



## Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 1<sup>st</sup> – 2<sup>nd</sup>, 2019  
Conference Proceedings

International Journal of Exercise Science, Volume 9, Issue 8



### Satellite cell myogenic capacity is maintained in aged human muscles

Davi A.G. Mázala<sup>1\*</sup>, James S. Novak<sup>1,2,3\*†</sup>, Marie Nearing<sup>1,4</sup>, Nayab F. Habib<sup>1</sup>, Tessa Dickson<sup>1</sup>, Olga B. Ioffe<sup>5</sup>, Brent T. Harris<sup>6</sup>, Marie N. Fidelia-Lambert<sup>7</sup>, Christopher Rossi<sup>8</sup>, D. Ashely Hill<sup>8</sup>, Kathryn R. Wagner<sup>9,10</sup>, Eric P. Hoffman<sup>1,11</sup>, Terence A. Partridge<sup>1,2,3†</sup>

<sup>1</sup> Children's National Hospital, Washington, DC; <sup>2</sup> Department of Genomics and Precision Medicine, The George Washington University School of Medicine and Health Sciences, Washington, DC; <sup>3</sup> Department of Pediatrics, The George Washington University School of Medicine and Health Sciences, Washington, DC; <sup>4</sup> Department of Medicine, University of Alabama at Birmingham, Birmingham, AL; <sup>5</sup> Department of Pathology, University of Maryland School of Medicine, Baltimore, MD; <sup>6</sup> Department of Neurology and Pathology, Georgetown University Medical Center, Washington, DC; <sup>7</sup> Department of Pathology, Howard University Hospital, Washington, DC; <sup>8</sup> Department of Pathology and Laboratory Medicine, Children's National Hospital, Washington, DC; <sup>9</sup> The Hugo W. Moser Research Institute, Kennedy Krieger Institute, Baltimore, MD; <sup>10</sup> Departments of Neurology and Neuroscience, Johns Hopkins University School of Medicine, Baltimore, MD; <sup>11</sup> Department of Pharmaceutical Sciences, School of Pharmacy and Pharmaceutical Sciences, Binghamton University, Binghamton, NY

\* Co-authorship: authors should be regarded as joint first authors and have contributed equally to this work.

The age-related loss of muscle mass and strength has been attributed to the limited myogenic capacity of satellite cells (SC). However, the majority of studies evaluating SC function has been performed *in vitro* and only a very limited number of studies have evaluated their function *in vivo*. **PURPOSE:** we used our established xenograft model to test whether the myogenic capacity of SC from muscles isolated from human cadavers, across a range of different ages, is maintained after being transplanted to mice. **METHODS:** Strips of human muscles derived from different donors were transplanted into the anterior compartment of the mouse leg (after removal of the tibialis anterior and extensor digitorum longus muscles), followed by closure of the skin with surgical glue and stainless-steel wound clips. At 3- and 6-weeks post-surgery, animals were euthanized and muscles were quickly dissected and snap frozen. Frozen muscles were then immunostained and imaged using specific antibodies. Statistical analyses performed by one-way ANOVA with multiple comparisons. **RESULTS:** all human muscle samples that successfully regenerated showed a similar regenerative capacity regardless of the age of the donor (from 36 to 78 years of age). Additionally, we found no apparent decline in the regenerative capacity of human SCs with extended postmortem intervals (from 4 to 11 days postmortem). Our results also showed that muscle fiber sizes were similar between all regenerated muscles at 3 weeks post post-transplant. **CONCLUSION:** Our findings demonstrate that the age-related loss in muscle



## Mid Atlantic Regional Chapter of the American College of Sports Medicine

Annual Scientific Meeting, November 1<sup>st</sup> – 2<sup>nd</sup>, 2019  
Conference Proceedings

International Journal of Exercise Science, Volume 9, Issue 8



mass is not attributed to ineffective satellite cell myogenic function but is potentially due to an inimical environment that does not favor the myogenicity of these cells.

Supported by the National Institutes of Health NIAMS (R21AG051260 | TAP, EPH; T32AR056993 | JSN, DAGM), Foundation to Eradicate Duchenne (JSN, DAGM), Muscular Dystrophy Association (MDA295203 | TAP; MDA480160 | JSN), Parent Project Muscular Dystrophy (TAP), and Duchenne Parent Project Netherlands (JSN).