**MATLAB Homework 02**

Yifu Huang

**Codes location:**

Question 1: <https://github.com/yifuhhh/EE385J_Biomed_Image/blob/master/HW02/YifuHuang_yh9692_HW02_Q1.m>

Question 2:

<https://github.com/yifuhhh/EE385J_Biomed_Image/blob/master/HW02/YifuHuang_yh9692_HW02_Q2.m>

1. **(25 pts) We have two mice that were imaged with 18F-MISO PET. 18F-MISO is a PET tracer (i.e. contrast agent) that accumulates (and is retained) in hypoxic cells. Mice with HER2+ breast cancer received injections of either saline (control group) or trastuzumab (treated group). Tratsuzumab primarily inhibits cell proliferation, however, it also has been known to suppress angiogenesis. Tumors tend to overexpress angiogenetic factors resulting in abnormal vasculature (poor perfusion and delivery, leaky). Suppressing angiogenic factors results in the “normalization” of tumor vasculature and potentially improving tissue perfusion.**
2. How is tumor hypoxia related to tumor vasculature?

The relationship between tumor hypoxia and tumor vasculature is the inability of the tumor's vascular network to sustain nonmonic conditions for the rapidly growing tumor. Some portions of the tumor do not have the necessary vessel network to supply sustainable amount of oxygen.

1. (2 Plots) Calculate the SUV in muscle at each time point for the control and treated mouse.
2. (1st plot) Plot the mean and 95% confidence interval.

图片包含 文字, 地图

描述已自动生成

1. (2nd plot) Plot the mean and 95% confidence interval normalize the means to day 0’s value.

图片包含 文字, 地图

描述已自动生成

1. (2 Plots) Calculate the SUV in tumor at each time point for the control and treated mouse.
2. (1st plot) Plot the mean and 95% confidence interval.

图片包含 文字, 地图

描述已自动生成

1. (2nd plot) Plot the mean and 95% confidence interval. Normalize the means to day 0’s value.

图片包含 文字, 地图

描述已自动生成

1. What does the SUV tell us about the mice (or the drug they are receiving)? Based off of these two mice, do these imaging measures support our hypothesis on what Tratsuzumab is doing to the tumor?

The SUV tells us that the drug is effective on tumor and does not have obvious effect on muscle cells. The imaging measures support the hypothesis.

1. **(25 pts) PET kinetic modeling & curve fitting: Expand the ODE45/curvefit code we developed in class to estimate model parameters from this digital reference object (DRO). DROs are used to evaluate the new code and to test out image acquisition settings.**
2. DRO1 is a 4D (2 in space, 2 in time) array where model parameters (k1, k2, and k3) are varied spatially (in x-y plane) throughout the domain. DRO(y, x, :, 1) = the [CT] time course, DRO (y, x, :, 2) = the [CIC] time course for position (y, x). Extend the code from class to fit each k1, k2, and k3 at each location. Use the imagesc command to display the estimated k1, k2, and k3. Label your plots, an add colorbars.