Sarcoma is cancer of the connective tissue and is a very deadly type of cancer. Two of the sarcoma types, alveolar soft parts sarcoma (ASPS) and clear cell sarcoma (CCS) have a unique morphology where there are clear spaces around the nucleus. This unique morphology is absent in synovial sarcoma (SS). We believe that the unusual morphology in ASPS and CCS is caused by the presence of abundant lysosomes. Lysosomes are the cell’s digestive system and also play a crucial role in the programmed cell death process, autophagy. Autophagy can also help the tumor cells survive under stressful conditions. We hypothesize that ASPS and CCS upregulate autophagy related genes and use autophagy as a survival mechanism.

Analysis of RNA sequencing data for the three sarcomas showed that LAMP1, LAMP2A, Beclin and Cathepsin D genes are expressed. Western blot data showed that the protein levels translated from all four genes was highest in ASPS and lowest in SS. CCS showed moderate levels of the proteins. Immunohistochemistry showed that the proteins translated from LAMP1, LAMP2, Beclin and Cathepsin D are localized outside the nucleus and in concentrated pockets. This supports the theory that ASPS and CCS have abundant autophagy-related lysosomes. There was significantly lower staining in SS which supports the theory that SS cells do not contain abundant lysosomes in comparison to SS and ASPS.

The next step is to determine whether autophagy is critical to the survival of these cancer cells and if it is, might it provide a possible therapeutic target for these cancers.