

Goals

1. To inform and promote enthusiasm about neuroscience to residents of North Carolina, targeting youth
2. To provide fun, structured opportunities for students, faculty and staff at the UNC Bowles Center for Alcohol Studies to practice community engagement

Partnerships

North Carolina Museum of Life and Science provided hands-on lab space and support from museum staff

UNC Bowles Center for Alcohol Studies provided new, brain-centered exhibit staffed by scientist volunteers

Duke University partnered with UNC to recruit volunteers and provide additional activities near the exhibit

Dana Foundation provided Brain Awareness Week supplies (activity books, pencils, brain erasers, stickers)

National Institute of Alcoholism and Alcohol Abuse provided funding through P60 Alcohol Research Center at UNC and brochures on prevention of alcohol abuse

Materials

- Human brain loaned from the UNC School of Medicine Body Donation Program
- Sheep brains from Carolina Biological Supply www.carolina.com
- Rat and mouse brains from research labs (scheduled for euthanasia)
- Brain models
 - Diseased brain in skull, Item G290, www.shopanatomical.com
 - Budget Brain With Arteries Model, www.amazon.com
- Portable EMG units, EMG SpikerBox Bundle, www.backyardbrains.com
- Portable electronic device such as iPod, tablet or smartphone to visualize the detected electrical potentials
- Conductive gel, Spectra 360 Electrode Gel from Parker Laboratories, www.amazon.com

Brain Awareness Week: “Electric Muscles!” interactive exhibit

Instructions to volunteers

Brain Awareness Week is just around the corner!

Dear “Electric Muscles!” volunteers –

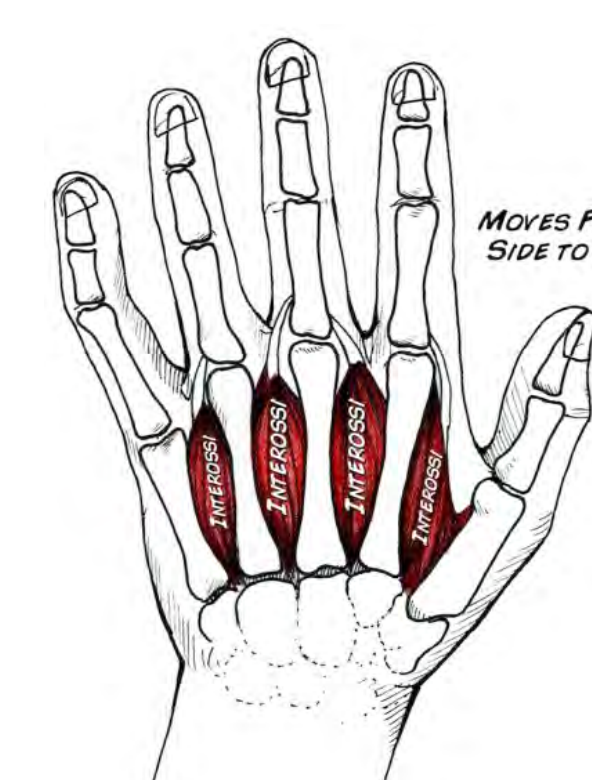
First, I want to thank you for volunteering for the Brain Awareness Week activities! In this message, I will update you on the activities you will run and give you information on where to go for your shift. (Logistics included museum address, location within the museum, contact information). The 1st 15 min of your shift will allow you to get oriented to the activities before actually dealing with visitors.

1. See and touch a human brain. One volunteer will show the human brain to the visitors. This is kinds of a free-flow activity, in which you ask the visitors questions and encourage them to think and explore, rather than just telling them facts about the brain. Example questions are: Where do you think the eyes would be? Where do you think this will go (pointing to the brainstem/spinal cord)? We will have a laminated sheet to point out parts of the brain – you can ask visitors to find the optic chiasm, for example. Let the visitors touch the brain with gloves on with you holding it. Adults can hold the brain briefly to see how heavy it is, but we need to treat it gently. Note that the brain will have been donated by someone who wanted their body to be used for education after they died. We won’t know anything about the person (sex, medical history, etc). Finally, introduce the concept that the brain controls muscles (point out the motor cortex) and mention that neurons use electricity to move information from one place to another.

