The Role of Hormones in Hypermobile Ehlers-Danlos Syndrome

Calhoun, Isabella (School: Martin County High School)

Hypermobile Ehlers-Danlos Syndrome (hEDS) is an inherited connective tissue disorder that primarily stems from defects in the extracellular matrix, namely collagen. Within those diagnosed, females tend to report symptoms more consistent with tissue fragility than their male counterparts. One explanation is the difference in hormones between males and females, the most widely researched being progesterone. So, this experiment studied the impact of increasing concentrations of progesterone, correlating to phases of the menstrual cycle and trimesters of pregnancy, on the collagen matrix organization of planaria. To investigate this, groups of planaria were treated with concentrations of progesterone correlating to the amounts in a female's body during the key experimental periods, and were observed for daily data collection. Photosensitivity was tested to provide a measure of signaling ability, which is highly dependent on proper collagen formation, and any outstanding visual characteristics were recorded. At the end of the 6 day testing period, a reticulin staining protocol was performed on planarian tissue and collagen formation was observed. Control group stains showed even striations of collagen fibers, while higher concentrations of progesterone, such as in the 3rd trimester group, yielded uneven granular deposits of collagen. Progesterone concentration between groups showed significant effect on the photosensitivity ($p<.001$). This data shows that increased concentrations of progesterone, such as in the later trimesters of pregnancy, yield weakened collagen formation which contributes to exacerbation of hEDS symptoms. Therefore, during these times in a female's life, prediction of symptoms may be possible and lead to better symptom management.

Awards Won: