

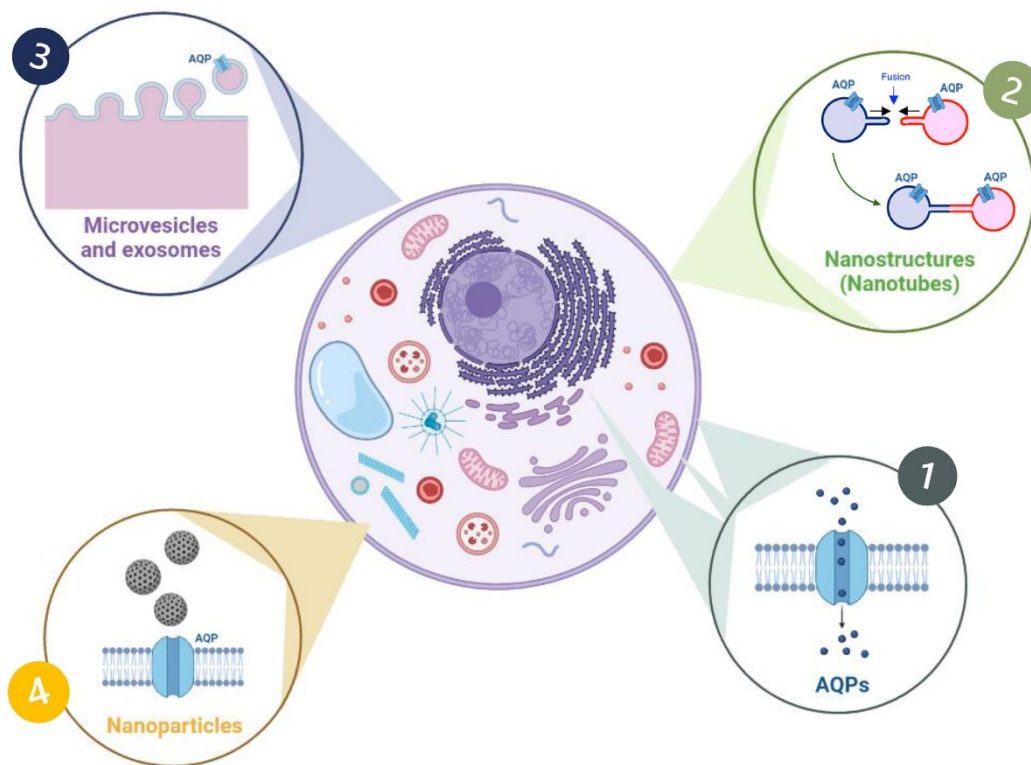
Title - Aquaporins in tumor cells: regulatory mechanisms from intracellular to nanotubes and microvesicles passing through the plasma membrane.

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Research Theme/Topic - Cellular mechanisms to control redox status

Main Abstract:

Background - ROS like H_2O_2 can exert a physiological effect at low concentrations, acting as intracellular second messengers (signaling molecules), or a cytotoxic effect at high concentrations that may trigger programmed cell death (apoptosis). Great interest was aroused by the discovery that some aquaporins (AQPs; AQP3, 5, 8, 9, and 11) can facilitate the diffusion of H_2O_2 from the producing cells across the plasma membranes to the extracellular fluid and vice versa, constituting an important ROS scavenging mechanism (Pellavio et al., 2017; 2020; Laforenza et al., 2016; Medraño-Fernandez et al., 2016). Recently, AQPs were found to promote cancer progression by increasing H_2O_2 efflux and resistance to apoptosis of mesothelioma cells.



The aim of this Ph.D. project is to identify the misregulation of AQPs in cancer. The following tasks will be considered: **1)** the functional modification of AQPs in the plasma membranes but also in mitochondria and in endoplasmic reticulum membranes by measuring the water and H_2O_2 permeability in

normal and in AQP-null cells; **2)** the role/s of AQPs in the formation of membranous nanostructures (nanotubes) in cell-to-cell communication; **3)** AQPs in microvesicles and exosomes as a mechanism underlying migration and proliferation; **4)** cellular and molecular mechanisms of cerium nanoparticles in the modulation of AQP redox status in cancer cells. **Techniques** - cell culture, gene silencing, qRT-PCR, immunoblotting, immunocytochemistry (ICC, IF), stopped-flow light scattering (SFLS), and real-time H_2O_2 imaging with a genetically encoded fluorescent probe (HyPer7).