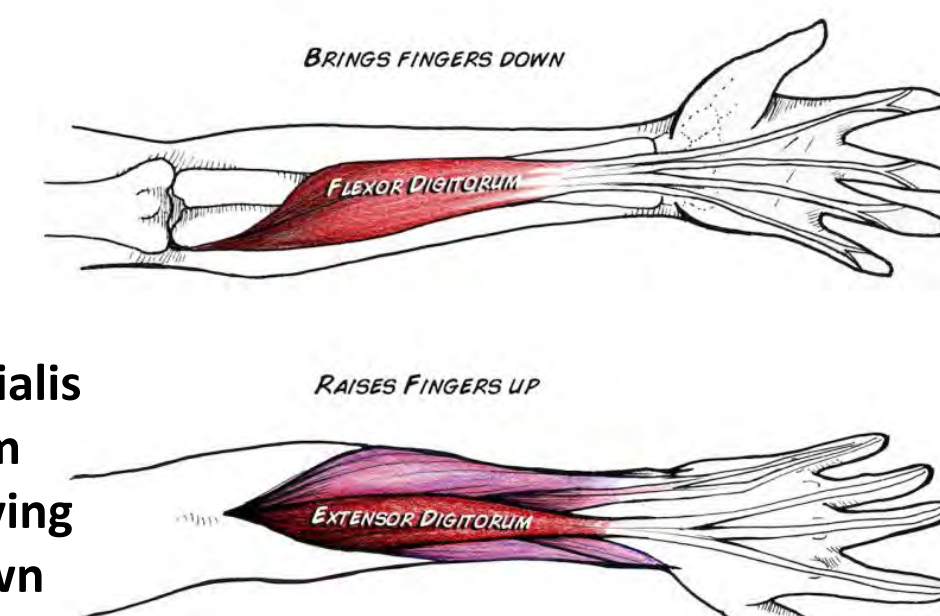
2. Hear your muscles working. Two - three volunteers will work at this station and use portable EMG recorders hooked up to iPods to “hear” and “see” your muscles working. We will concentrate on the muscles that move your fingers side-to-side (dorsal interossei muscles), the arm muscles that move your hand up and down (), the biceps, and the temporalis muscle (you can feel this on your temple when you clench your jaw). We will lead the visitors through “listening” to their muscles with questions. What happens when you move your fingers? What about it you just *think* about moving your finger? What happens to your jaw muscle when you move your jaw? What if you clench your teeth or chew something? Yes, we will have something yummy to chew! I have attached some pictures and guides – we won’t have the visitors read the guides, but you can read them and help visitors to “listen” to the muscles. Please watch the 90-second video at the bottom of this webpage to get an idea of what we will be doing:

<https://backyardbrains.com/products/emgspikerboxkit>.

Thanks for helping out – it will be fun! You are welcome to stay and explore the rest of the museum after your shift – there are many fascinating indoor and outdoor exhibits. For those of you with kids, they might enjoy coming along – ask me about it, as we will have some junior scientists there.



