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Dear editors, dear Dr Berard,

Following your invitation to submit a research protocol, please find enclosed our manuscript entitled "Electromechanical Assessment of Optogenetically Modulated Cardiomyocyte Activity" to be considered for publication in Jove.

Optogenetics - the use of light-activated proteins to modulate and/or observe cellular behaviour - is a fast-developing technology first applied to neuroscience research just over a decade ago. To date, a number of studies have begun to transfer the optogenetic approach to cardiovascular research, with a focus on manipulation and monitoring of cardiomyocyte activity.

Here, we provide a protocol to characterize the electromechanical effects of activating light-gated chloride channels in rabbit isolated cardiomyocytes. The protocol includes cell isolation, culturing and adenoviral transduction, followed by patch-clamp recordings and carbon fibre measurements of cell mechanics to assess cardiomyocyte responses to light stimulation.

We think that a thorough characterization of light-induced effects in the target cells is an important prerequisite for efficient and informative optogenetic experiments in cardiac tissue and whole hearts. As our protocol can be generally applied to test different optogenetic actuators, we anticipate that it will be useful for many researchers using optogenetics in the heart.

With kind regards on behalf of all coauthors,



Dr Franziska Schneider-Warme