

Basic Sciences in GME

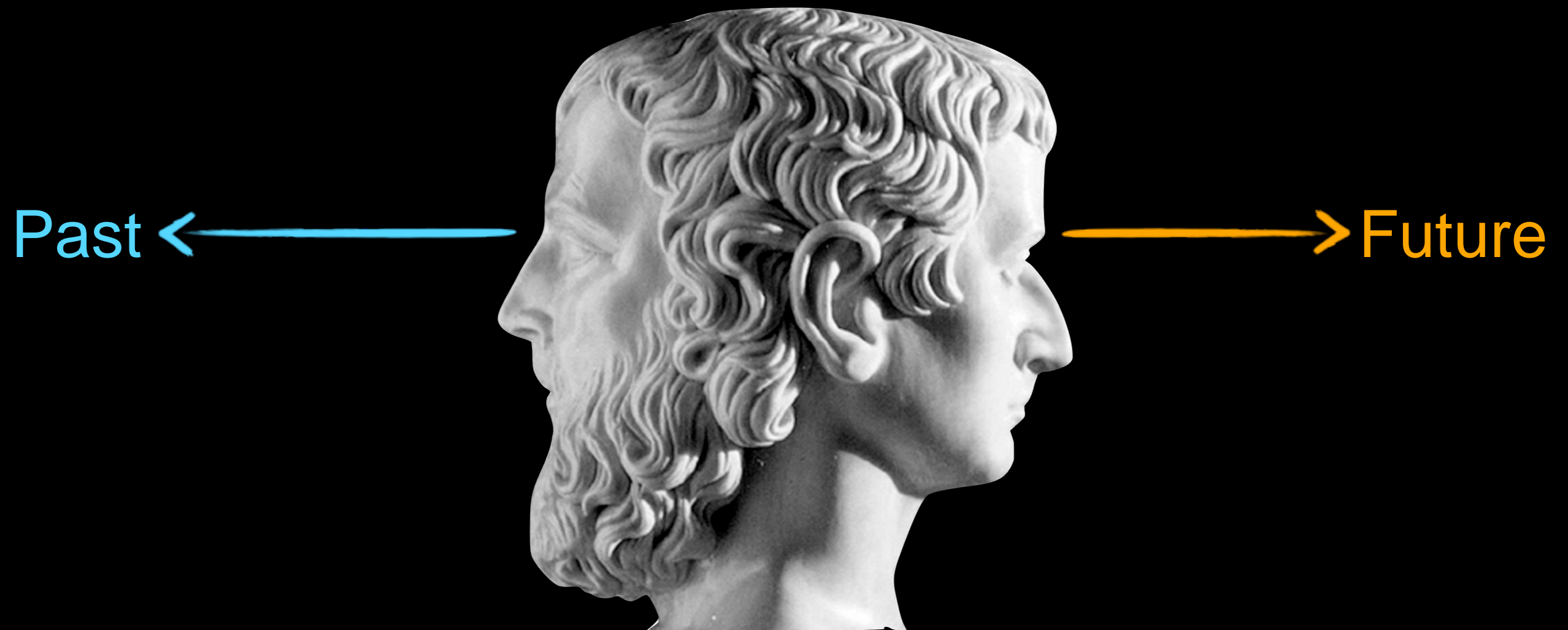
The Ultimate Setting for Being Two-Faced



David A. Morton, Ph.D.

Professor, Vice-Chair of Medical and Dental Education
Academy of Health Science Educators
Department of Neurobiology and Anatomy
University of Utah School of Medicine

Beginnings and Endings

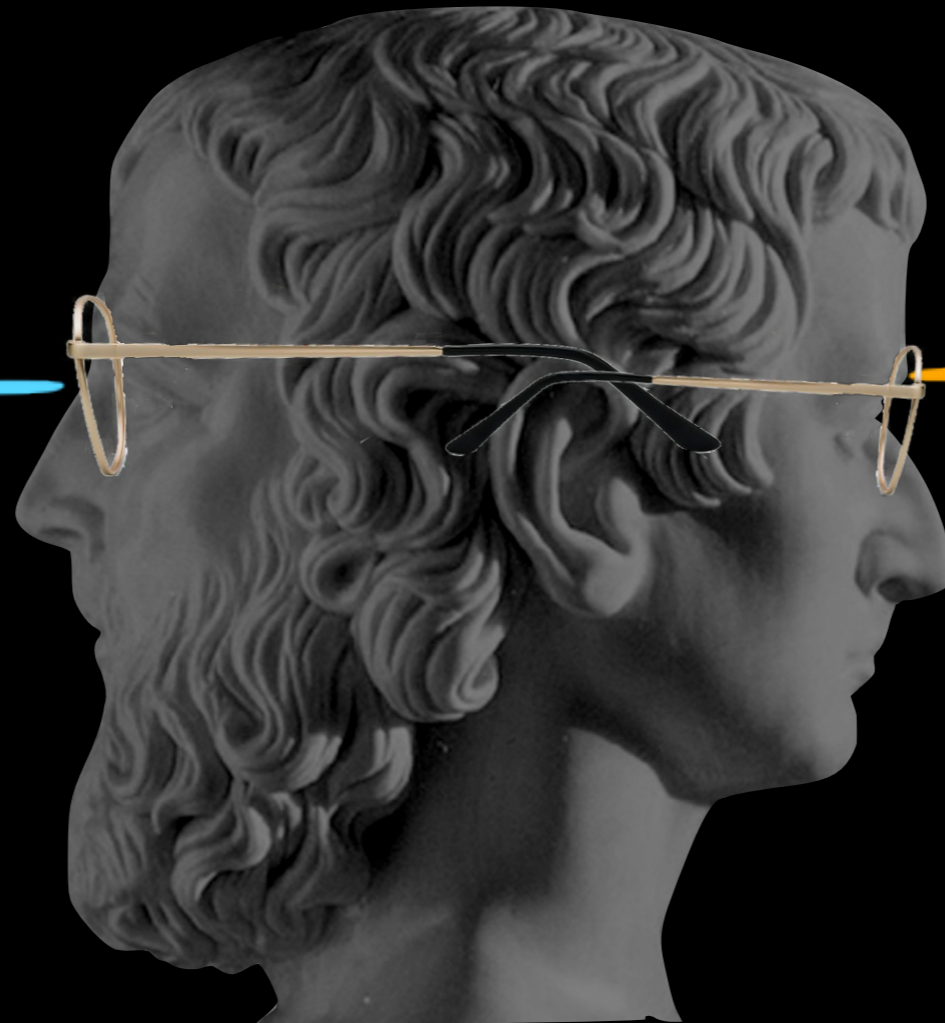


Janus

An educator is like the Roman God Janus

Retrospective and Prospective

Reviewing
past material



Teaching
future material

Professor

What does this have to
do with learning?

Student



Pearl 1

How do we make information stick?

