Loss of Reactive Oxygen Species (ROS) Inhibits Planarian Regeneration

Qureshi, Saad (School: Kalamazoo Area Mathematics and Science Center)

Regeneration is defined as a natural process that allows plants and animals to replace or restore damaged or missing cells, tissues, organs, and even entire body parts to full function (Regeneration, n.d.). Planarians are flatworms that live in freshwater and serve as an excellent model organism to study regeneration. About 25-30% of all planarian cells are adult stem cells, facilitating the highly regenerative ability of the planarians (Saló & Baguña, 1984). Additionally, planarians can regenerate all tissues, including their central nervous system and brain (Van Huizen et al., 2019). Reactive oxygen species (ROS) are oxygen-containing molecules critical for cell signaling (Li, Jia, & Trush, 2016). ROS has been associated with various diseases due to cell death caused by high concentrations. However, in smaller concentrations ROS facilitates regeneration (Gauron et al., 2013). ROS iwas found to be required for the regeneration of gecko tails after amputation (Zhang et al., 2016). Interestingly, new studies of planarian flatworms show that a surge of ROS post-amputation is required for regeneration (Piroette et al., 2015). Diphenyliodonium chloride (DPI) is a NADPH oxidase inhibitor, which inhibits ROS generated by this enzyme, and can serve as an experimental tool to test the effects of ROS in planarian regeneration (Osaki et al., 2011).

Awards Won: