CAF/23/07 - Non-Invasive Evaluation of Fractional Flow Reserve in Peripheral Arterial Diseases

Cardiovascular diseases are the leading cause of death globally, each year around 17.9 million people die from this, which accounts for 32% of all global deaths. Although most deaths are due to heart attacks and stroke, peripheral arterial disease (PAD) (narrowing of the blood vessels of the legs) is associated with major risks such as coronary heart disease, stroke and leg amputation.

If a doctor thinks a patient may have PAD they will go for a blood pressure test of the ankle, which they measure before and after exercise. This test can be unsuccessful for patients who may have mobility issues. CT or MRI scans, which can image blood vessels at a high resolution, can also be used to determine how much narrowing of the blood vessels are present, but only a visual assessment is made; i.e. whether the blood vessel is narrow or not. The best method is to determine the amount of the disease present is to use a catheter to measure pressure within the blood vessel however, but this is an invasive examination.

Over the last decade research has shown and developed software to analyse CT images of blood vessels of heart and have indirectly determined the pressure differences around a blockage within a vessel, which determines the severity of narrowing. However, this technique has not been researched for other parts of the body. This project will study CT images and use MRI to measure blood flow to help software derive blood pressure measures of around blockages within the blood vessels of the leg. This in turn will provide clinicians in the future a non-invasive screening tool which will help them determine what treatment a patient will need.