The mind is like a storehouse
Memories are objects stored in that space



The mind is like a storehouse
Memories are objects stored in that space

Novel information A

Novel information B

Novel information C

Retrieval is essential for durable, long-term learning



Novel information A

Novel information B

Novel information C

emory is retrieved, that memory becomes more accessible

Novel information A

Novel information B

Novel information C

Problem Solved



Novel information C

Storage/Retrieval

Novel information A

Novel information B

Novel information C



New information

Novel information A

Novel information B

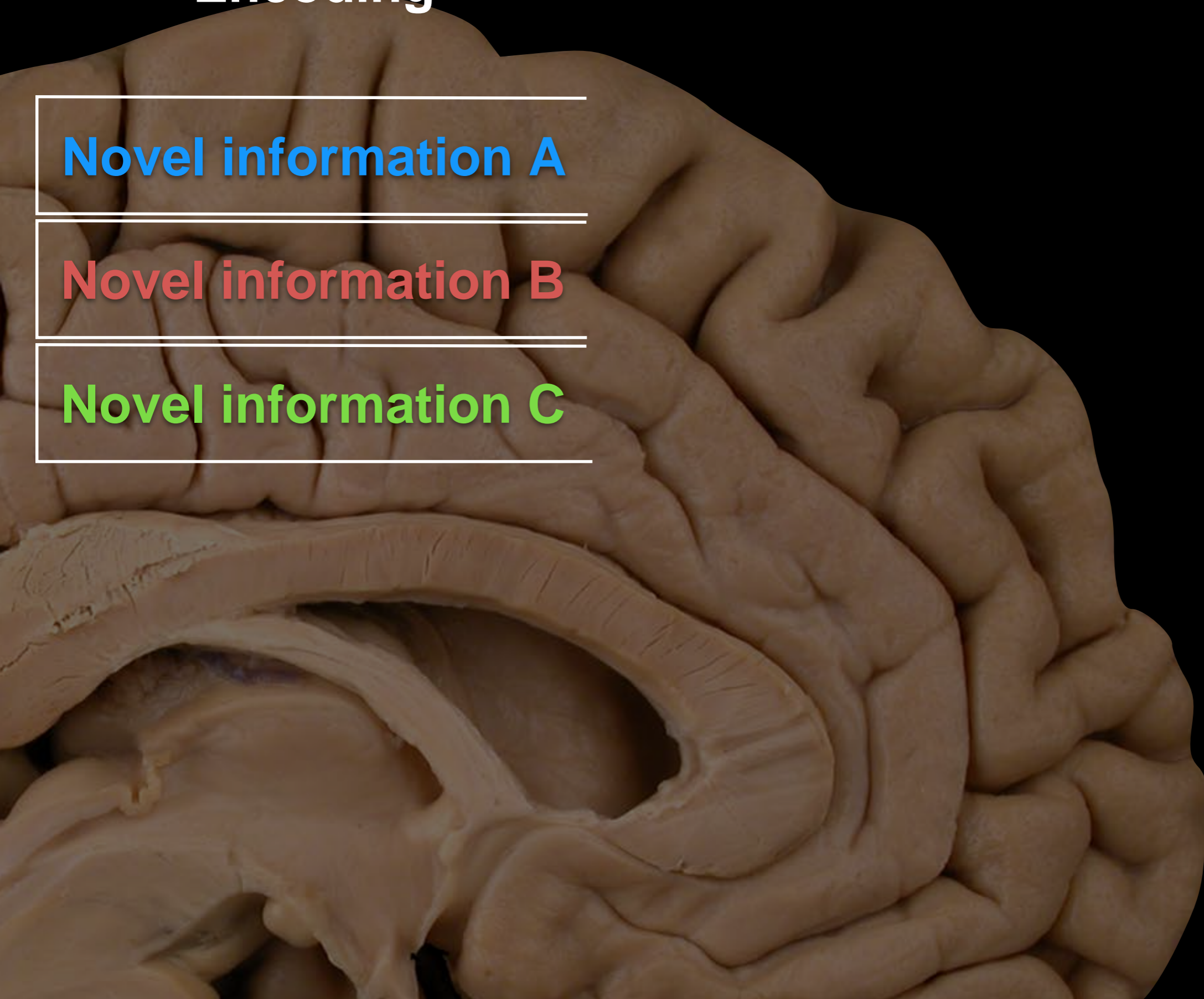
Novel information C

Encoding

Novel information A

Novel information B

Novel information C



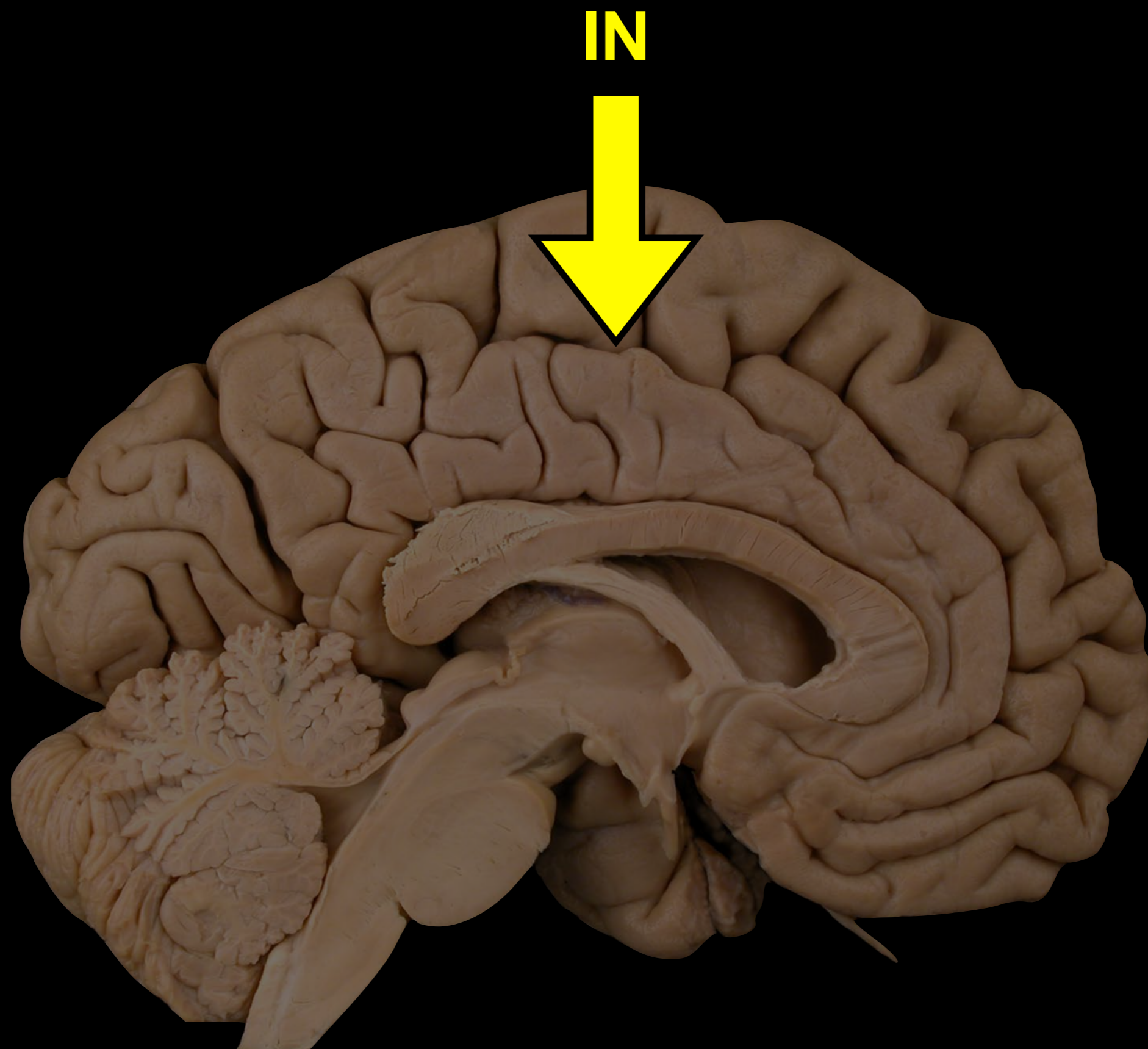
Retrieval

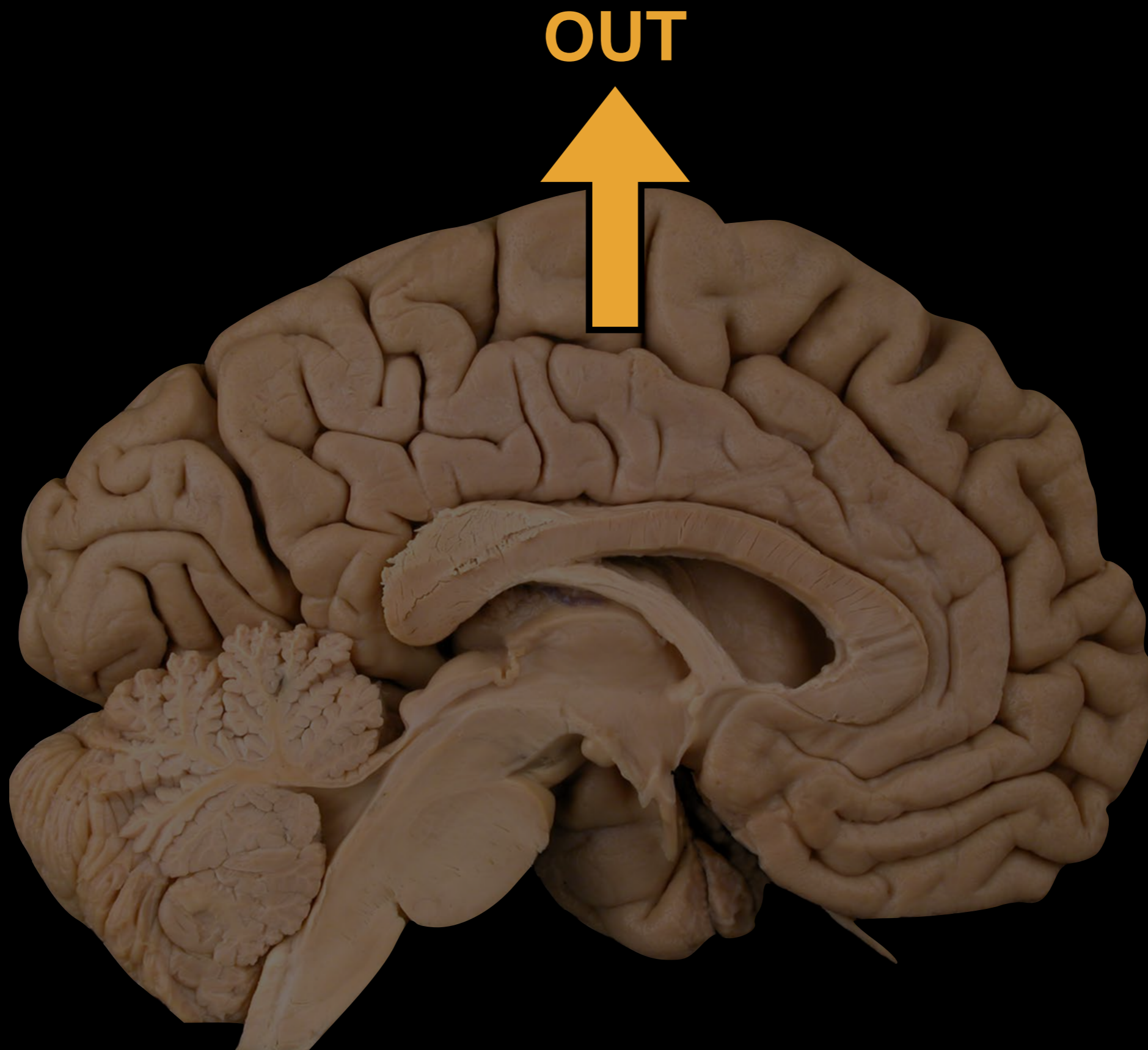


Novel information A

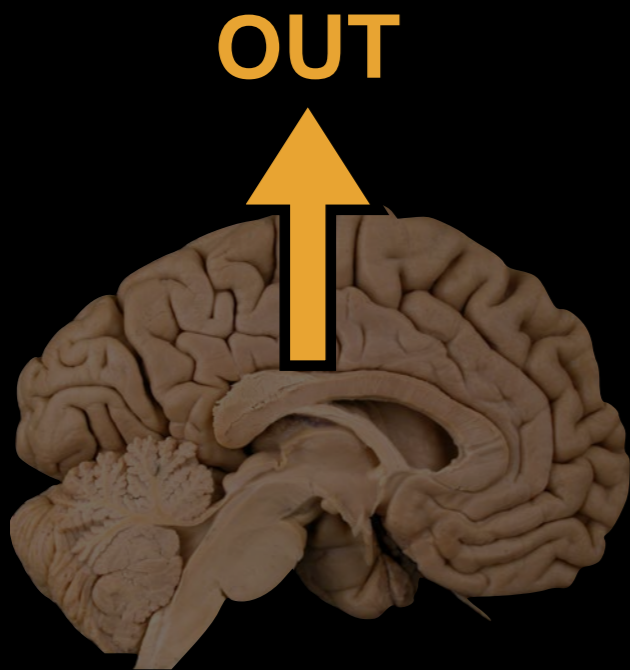
Novel information B

Novel information C





OUT

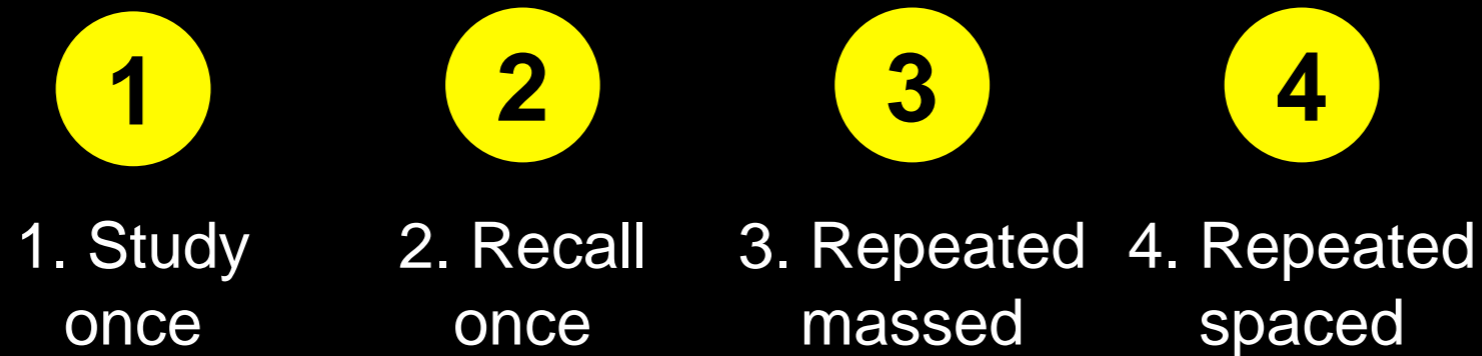


What is Retrieval Practice?

- Activities that force us to pull knowledge “out” and see what we know
- ... when we are forced to recall ... we struggle to remember
- It’s precisely this “struggle” that improves memory and learning
- Therefore, Retrieval Practice...
 - Exercises and strengthens our memory
 - Identifies gaps in our learning

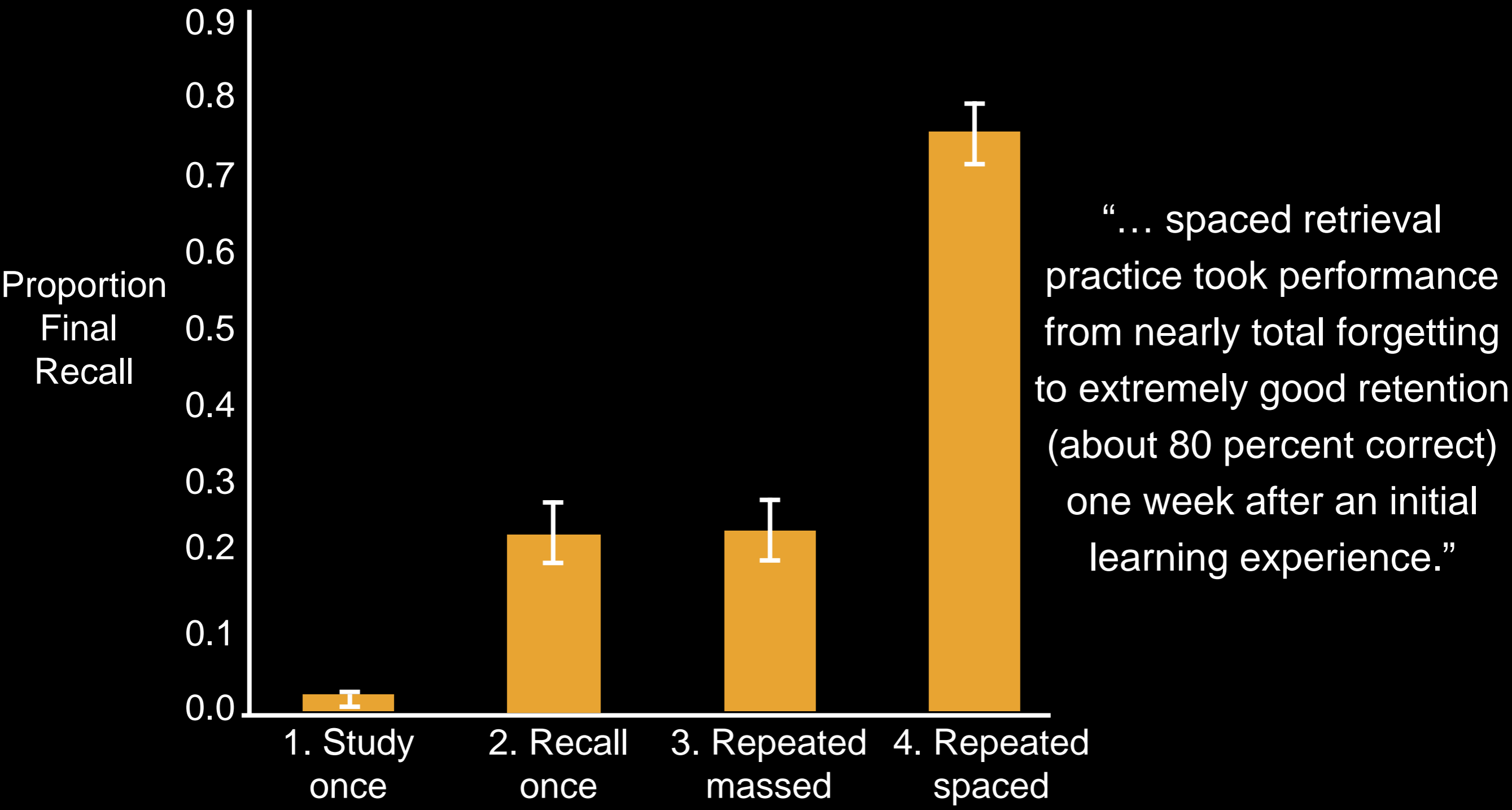
How many people here speak Swahili?

- Required participants to learn 50 Swahili vocabulary words
- Participants divided into 4 groups - learned in 4 different ways

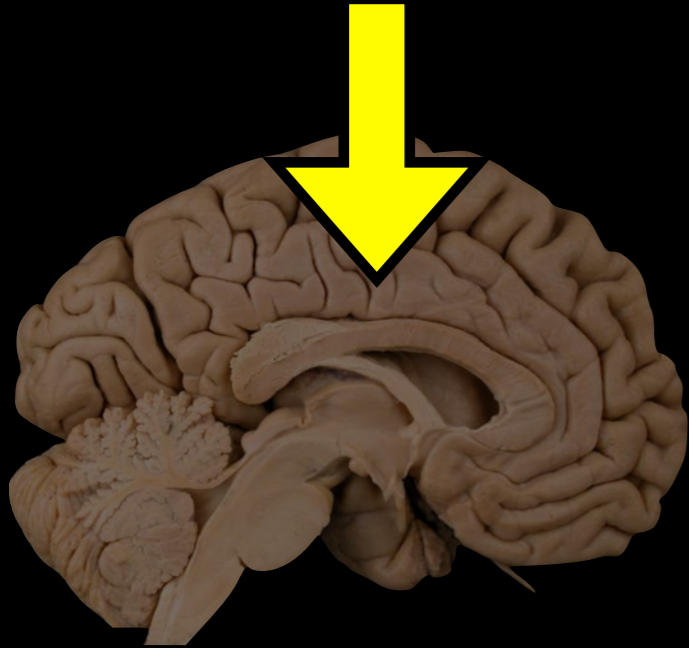


- Tested recall of 50 Swahili words one week later

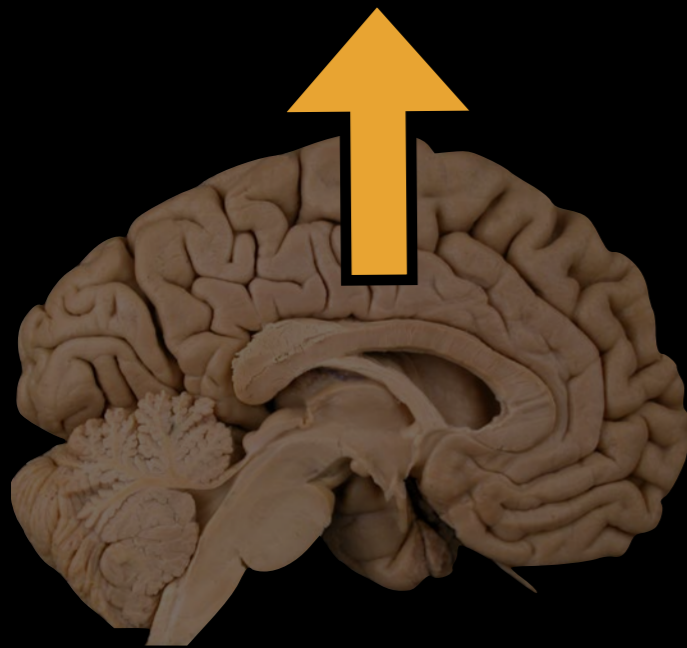
How well would students remember the vocabulary word translation



Data adapted from Karpicke & Bauernschmidt (2011)



Lecture new material for 10 mins



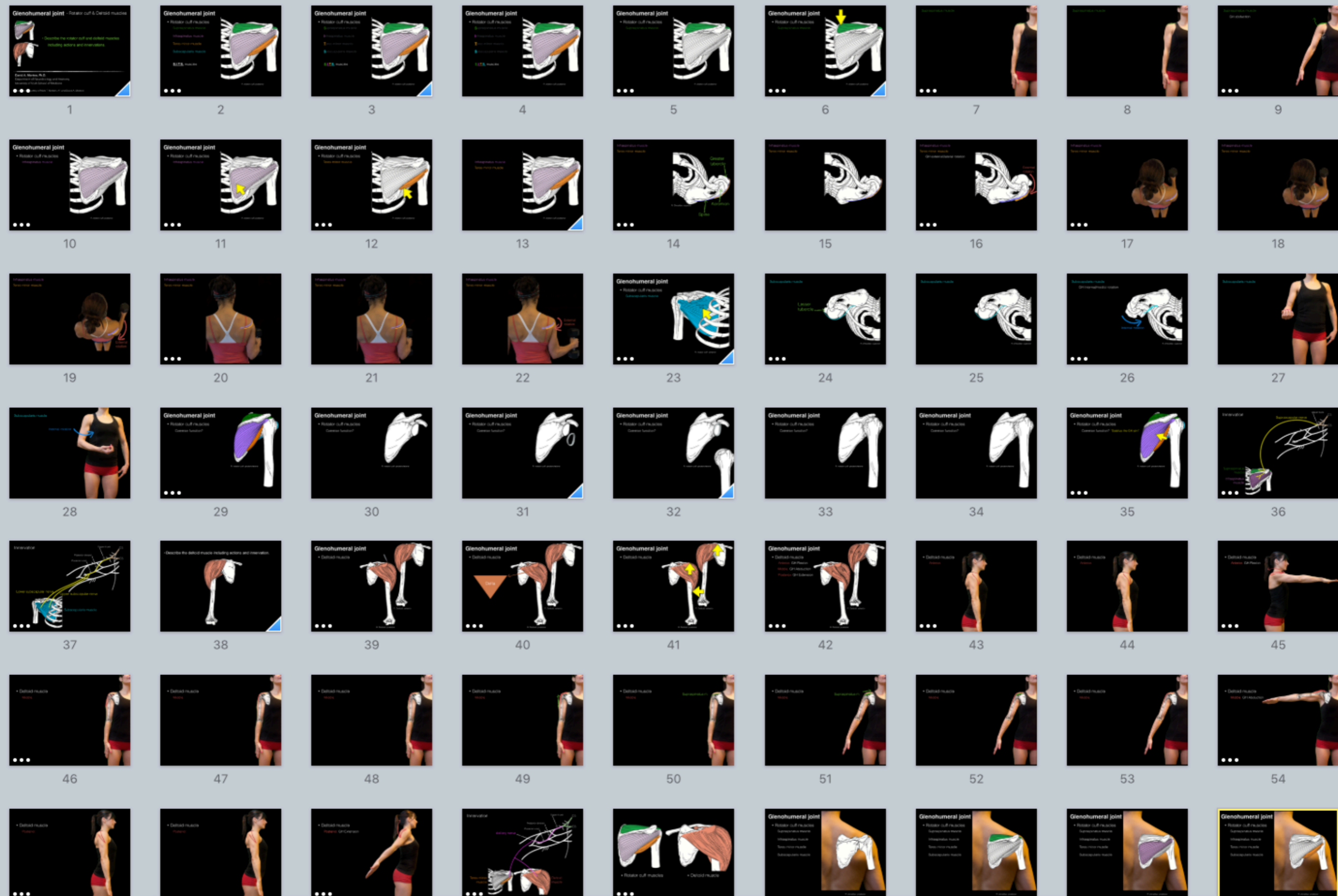
1. Retrieval Practice Activity ...stuff you just taught them

2. Spaced Repetition ...

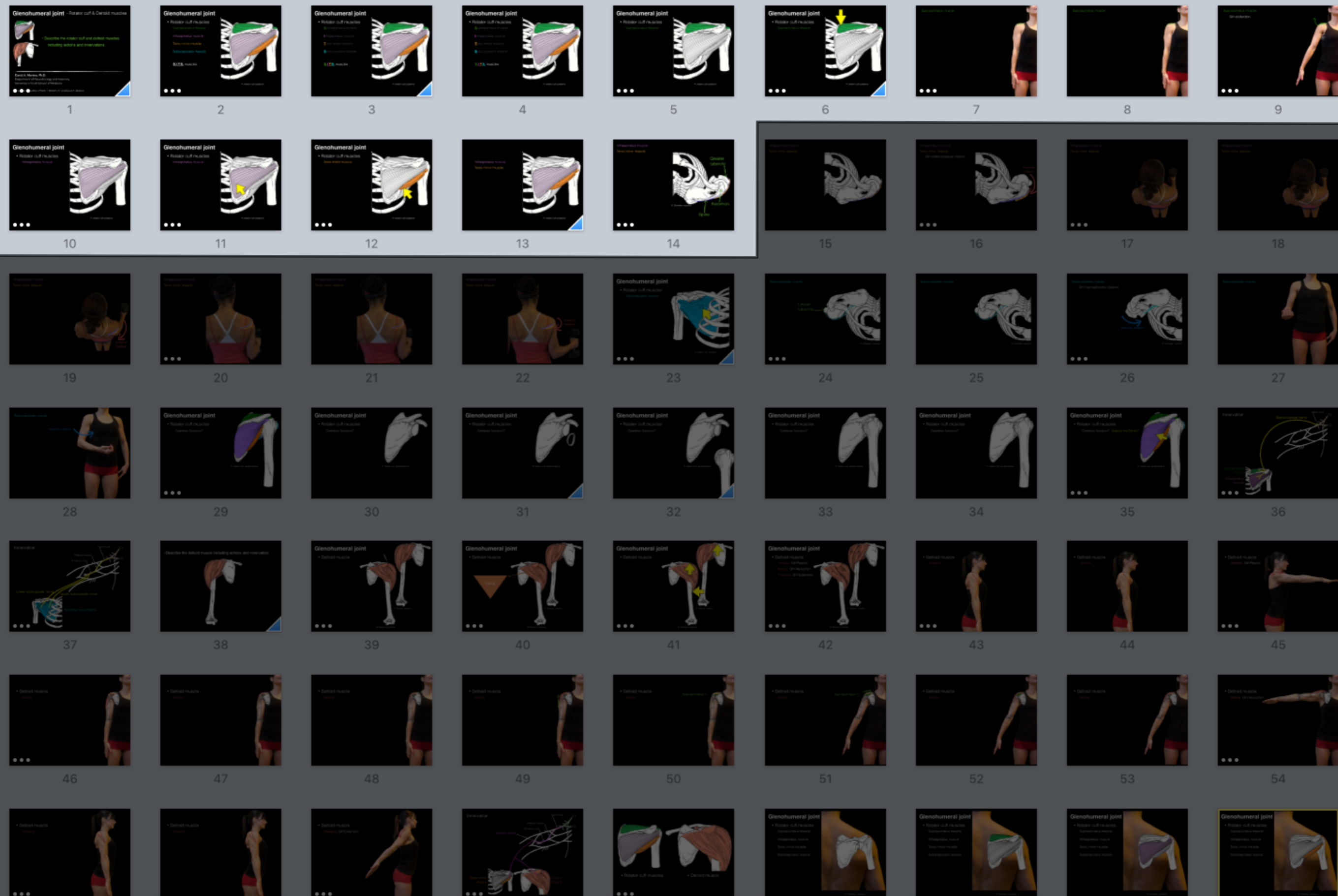
stuff you taught them 20 mins, 2 days, 2 weeks, 2 years ago

