**Game 4 Lab Manual: Fresh blood**

**Why?**

MRI is versatile because it can look at not only shapes and anatomies but also physiological processes. These include processes from localized brain activation (the BOLD signal, [ref]) to long-term changes in chemical composition in specific brain areas (Magnetic Resonance Spectroscopic Imaging or MRSI). In this game, we look at a simple process happening all the time in our bodies - blood flow. As soon as we learn to use MRI to see blood vessels, we open the possibilities of diagnosing injuries, plaques, aneurysms, and obstructions in them. Analysis of these images could also provide flow speed maps and help us pinpoint the problem.

Materials

* Flow phantom
* Plastic tube
* Syringe
* Water reservoir
* Water refill

Background

1. Key terms

* Magnetic Resonance Angiography
* Spoiled Gradient Recalled Echo
* Steady state
* Spin Echo
* T2/T2\* decay
* Dark blood methods
* Bright blood methods
* Minimum or maximum intensity projection

1. Basics
2. Explanations

Magnetic Resonance Angiography refers to any MR imaging method that generates a contrast between blood vessels and other tissue. This contrast can be generated by distinguishing blood from other materials in one of three ways:

(1) Using blood’s inherent properties. For example, T1.

(2) Using the fact that blood is flowing in or out of the imaging slice

(3) Using contrast agents injected into the blood to change its properties and enhance contrast

Spoiled Gradient Recalled Echo

Steady State

Lab Procedures

1. Bright blood method: SPGR
2. Dark blood method: SE
3. Imaging flowing solutions

* Generate the most contrast at given T1,T2 settings

1. Contrast agent

* T1/ T2 changing (with calculations; read off signal values)