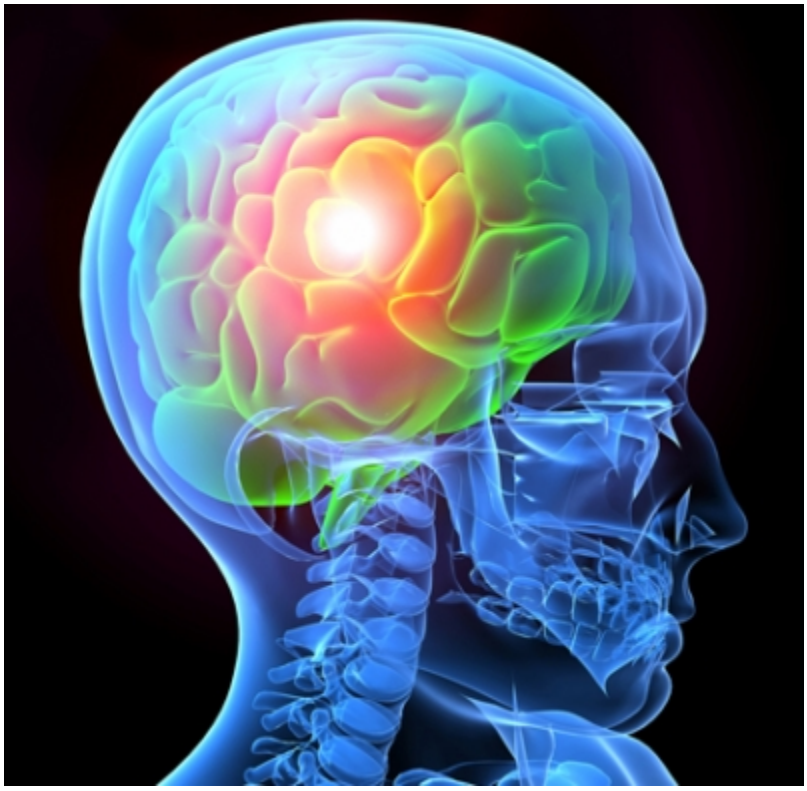
UNIVERSITY OF NEW ENGLAND

Center for Excellence in the Neurosciences

CEN Outreach

Traumatic Brain Injury & Concussion



Module Demonstrations and Components:

-Egg Drop Cerebral Spinal Fluid (CSF) Simulation

-Melon Drop Brain Safety Simulation

-Helmet Safety Fitting Demonstration

-Post-TBI Cranial Nerve Exam Demonstration

Learning Goals and Design for Each Module Component

These activities may serve as a guide for instructors to use, feel free to create your own to demonstrate different neurological functions or to better explain these same concepts. These demonstrations can be used as standalone activities but are often presented in succession to better reinforce each concept.

Egg Drop

Students should be able to understand the connection between the fragile state of the human brain against impact with and without the aid of Cerebral Spinal Fluid (CSF). This will be achieved by dropping an egg (human brain) in a container (human skull) in two trials, one with water in the container (CSF) and one without the aid of the stimulated CSF. The goal of this module is to demonstrate a basic function of the neuroanatomy. Instructors may be able to introduce the effectiveness of helmets during this demonstration as well, depending on the age group of the students.

Melon Drop

Students should be able to understand the importance of helmets during high impact sports and activities. This demonstration involves the use of two trials. The first trial includes a helmet placed around a melon fulfilling the role of a human skull. This "skull" and helmet are then thrown against the ground by the student to show how the helmet takes the brunt of the impact and the melon remains intact. To show the contrary to this model, the students are then permitted to throw the second melon against the ground without the helmet, with mats placed on floor to accommodate the ensuing destruction. The demonstration is designed to show students how the brain, and in this case the skull, are fragile and with the aid of helmets, they can prevent serious traumatic brain injuries. Instructors can preface this component with polling the students about any TBI's they, or someone they know, may have experienced. They may also follow up on this demonstration with the cranial nerve examination.

Helmet Safety Fitting

This component is designed to show students the proper way to fit a helmet. The students may volunteer to show how they personally wear a helmet or the instructor may demonstrate the different, incorrect ways to fit a helmet, focusing on how an impact while wearing the helmet the wrong way may injure them. The instructor may then demonstrate the correct fitting, focusing on keeping the strap in the correct place, and the helmet centered on the head to provide maximum protection. The goal of this demonstration is to enlighten students on how to wear a helmet in such a fashion that they are the best protected against impact. It is also important to touch upon the fact that a new helmet should be purchased after any kind of impact that could have weakened the structure of the helmet.

Cranial Nerves

Post-TBI Cranial Nerve Exam

The overall goal of this activity is to have the students better understand what might happen after a concussion or TBI and what issues someone may experience during such an event. It is important to note that this test is only administered by a trained health professional in actual scenarios where a TBI may have occurred. If someone who may have had a TBI isn't able to successfully complete this series of tests, they are in serious trouble and should be transported to the hospital.