Retrieval within a lecture

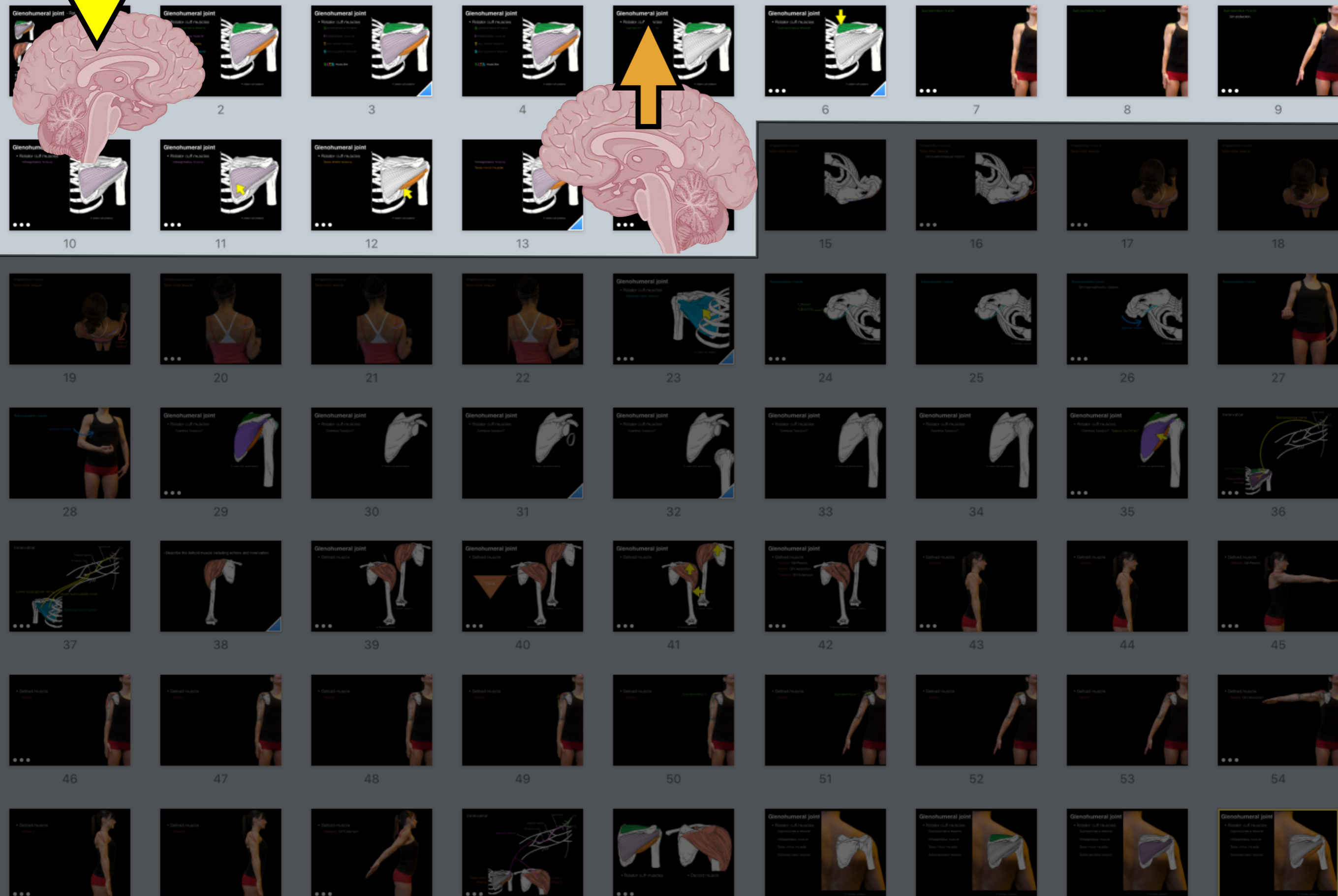
Retrieval within a lecture



Retrieval within a lecture



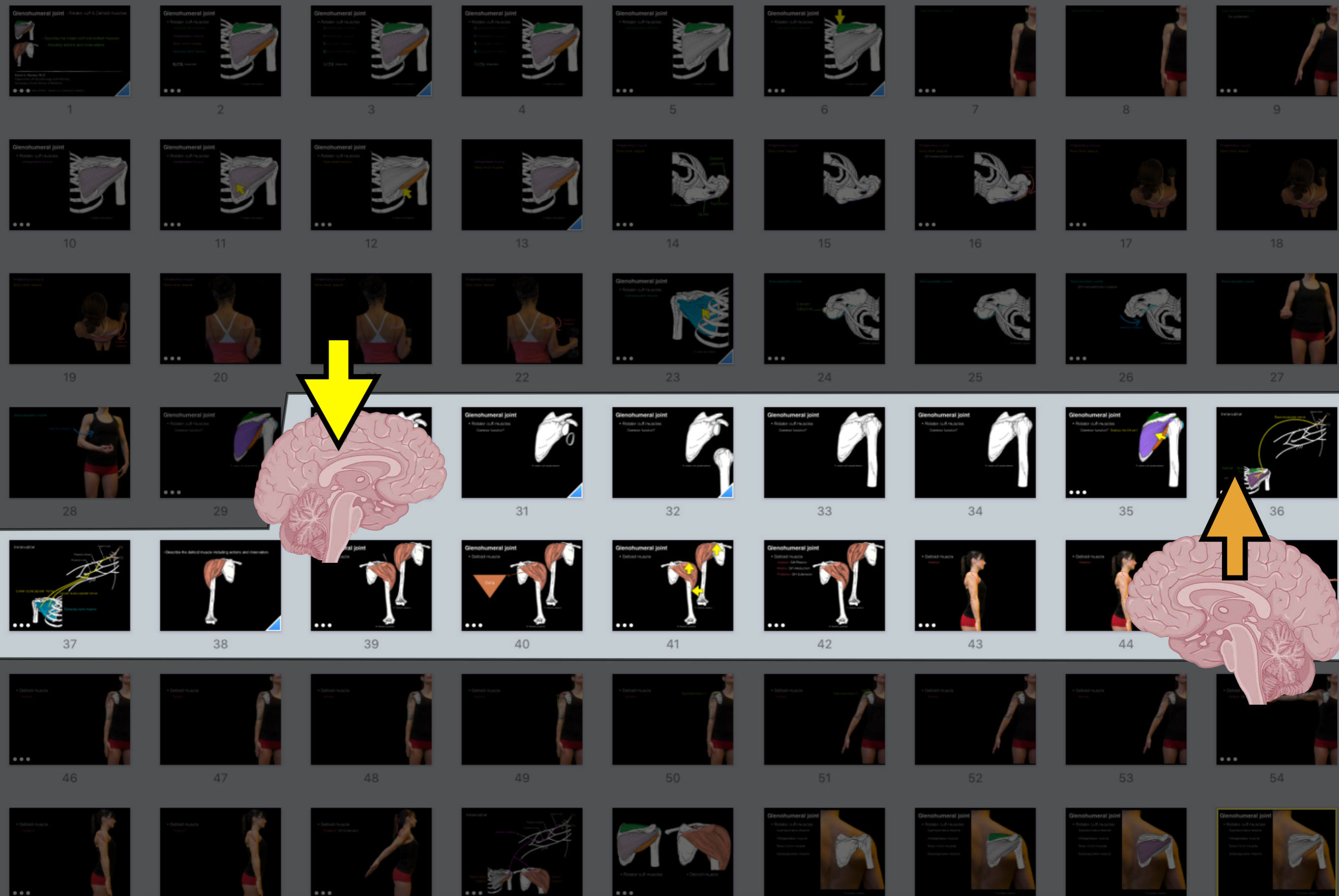
Retrieval within a lecture



Retrieval within a lecture



Retrieval within a lecture



Relevel within a lecture



Retrieval from previous lectures

Retrieval from previous lectures



