

## **Influence of Nitric Oxide on the recovery kinetics of flash responses of isolated frog rods**

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**Abstract.** cGMP is a major second messenger in the visual transduction pathway. Flash response recovery of photoreceptors is the result of several biochemical reactions that end up with restoring the cGMP-concentration to preillumination levels. Substances affecting the cGMP-concentration in the photoreceptor outer segment could play a modulating role in the recovery process of the light response.

Nitric oxide is known to increase the formation of cyclic GMP in several tissues through the activation of soluble guanylate cyclases. Its endogenous synthesis was demonstrated in several cell types in the retina. Since rod outer segments are reported to contain guanylate cyclase activity in the cytosol, which is highly activated by nitroprusside, a nitric oxide generating agent, it was goal of this study to examine the influence of sodium nitroprusside on the kinetics of light responses of intact photoreceptors. We investigated the effect of extracellularly applied nitroprusside on the amplitude and recovery time of flash responses of isolated dark-adapted rods of the frog *Rana temporaria* using the pipette suction technique. The inner segments of single intact rods were drawn into a suction electrode, and the light induced changes in membrane current were amplified and recorded with a computer-controlled current-to-voltage converter system. The recorded signal was filtered and digitized for subsequent analysis at a sampling rate of 250 Hz. Light stimuli were unpolarized 30 ms monochromatic flashes of 550 nm wavelength, the flash intensities were defined by the voltage applied on the LED. The perfusing solution in the recording chamber was replaced with the nitroprusside containing solution during recording and identical light flashes on the rod as before solution changing were applied. The maximal amplitude and the time course of the recovery phase of the recorded signals in the standard and in the nitroprusside Ringer were compared with the Wilcoxon Signed-Rank Test. Nitroprusside induced a statistically significant ( $p < 0.01$ ) decrease of the amplitude and accelerated the recovery phase ( $p < 0.05$ ) of the light response on subsaturating flashes of a fixed low intensity. Increasing of light intensity of the applied flashes towards saturating levels attenuated both effects. The results suggest that sodium nitroprusside enhances termination of the rod response at non saturating low light intensities and reduces photosensitivity probably through early activation of cGMP synthesis; at high intensities there are no significant changes in both parameters, amplitude and time course, so that this effect is eventually neutralized by other mechanisms at increasing light level. We conclude that nitric oxide could act as an additional modulating factor in recovery under appropriate low light conditions.