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In vivo **fluorescence fiber-optic microscopy of superfast Ca^{2+} transients in syrinx muscles** ANALÍA DALL'ASÉN, JORGE MÉNDEZ, FRANZ GOLLER, Department of Biology, University of Utah, Salt Lake City, Utah, USA — Optical techniques in conjunction with fluorescent markers have revolutionized the investigation of dynamical cellular processes, such as studies of calcium ion (Ca^{2+}) dynamics in muscles. Recently, it was shown that songbirds have superfast syringeal muscles, which can modulate song acoustics up to 250 Hz. Such rapid contraction cycles most likely require very rapid Ca^{2+} kinetics. We developed a technique to measure Ca^{2+} transients in syringeal muscles of anesthetized birds with a custom-built endoscope. The fluorescence measurements were carried out before and after applying a calcium indicator dye and while muscles were stimulated electrically. The results show fast (∼50-ms FWHM) and superfast (∼7-ms FWHM) Ca^{2+} transients. The strongest signals were observed 30-40 minutes after applying the dye. This study confirms that rapid Ca^{2+} transients in syringeal muscles facilitate superfast contraction kinetics and demonstrates the feasibility of this optical technique as a biosensor for detecting fluorescence signals of muscular calcium activity on a ms timescale of living animals.

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