1. Scapular sling muscles



2. Rotator cuff muscles



3. Brachial muscles



4. Intertubercular groove muscles



5. Forearm flexor muscles



6. Forearm extensor muscles

Retrieval from previous lectures



1. Scapular sling muscles



2. Rotator cuff muscles



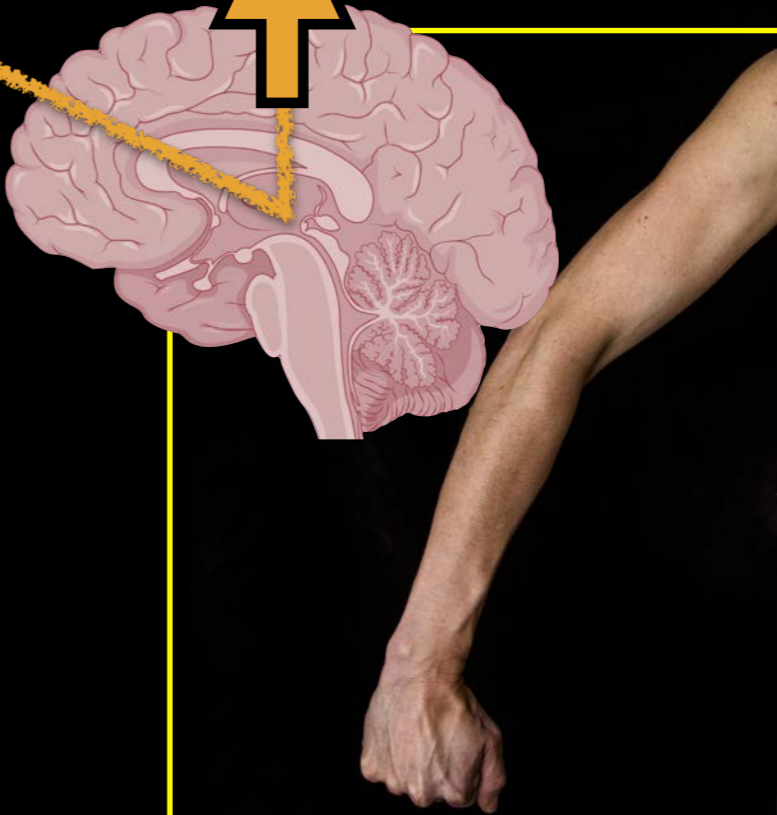
3. Brachial muscles



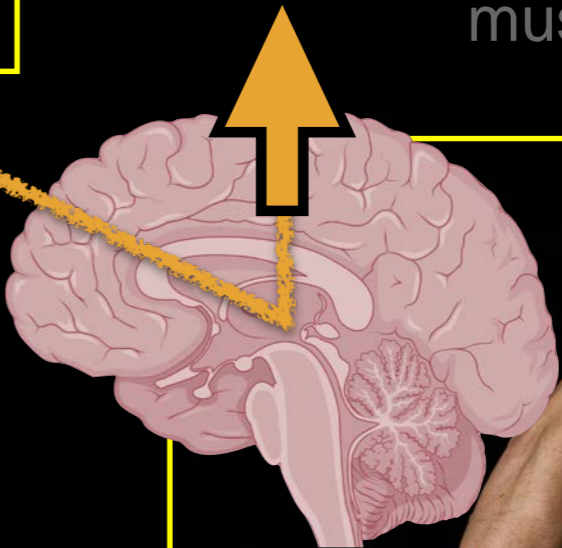
