Kathy weighs the delicate powder. MAX8 is made with 20 amino acids. RADA16 is made with 16 amino acids. The amino acids were synthetically produced by man. Injuries. The scientists we worked with this summer were interested in studying designer proteins. Different proteins that help our cells grow, fight infection, and repair bones all contain proteins we need to survive. Our bodies also make proteins. We hypothesize that they will be able to use these proteins to deliver medicine. Once they understand more about MAX8 and RADA16, they will be able to make designer proteins by using specific amounts of amino acids. The amino acids have to follow a particular sequence for each desired protein. Our bodies do this naturally through coding that we are born with in our DNA. When we were assisted in making first we weighed specific amino acids (arginine, aspartic acid). They order on the peptide chain in the injected necessary help of each protein. This hour per amino of RADA16 make. After cleaved and about 25g of RADA16. MAX8 makes a self-assembly and forms β-sheets that seem to make it insoluble. MAX8 will currently dissolve in a solvent because many variables are involved. The NMR graph below shows the dissolve in different solvents. MAX8 emits different signals when it is heated. There are also concerns about separation to water vapor in the air and the protein breaking down over time. MAX8 will currently dissolve in a solvent but RADA16 will not, which interferes with the HPLC purification process for proteins. Both proteins seem to form β-sheets and it is possible that RADA16’s β-sheets are keeping it from dissolving.

Using Solid State NMR to Understand the Molecular Structure of Designer Self-Assembling Proteins MAX8 and RADA16

Introduction
Proteins are a necessary part of everyday life. Nerves, tissues, and bones all contain proteins we need to survive. Our bodies also make different proteins that help our cells grow, fight infection, and repair injuries. The scientists we worked with this summer were interested in studying designer proteins that were synthetically produced by man. Though these proteins are not as complex as ones that exist naturally, they are important because they can be used for repair and regeneration of cells and nerves.

Purpose
Our summer mission was to analyze data from NMR spectrometry to better understand the molecular structures of the designer proteins MAX8 and RADA16. This would let scientists use computer programs to create 3-D models of the proteins. Even though scientists are able to synthesize and experiment with these proteins, they are still not completely certain about all of their structural characteristics. Once they understand more about MAX8 and RADA16, they hypothesize that they will be able to use these proteins to deliver medicine. These proteins are particularly interesting because they can self-assemble and then assemble in new environments. Real world applications of these proteins would allow someone to receive an injection of MAX8 or RADA16 to assist in nerve regeneration.

Protein Synthesis
Before we could use NMR spectrometry to analyze data about the proteins, we worked with Dr. Paravastu’s graduate students to synthesize MAX8 and RADA16. In this process scientists can make designer proteins by using specific amounts of amino acids. The amino acids have to follow a particular sequence for each desired protein. Our bodies do this naturally through coding that we are born with in our DNA. When we were assisted in making first we weighed specific each amino acid (arginine, aspartic acid). They order on the peptide chain in the injected necessary help of each protein. This hour per amino of RADA16 make. After cleaved and about 25g of RADA16. MAX8 makes a self-assembly and forms β-sheets that seem to make it insoluble. MAX8 will currently dissolve in a solvent because many variables are involved. The NMR graph below shows the dissolve in different solvents. MAX8 emits different signals when it is heated. There are also concerns about separation to water vapor in the air and the protein breaking down over time. MAX8 will currently dissolve in a solvent but RADA16 will not, which interferes with the HPLC purification process for proteins. Both proteins seem to form β-sheets and it is possible that RADA16’s β-sheets are keeping it from dissolving.

Nuclear Magnetic Resonance (NMR)
Our group was able to inject necessary help of each protein. This hour per amino of RADA16 make. After cleaved and about 25g of RADA16. MAX8 makes a self-assembly and forms β-sheets that seem to make it insoluble. MAX8 will currently dissolve in a solvent because many variables are involved. The NMR graph below shows the dissolve in different solvents. MAX8 emits different signals when it is heated. There are also concerns about separation to water vapor in the air and the protein breaking down over time. MAX8 will currently dissolve in a solvent but RADA16 will not, which interferes with the HPLC purification process for proteins. Both proteins seem to form β-sheets and it is possible that RADA16’s β-sheets are keeping it from dissolving.

Challenges with MAX8 and RADA16
Determining the molecular structure of the proteins is difficult because many variables are involved. The NMR graph below shows RADA16 emits different signals when it is heated. There are also concerns about separation to water vapor in the air and the protein breaking down over time. MAX8 will currently dissolve in a solvent but RADA16 will not, which interferes with the HPLC purification process for proteins. Both proteins seem to form β-sheets and it is possible that RADA16’s β-sheets are keeping it from dissolving.