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Characterizing Photoswitches to Mimic Nerve Cell Repolarization

It has been shown that a quaternary ammonium structure (nitrogen bonded to four carbons), such as tetra-ethyl ammonium iodide, can block a potassium channel and therefore inhibit the depolarization of a nerve cell. By attaching this quaternary ammonium (or other biologically active structure) to an organic photochromic molecular photoswitch, it is possible to control the nerve cell with light. The goal of this research is to create a photoswitch that will depolarize and repolarize a nerve cell at a physiologically realistic rate using low-power visible light. This “drug” would allow people suffering from retinitis pigmentosa a chance to again “see” since only the rods and cones are damaged and the retinal nerve cells only need a new means by which to respond to light.