



2023 IMPACT CIRCLE

Project Title: **PROJECT "AHAB"**

Investigator: **Simon Melov**

Unmet Need: Improving the quality and quantity of life in the elderly

Background: Whales are amongst the largest animals to have ever lived, and some species can live for more than 200 years. We have little insight into how such gigantic animals maintain their health for such long periods of time. Recent developments in cell biology and microfluidics enable creating miniaturized versions of complex tissues such as muscle from the whale. We routinely do this for human muscle tissue in the lab. These "organoids" have many of the characteristics of the full-grown organs they are derived from, including measurable force production. By growing such "organoids" from whales in the lab, we can study tissue function from these incredible species and ask specific questions about how whales avoid many of the diseases aging humans develop.

Novel Hypothesis: Are there secreted factors from living whale muscle tissue that can improve function in human cultured muscle?

Proposal: We have established a collaboration with John Calambokidis from the Cascadia research collective, a non-profit organization that studies whales in the field. John routinely harvests tissue biopsies from whales in the Pacific. We will collect live cells from three species of whales; blue whales (lifespan >100 years), humpback whales (lifespan ~100 years), grey whales (lifespan ~100 years). We will bring these cells to the Buck, and differentiate them into muscle. We will then characterize factors secreted from muscle tissue in the lab and characterize force produced. We will then expose human cultured muscle tissue to such factors to understand whether or not human tissue function is improved in tissue culture by specific factors produced by these amazing long-lived animals.

Impact: Identification of novel factors which enhance human tissue in vitro may provide drug targets for aging and age-related disease.

Also, super cool to grow whale tissue in the lab!

Specialized Equipment Needs: Dedicated incubator for whale tissue, funds to assist biopsy collection in the field, and muscle organoid development.

Our collaborator, John Calambokidis, collecting biopsies from a humpback whale (top), and a blue whale (bottom)

