TEDY'S TEAM
Raising Awareness Fighting Stroke

# RESEARCH FUNDED

**SINCE 2019**

There are many ways Tedy's Team is helping to fund life-saving research. One of the ways is through our collaboration with the American Heart Association (AHA). We fund research projects to help make an impact in the fight against stroke and heart disease on a larger scale.

Tedy's Team contributed money towards the following AHA funded research projects during the year stated:

### Ischemic Stroke: The Role of Endothelial TRPV1 in Blood Flow Restoration Following Stroke

The University of Texas Health Science Center at Houston, Houston, TX

Ischemic stroke affects nearly 800,000 people yearly in the US. Current treatments consist of chemically dissolving the clot or physically removing the clot. Both of these treatments are effective in restoring brain blood flow in a majority of treated patients. However, despite initial success in opening the artery, a significant fraction of these patients develop delayed loss of blood flow. Our studies aim to target the blood vessels of the injured brain territory to improve blood flow in the aftermath of stroke. We have identified an ion channel that is altered in the post-stroke period, rendering it more sensitive to drug activation. We use this phenomenon to promote increased blood flow in the post-stroke brain with the goal of reducing stroke injury and improving functional outcome.

The results from this study will provide the foundation for a novel therapeutic option to improve blood flow after stroke. Furthermore, validation of TRPV1 agonist with aged male and female mice will highlight translational opportunity in stroke patients by addressing the specific age and sex effects in stroke outcome. Importantly, this therapeutic option could be used as a standalone treatment or in conjunction with existing treatment options to increase effectiveness and improve outcome.

### Neonatal Stroke: Targeting White Matter Repair to Improve Functional Outcome After Neonatal Stroke at the University of Colorado Denver, Aurora, CO

Stroke in newborn babies occurs almost as often as stroke in older people. Newborns with strokes are usually not diagnosed right when the stroke happens. In this project we will study whether we can cause brain repair at later times after stroke to improve long term outcome. The brain has both grey and white matter. The axons in white matter are like electrical wires that carry information between different parts of the brain. Like electrical wires, axons have a coating called myelin. Myelin helps axons move information more quickly. Myelin is made by cells in the brain called oligodendrocytes. At the time of birth babies do not have much myelin, but more is formed during childhood. They believe that this means the window for white matter regeneration after stroke is long. They will test whether and over-the-counter drug, melatonin, can cause myelin repair. They believe this project will lead to new treatments to improve outcome and quality of life in children who have strokes as newborns

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## Moyamoya Disease: Molecular Pathogenesis of Occlusive Cerebrovascular Disease Resulting from ACTA2 Mutations at the University of Texas Health Center at Houston

This study aims to understand the underlying molecular mechanisms that lead to Moyamoya Disease (MMD), a genetic cause of strokes in children. Findings from this study have the potential to improve the prevention and treatment of strokes in patients of all ages. Understanding the molecular and cellular basis of Moyamoya Disease has the potential to improve the prevention and treatment of strokes in patients of all ages.

## Widening Access and Availability: Wake-up Stroke Examination Using Portable MRI k (Wake-Up MRI) - Massachusetts General Hospital, Boston, MA

Stroke often arises due to blockage of one of the blood vessels supplying the brain with oxygen. Treatment involves quickly removing the blockage using a clot busting drug. This drug can only be given within 4.5 hours following the time the patient first detected symptoms of stroke. However a quarter of patients wake up with stroke symptoms after going to bed. In this instance the time of onset is unknown and treatment will not be given. It is often the case though that the stroke occurred in the few hours before the patient woke up and they could benefit from treatment. Imaging the brain is the most accurate way to assess when a stroke occurred.

Machines called MRI's use a strong magnet and radio waves to produce detailed images of the brain. Different images can provide specific information. One image (DWI) can detect stroke in as little as 2 minutes. Another image (FLAIR) can only detect stroke after about 4.5 hours. When there is a mismatch between DWI-FLAIR this provides information about the time of stroke onset in patients who have woken with symptoms. Mismatch has thus been used to select patients who can benefit from clot busting treatment but would not be able to based on the time they were last well alone. This is shown to improve outcomes. MRI imaging is thus highly beneficial in patients with wake-up stroke. There are however limits to existing MRI machines. They use a very strong magnet and cannot be used around metal. They are expensive and bulky. People on lifesaving equipment or with metal implants are unable to have an MRI. Hospitals located in remote areas also do not have easy access due to their cost and size.

A new device has recently been developed to overcome some of these limitations. This device is referred to as a 'low-field' MRI. This is because it uses a magnet strength that is 10 times less than that of current machines. The device also costs significantly less and can be used in the presence of metal. It is portable and can be moved directly to a patient in their hospital bed. This work seeks to test the low-field MRI system in patients who have woken up with a stroke. Specifically, it intends to look at the quality of DWI/FLAIR images and how these compare with existing systems. It also intends to see if the device can be used across a range of settings. By advancing low-field MRI, this work seeks to provide fast, available and affordable imaging for all.

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## Motor and Neurophysiological Changes after Ischemic Conditioning in Individuals with Chronic Stroke

Stroke is the leading cause of long-term disfunction in the United States. Stroke is a major health problem and leaves most survivors with walking deficiencies. Researchers have focused on methods that produce changes in brain activity to make it easier to improve motor function during therapy. Despite good results, no method has stood out as the best to produce the desired changes in brain activity to improve motor function after a stroke. Ischemic conditioning (IC), also known as blood flow restriction and release, is a method that uses a blood pressure cuff to restrict blood flow for 5 minutes then release blood flow for 5 minutes. This procedure is typically done in the arm or leg. This method has improved endurance, strength and walking speed for healthy and patient populations. Only three studies have investigated IC to improve motor function in stroke. These studies revealed that IC improved strength in the side affected by the stroke as well as increased energy and walking speed.

However, no study can explain why improvements are seen after IC (i.e., changes in brain activity). Current studies allude to brain involvement, but this remains to be proven. The goal of this research project is to assess changes in brain activity and motor function before/ after one session of IC. These measures will explain why motor function is enhanced after IC. This study will provide evidence for a safe, new, and cheap method to modify brain activity for the best improvements in motor function during stroke therapy.