Glycocalyx Project Summary

The endothelial glycocalyx is a layer of proteoglycans and glycoproteins lining portions of the aqueous outflow pathway. It is involved in mechanotransduction of shear stress and mediates alignment of endothelial cells with flow. Very little is known about the glycocalyx within the aqueous outflow pathway. Our goals include determining the typical height and distribution in normal eyes, including whether it differs based on the amount of flow of certain radial segments of the outflow pathway, as well as changes in the height and distribution of glycocalyx in a model of glaucoma (laser-treated eyes in this experiment).

We have control and treated monkey eyes. Treated monkey eyes were treated with laser treatment to the trabecular meshwork in some but not all regions of the eye. When dissecting the eye we could separate the sections into lasered and nonlasered regions. Due to the treatment itself, I could not get data for lasered regions. Some of my control eyes were subdivided in high flow and low flow regions based on assessment following perfusion with fluorescein. Not all of the control eyes were perfused with fluorescein though so I do have measurements from those eyes which are just labeled “control” and couldn’t be categorized by flow region. In total, that left me with high flow, low flow, and control (unknown flow region) from untreated eyes and nonlasered regions from laser treated eyes.

Each eye was dissected into radial sections. Each section is labeled by monkey, eye (L or R), section. Some include quadrant information. For example, M#1OSSN1.1 if from monkey 1, OS refers to the left eye (OD refers to right), SN refers to the quadrant (most sections do not have this label) and 1.1 refers to the section number. For each individual section, I looked at glycocalyx in multiple locations along the outflow pathway including the trabecular meshwork (TM), Schlemm’s canal (SC), Collector channels (CC), intrascleral veins (ISV), episcleral veins (ESV). For control eyes but not laser treated eyes I looked at uveal and corneoscleral beams as well (subdivisions of the trabecular meshwork). I looked at 1-6 images from each section and for each image, collected three height measurements of the glycocalyx and one coverage measurement. Height measurements were made just using the line tool in image J and coverage measurements were taken by plotting a segmented line along the glycocalyx, using plot profile to get grayscale values of that line, then using a cutoff value to define glycocalyx, I could determine the percentage of that line that was glycocalyx. Each coverage measurement is that percentage and each height measurement on the excel sheet is the average of the three measurements from each image.

I would like to compare heights and coverages of specific locations (for example: SC) between different flow regions (for example: control, high flow, low flow, nonlasered). I would also like to compare heights and coverages of different locations (for example: TM, SC, CC, ISV, ESV) within individual flow regions (for example: low flow).

Glycocalyx项目总结

内皮糖萼是由蛋白多糖和糖蛋白组成的一层，它们排列在水流出途径的部分。 它参与剪切应力的机械转导，并介导内皮细胞与流动的对齐。 我们对水流出途径中的多醣萼所知甚少。 我们的目标包括确定典型的高度和分布在正常的眼睛,包括是否与基于一定的径向流段的数量流出的途径,以及高度的变化和分布的glycocalyx青光眼模型(在这个实验laser-treated眼睛)。

我们控制并治疗了猴子的眼睛。 治疗后的猴子眼睛用激光治疗部分但不是全部的眼小梁网。 当解剖眼睛时，我们可以将部分分为激光和非激光区域。 由于治疗本身的原因，我无法获得激光区域的数据。 根据灌注荧光素后的评估，我的一些对照眼被细分为高流量和低流量区域。 并不是所有的控制眼都灌注了荧光素，所以我有来自这些眼睛的测量，只是标记为“控制”，不能按流动区域分类。 总的来说，这给我留下了高流量、低流量和未经治疗的眼睛的控制(未知的流量区域)和未经激光治疗的眼睛的非激光区域。

每只眼睛都被切成放射状。 每一节以猴、眼(L或R)、节来标示。 有些包含象限信息。 例如，m# 1OSSN1.1如果来自猴子1，那么OS指的是左眼(OD指的是右眼)，SN指的是象限(大多数区域没有这个标签)，1.1指的是区号。 对于每一个单独的部分，我沿着流出通路的多个位置观察了糖萼，包括小梁网(TM)、施莱姆管(SC)、集电极通道(CC)、血管内静脉(ISV)、巩膜外静脉(ESV)。 对于未接受激光治疗的对照组，我也观察了葡萄膜和角膜束(小梁网的细分)。 我观察了每个部分的1-6张图像，每一张图像收集了3个糖萼的高度测量值和1个覆盖率测量值。 高度测量是使用直线工具在图像J和覆盖率测量被策划沿着glycocalyx分段线,使用情节概要文件获得灰度值的行,然后使用一个截断值定义glycocalyx,我可以确定的百分比glycocalyx这条线。 每个覆盖率测量是百分比，excel表上的每个高度测量是每个图像的三个测量值的平均值。

我想比较不同流动区域(例如:控制、高流量、低流量、非激光)之间特定位置(例如:SC)的高度和覆盖范围。 我还想比较不同位置(例如:TM, SC, CC, ISV, ESV)在单个流区域(例如:低流)中的高度和覆盖率。