# *In vivo* investigation of $Ca^{2+}$ signaling in seminiferous tubules

Jerome Schröer[1], David Fleck[1], Justine Fischoeder[1], Christopher Wiesbrock[1] & Marc Spehr[1]

1. Institute for Biology II, Department of Chemosensation, RWTH Aachen University, Germany

Contact: j.schroeer@sensorik.rwth-aachen.de

The life-long process of fertile sperm production is a fundamental mechanism of reproduction. Nevertheless, the complex and precisely orchestrated mechanisms behind this phenomenon largely remain a black box. To gain insights into these mechanisms we focus on the seminiferous tubules, the primary functional units of mammalian testis, and its three main cell types, i.e., peritubular, germ, and Sertoli cells. We address cell type specific $Ca^{2+}$ signaling due to its established role in regulation of cellular activity. Here, we use *in vitro* and *in vivo* life cell imaging approaches to study non-evoked $Ca^{2+}$ signaling events in all three cell types. We employ Cre-loxP genetics to conditionally express the genetically encoded fluorescence $Ca^{2+}$ reporter GCaMP6f. Our studies show that all three cell types exhibit distinct $Ca^{2+}$ signaling patterns with unique characteristics. We demonstrate that $Ca^{2+}$ activity is both age- and endocrine state-dependent, and it is affected by gonadotropins such as FSH and LH. Moreover, cross-correlation analysis reveals unexpected coordinated ensemble activity. Collectively, our findings provide a deeper understanding of male reproductive physiology.