Spontaneous activity of the light-dependent channel irreversibly induced in excised patches from Limulus ventral photoreceptors

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We have studied the properties of membrane patches excised from the transducing lobe of Limulus ventral photoreceptors. If patches are excised into an "internal" solution that resembles the ionic composition of the cytoplasm, channel activity is typically absent, but can be turned on by cyclic GMP (cGMP). In contrast, if patches are excised directly into sea water and subsequently examined in internal solution, they exhibit a high channel activity in the absence of any second messenger (spontaneous channel activity). Because these patches contained only light-dependent channels when examined before excision and because these spontaneous channels have properties in common with the light/cGMP-dependent channel, we believe that the spontaneously active channels represent light/cGMP-dependent channels that have been damaged by exposure to sea water, perhaps due to proteolysis activated by the high Ca2+ levels of the sea water. One type of the spontaneously active channel resembles the ligh