechanistic investigation of oxidation processes in cancer cell membranes and their functional consequences
- Identification of signaling pathways specifically translating membrane oxidation
- Exploring the concept of immune cell receptors specifically recognizing oxidized targets as a "danger" signal of excessive inflammation
- Biochemical studies on redox chemistry and extracellular radical formation
- Inactivation/functional alteration of membrane proteins and receptors important in tumor cell biology
- Biochemical characterization of lipid and advanced oxidation products
- Computational studies on ROS/RNS on cellular membranes
- new methods for investigating oxidative events in cellular membranes

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