



# Does beet root juice enhance the benefits of exercise on brain health in aging hypertensives?

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## Introduction

Hypertension affects one in three American adults. It is a major cause of cardiovascular disease and brain disease such as dementia or stroke. Hypertension may be prevented with adequate exercise and diet. Diets high in nitrate may have synergistic effects with exercise that lead to increasing blood flow to hypoxic regions in the brain.

## Hypothesis

Exercise training combined with Beet Root Juice (BRJ) will lead to greater increases in brain perfusion and connectivity than exercise and placebo.

## Methods: Study Design

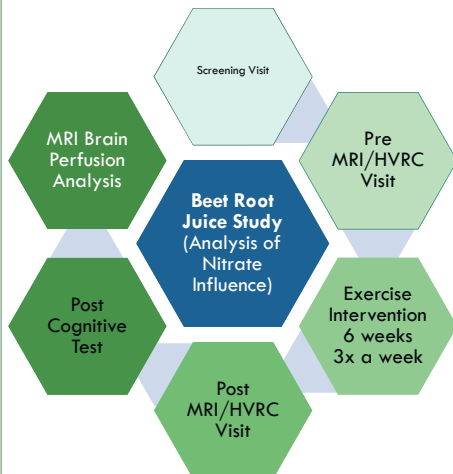


Figure 1. Overview of study

## Methods: Brain Networks

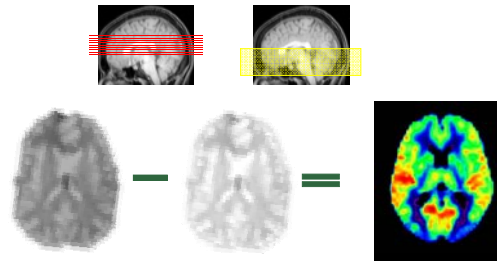


Figure 2. Magnetizing blood to analyze brain perfusion.

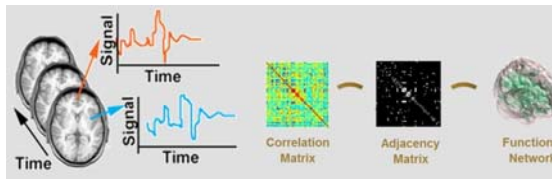


Figure 3. Steps to analyzing brain networks.

## Results

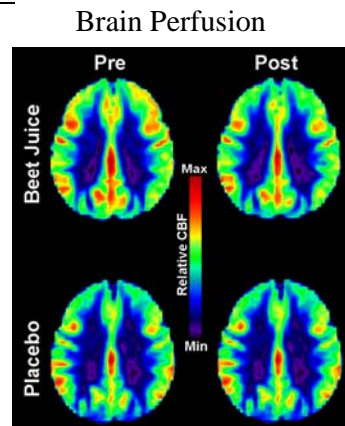


Figure 4. Cerebral blood flow differences between BRJ high nitrate diet and placebo BRJ.

## Brain Network Connectivity

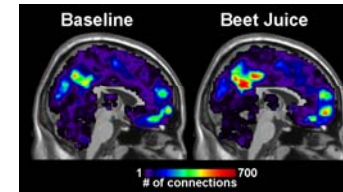


Figure 5. Example of degree imaging in an individual receiving beet root juice

## Discussion

A high nitrate diet can enhance blood flow to regions depleted in oxygen. The results of this study show that there was no significant difference in brain perfusion as a result of the BRJ treatment; yet, preliminary analyses suggest that BRJ may lead to an increase in brain connectivity within the precuneus during a resting state. The results of our perfusion analyses differ from earlier work by *Presley and colleagues* (2011). They showed an increase in brain perfusion in areas directly involved with executive function. However, an important distinction between the two studies is that Presley et al. examined the acute effects of BRJ, whereas the current study focused on chronic ingestion of BRJ. The potential effects of BRJ on brain connection in the precuneus could be important since this is the hub of the default mode network.



Figure 7. Results from study conducted by *Presley and colleagues* (2011)