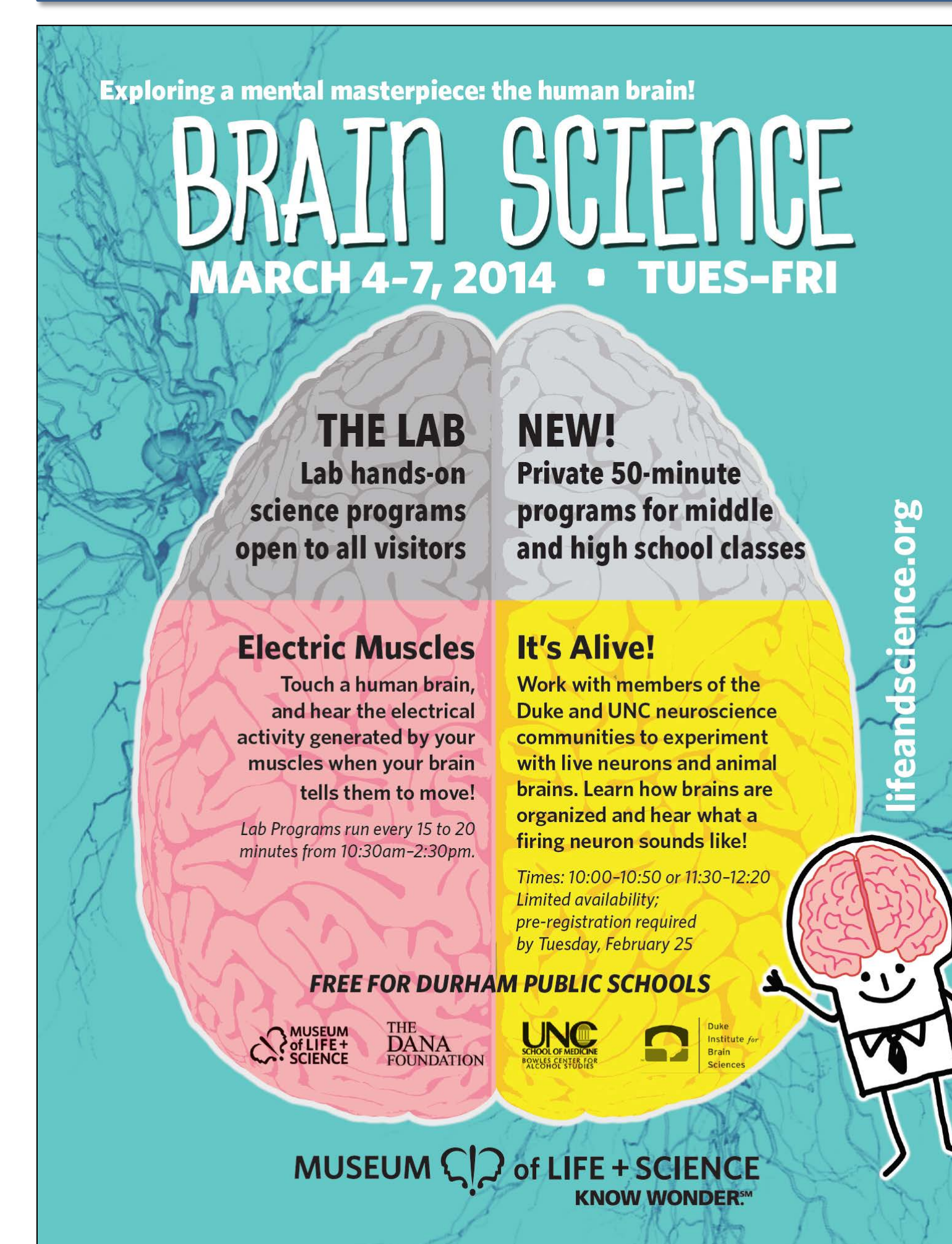
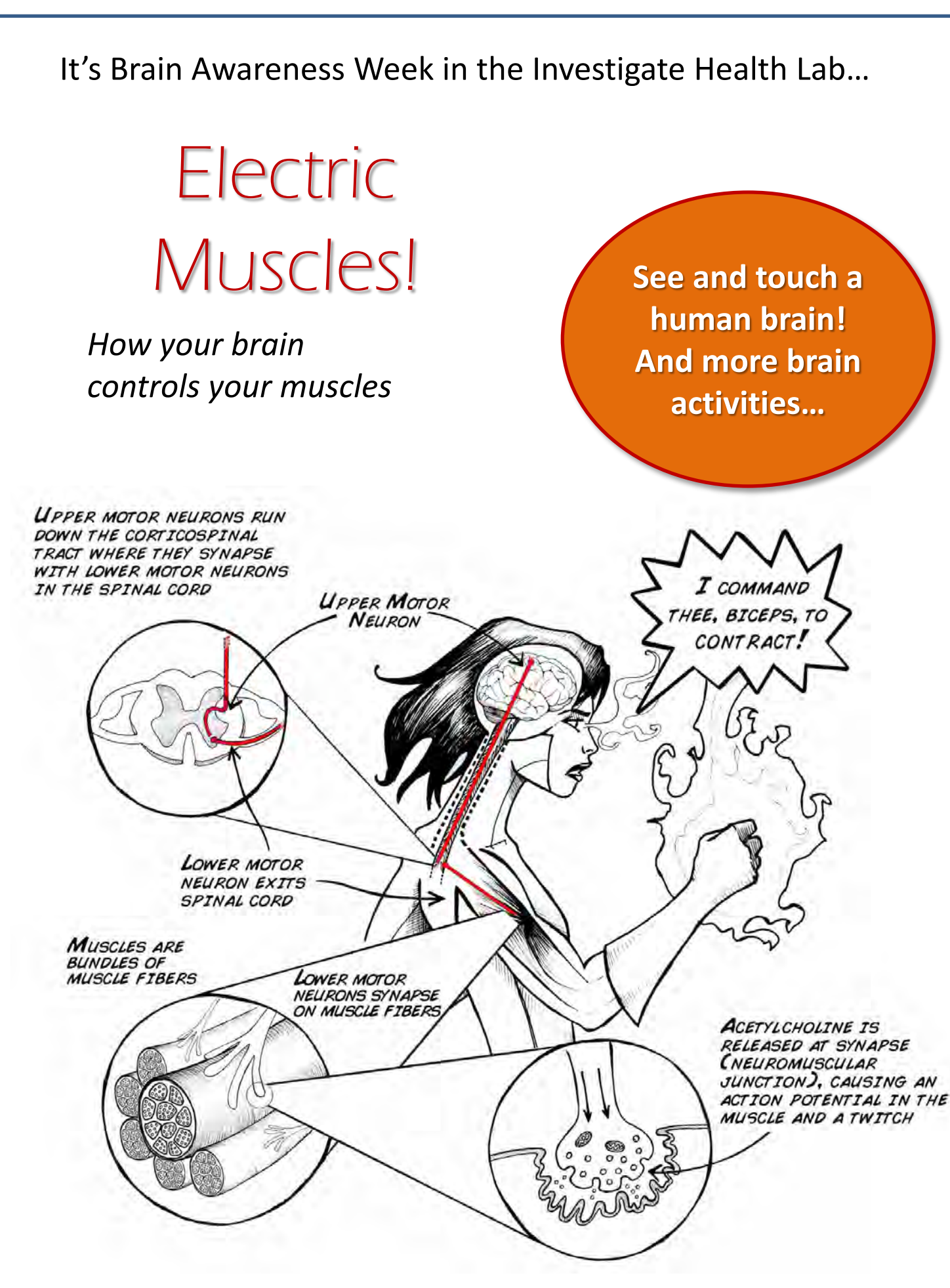
Dorsal interossei muscles – moving your fingers side-to-side



