What Do Aging, Exercise, Swallowing Problems, and Nerve Growth Factors Have in Common?

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**Aging and Swallowing Problems**
Age-related muscle weakness can affect the muscles of the head and neck and can disrupt one important activity of daily living: eating. Lack of precise control over the tongue musculature, due to weakness and/or fatigue, may contribute to the swallowing difficulties elderly individuals face.

**Exercise**
Targeted exercise can improve tongue strength in elderly individuals. However, the underlying cause of the improvement in tongue strength following exercise is unknown. To address this gap in knowledge, our study used a rat model to see whether tongue exercise could improve voluntary tongue forces in rats of differing ages. We studied one possible mechanism that might be responsible for improvement: a change in levels of nerve growth factors and/or their receptors.

**Nerve Growth Factors**
Nerve growth factors are proteins found in the body that help with nerve function. They are important for nerve growth, communication, and survival throughout life. It has been shown that the amount of nerve growth factor in muscles and nerves in the limbs decreases with age and increases with exercise. We focused on one nerve growth factor in particular, brain-derived neurotrophic factor (BDNF) and its receptor (TrkB) because previous studies in the limb have shown that BDNF increases in an exercise-dependent manner.

**Methods**
48 rats in 3 age groups were used. Half of the rats participated in a tongue exercise program for 8 weeks, half did not.

**Tongue Exercise Operandum**
The maximum force that each animal could press with their tongue was recorded before and after the 8 weeks of training.

**Conclusions**
We conclude that exercise can be used to increase tongue force at all ages. Although BDNF and its receptor, TrkB may be involved in this process in young rats, it is not clear what the mechanism is in older rats. In the future, we will look at other nerve growth factors and other mechanisms that could underlie the changes in force seen following exercise in middle aged and old rats.