This demonstration is designed to show students what may happen after they have a TBI or concussion. This task is completed by testing the given senses in different activities. The activities are as follows;

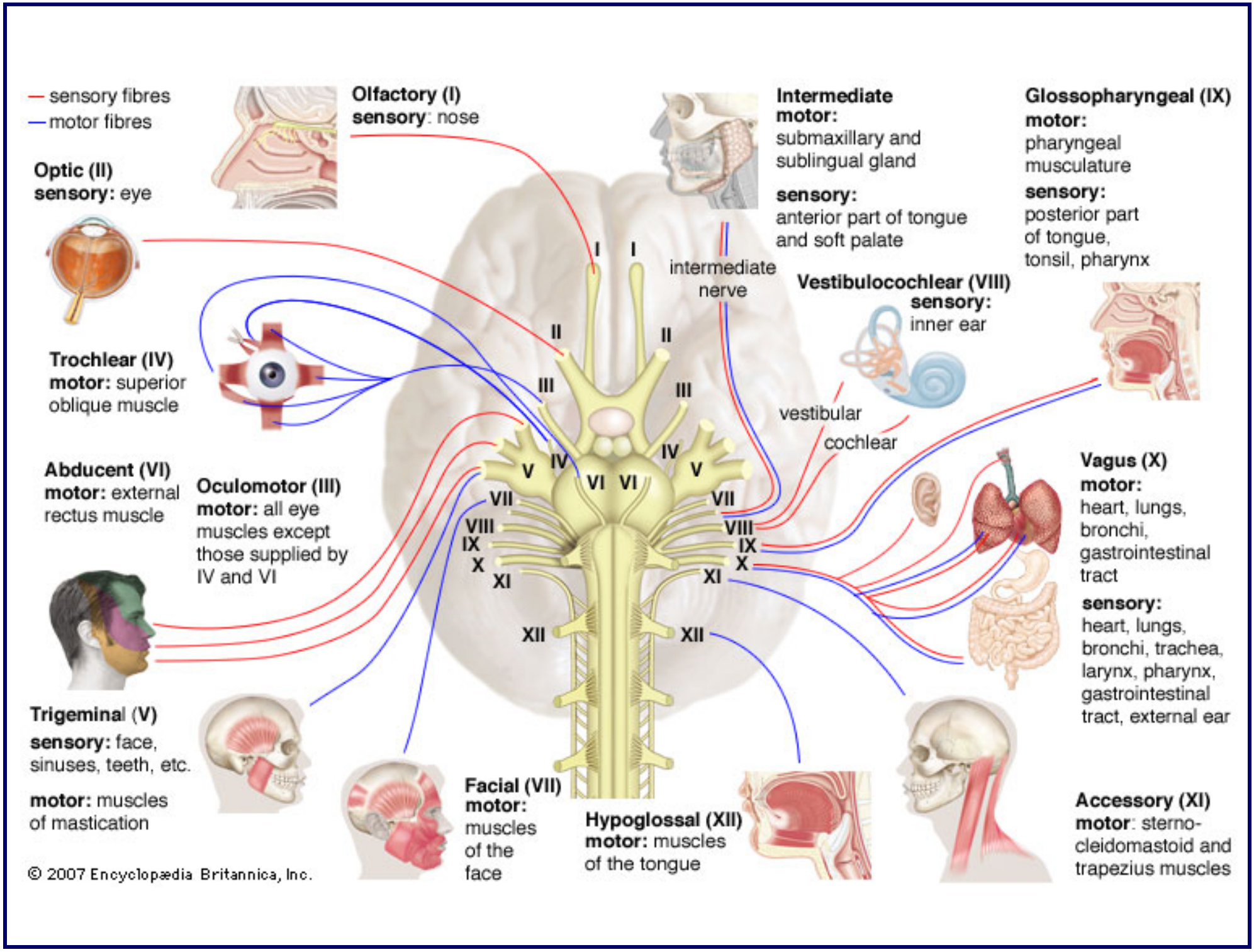
Touch- Place a toothpick or cotton swab against a students' cheek and ask them to identify whether or not the feeling was soft or hard. Repeat using different side. Explain how someone may not be able to identify a difference, post-TBI.

Hearing- Using tuning fork, vibrate and place against students ear while moving it back and forth to increase and decrease the sound level. Explain how the sound wouldn't be audible after a TBI at the normal distance.

Smell- Place a strong smelling substance in a dark vial (we used coffee grounds) and ask the students to smell the substance. Then ask the students to identify the smell. Explain how after a TBI someone may not be able to identify the smell.

Sight- Using a penlight or flashlight, demonstrate normal pupil dilation and explain how in someone who had a concussion, the pupils may not dilate normally and might remain the same even in direct light.

Taste- Using a vial of some strong tasting substance (we recommend salt water because students may have tasted it), have students taste it and then identify it. Explain how someone may not be able to identify this if they had a concussion or TBI.


— sensory fibres
— motor fibres
Olfactory (I)
sensory: nose
Optic (II)
sensory: eye
Trochlear (IV)
motor: superior oblique muscle
Abducent (VI)
motor: external rectus muscle
Oculomotor (III)
motor: all eye muscles except those supplied by IV and VI
Trigeminal (V)
sensory: face, sinuses, teeth, etc.
motor: muscles of mastication
Facial (VII)
motor: muscles of the face
Hypoglossal (XII)
motor: muscles of the tongue
Accessory (XI)
motor: sterno-cleidomastoid and trapezius muscles
Intermediate
motor: submaxillary and sublingual gland
sensory: anterior part of tongue and soft palate
intermediate nerve
Vestibulocochlear (VIII)
sensory: inner ear
vestibular
cochlear
Glossopharyngeal (IX)
motor: pharyngeal musculature
sensory: posterior part of tongue, tonsil, pharynx
Vagus (X)
motor: heart, lungs, bronchi, gastrointestinal tract
sensory: heart, lungs, bronchi, trachea, larynx, pharynx, gastrointestinal tract, external ear
I
II
III
IV
V
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VII
VIII
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X
XI
XII
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