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Isolation and characterization of myogenic precursor cells from human cremaster muscle

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Human myogenic precursor cells have been isolated and expanded from a number of skeletal muscles, but alternative donor biopsy sites must be sought after in diseases where muscle damage is widespread. Biopsy sites must be relatively accessible, and the biopsied muscle dispensable. Here, we aimed to histologically characterize the cremaster muscle with regard number of satellite cells and regenerative fibres, and to isolate and characterize human cremaster muscle-derived stem/precursor cells in adult male donors with the objective of characterizing this muscle as a novel source of myogenic precursor cells. Cremaster muscle biopsies (or adjacent non-muscle tissue for negative controls; N = 19) were taken from male patients undergoing routine surgery for urogenital pathology. Myosphere cultures were derived and tested for their *in vitro* and *in vivo* myogenic differentiation and muscle regeneration capacities. Cremaster-derived myogenic precursor cells were maintained by myosphere culture and efficiently differentiated to myotubes in adhesion culture. Upon transplantation to an immunocompromised mouse model of cardiotoxin-induced acute muscle damage, human cremaster-derived myogenic precursor cells survived to the transplants and contributed to muscle regeneration. These precursors are a good candidate for cell therapy approaches of skeletal muscle. Due to their location and developmental origin, we propose that they might be best suited for regeneration of the rhabdosphincter in patients undergoing stress urinary incontinence after radical prostatectomy.

In striated muscle, adult myogenic stem cells are known as satellite cells, due to their superficial position on muscle fibres[1]. The myogenic process is a multifaceted transition between precursor states (quiescence, activation, proliferation and differentiation) that precede fusion of the myoblasts to regenerative muscle fibres[2]. Besides, satellite cells reside in a complex niche, which includes other precursors such as fibro-adipogenic precursor cells (FAPs) that modulate the regenerative response[3], along with signals arising from nerve and capillary terminals and other interstitial cells. For cell-based therapeutic purposes, it would thus be desirable to obtain and characterize the diverse types of human muscle precursor cells from an accessible source.

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