Flexor digitorum superficialis and extensor digitorum communis - moving your fingers up and down

Tip: feel for the muscle first so you know where to place your electrodes. The exact placement depends on just how the visitor clenches the muscle.

Have the visitor put their hand flat on the table, then move their fingers side-to-side. If



Temporalis Muscle

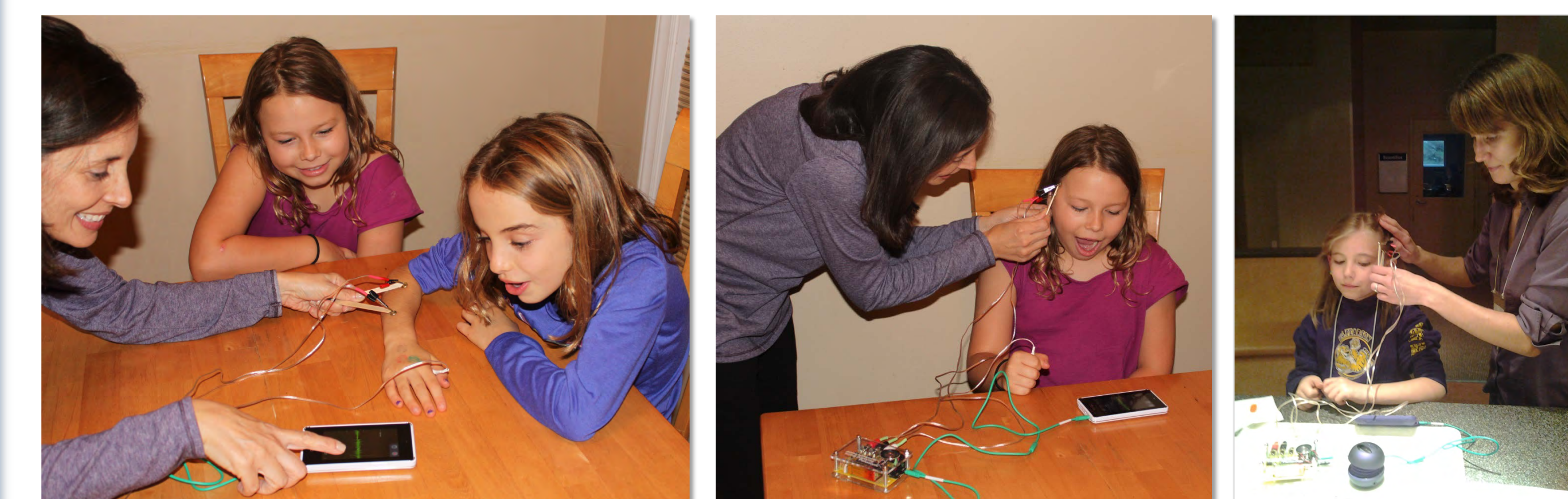
It's sole function is to elevate the mandible and crush objects between the molars, or in carnivores, to clench into other animals using the canine (fang) teeth

This muscle was easy to detect and record from in all visitors. Best for kids with short hair or ponytails!

Developing the exhibit

Specifics and numbers:

- We piloted the activities in January on a day when public schools were not in session, guaranteeing lots of museum visitors (10 volunteer scientists, 171 visitors)
- Brain Awareness Week
 - 40 volunteer scientists from UNC, Duke, NC State and the community
 - 745 visitors (498 children, 247 adults)
- Groups of 3-5 children (plus parents) came through the exhibit at a time
- Station 1: Brains
 - One scientist showed visitors the brains, asking questions
 - What animal do you think this is from? What do you think it will feel like? Is that what you thought it would feel like? Do you think your brain looks like this?
- Station 2: Electric muscles
 - One scientist worked with 2-3 children (and parents) at a time
 - Can you feel your muscle? What is this muscle moving? Do you think the gel will be cold? What do you think will happen when you contract your muscle? Did you know you had so much electricity in your muscles?



Adapting the exhibit to table-top activities

- UNC Science Expo: an outdoor street fair that is part of the NC Science Festival
- North Carolina DNA Day: science events organized by North Carolina research universities
 - Animal brains on one end (no human brain); brains were numbered and visitors guessed the brains' species
 - Electric Muscles: EMG Spiker boxes with android touch tablets
 - Timing was modified depending on the number of visitors



Acknowledgments

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