4. Intertubercular groove muscles



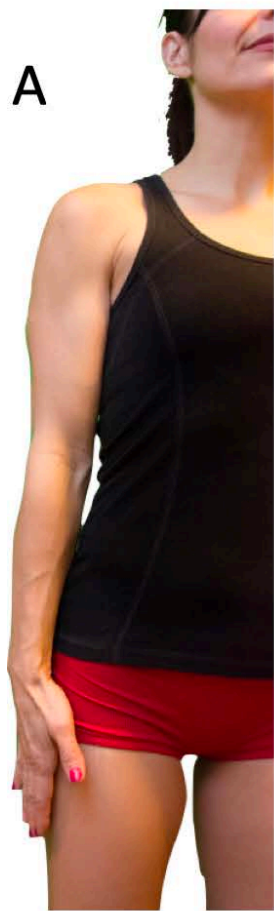
5. Forearm flexor muscles



6. Forearm extensor muscles



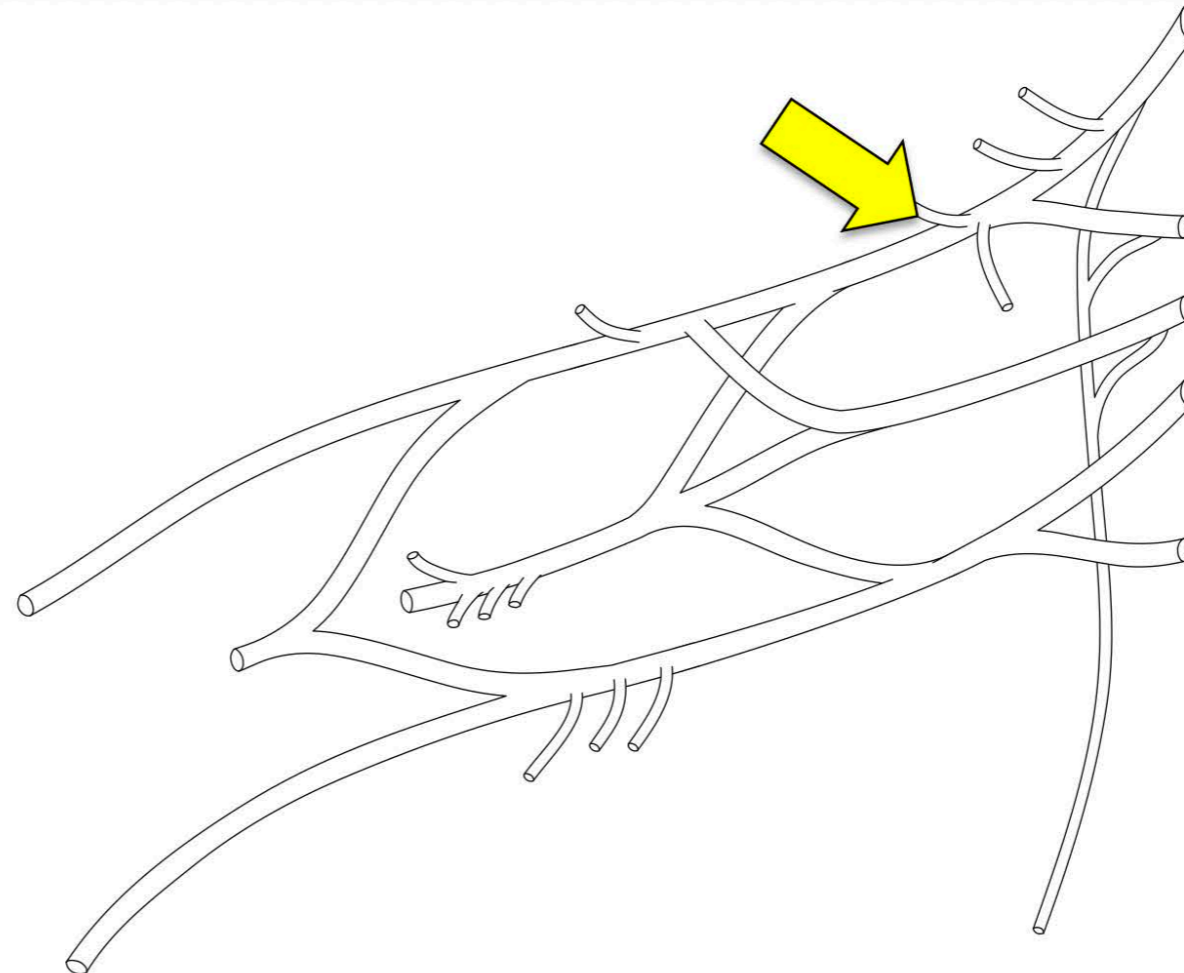
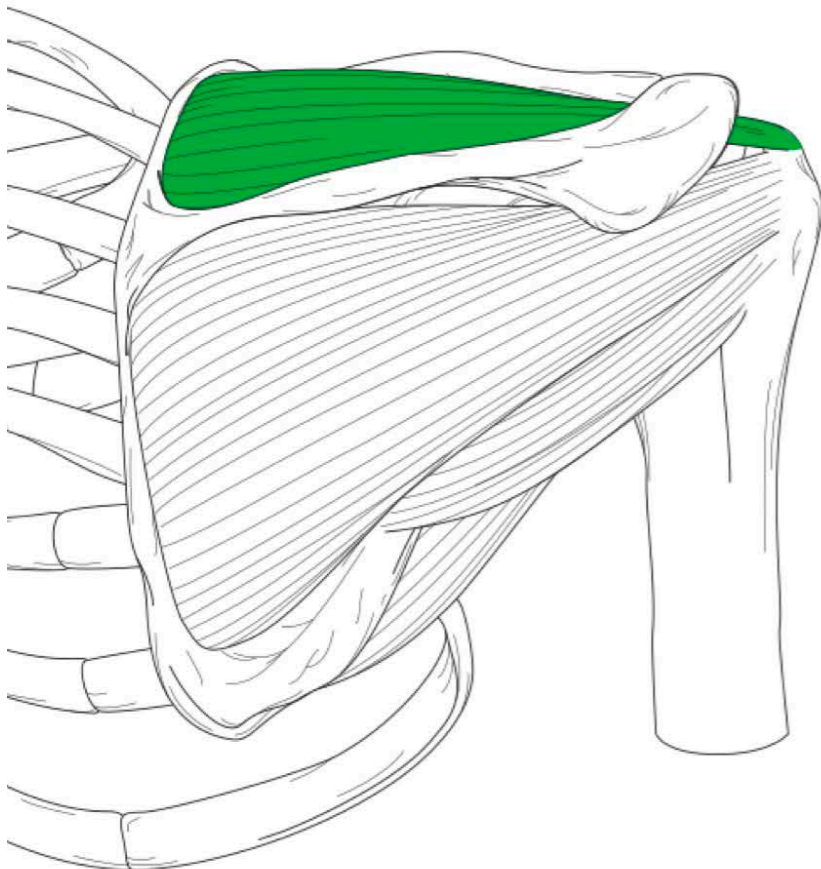
Paper puzzles



Suprascapular nerve

Supraspinatus

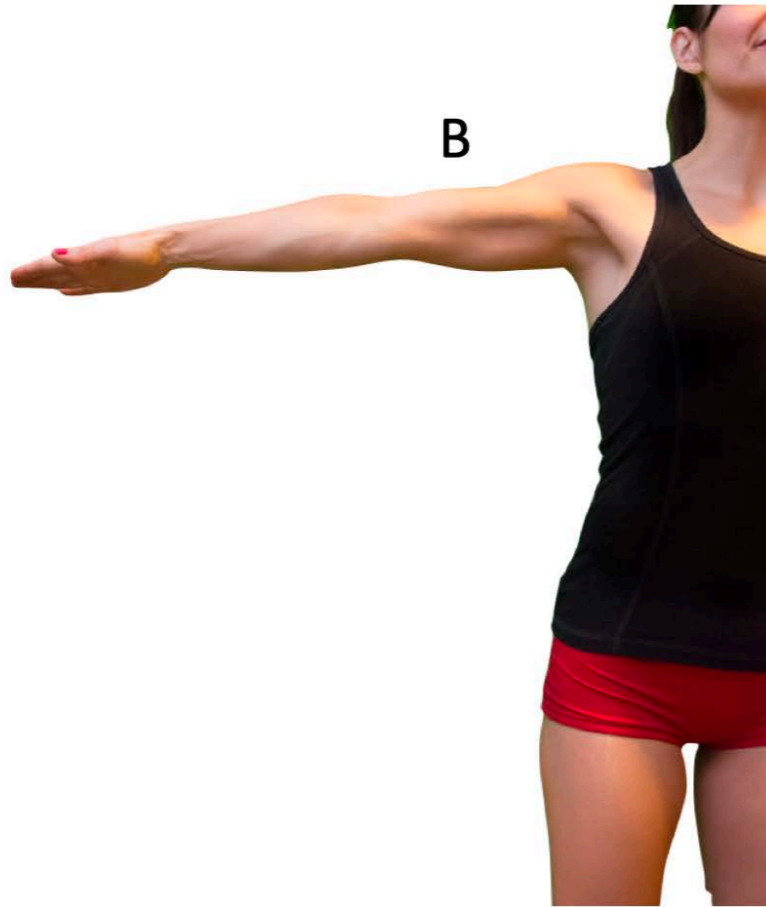
Glenohumeral abduction (15°)



A



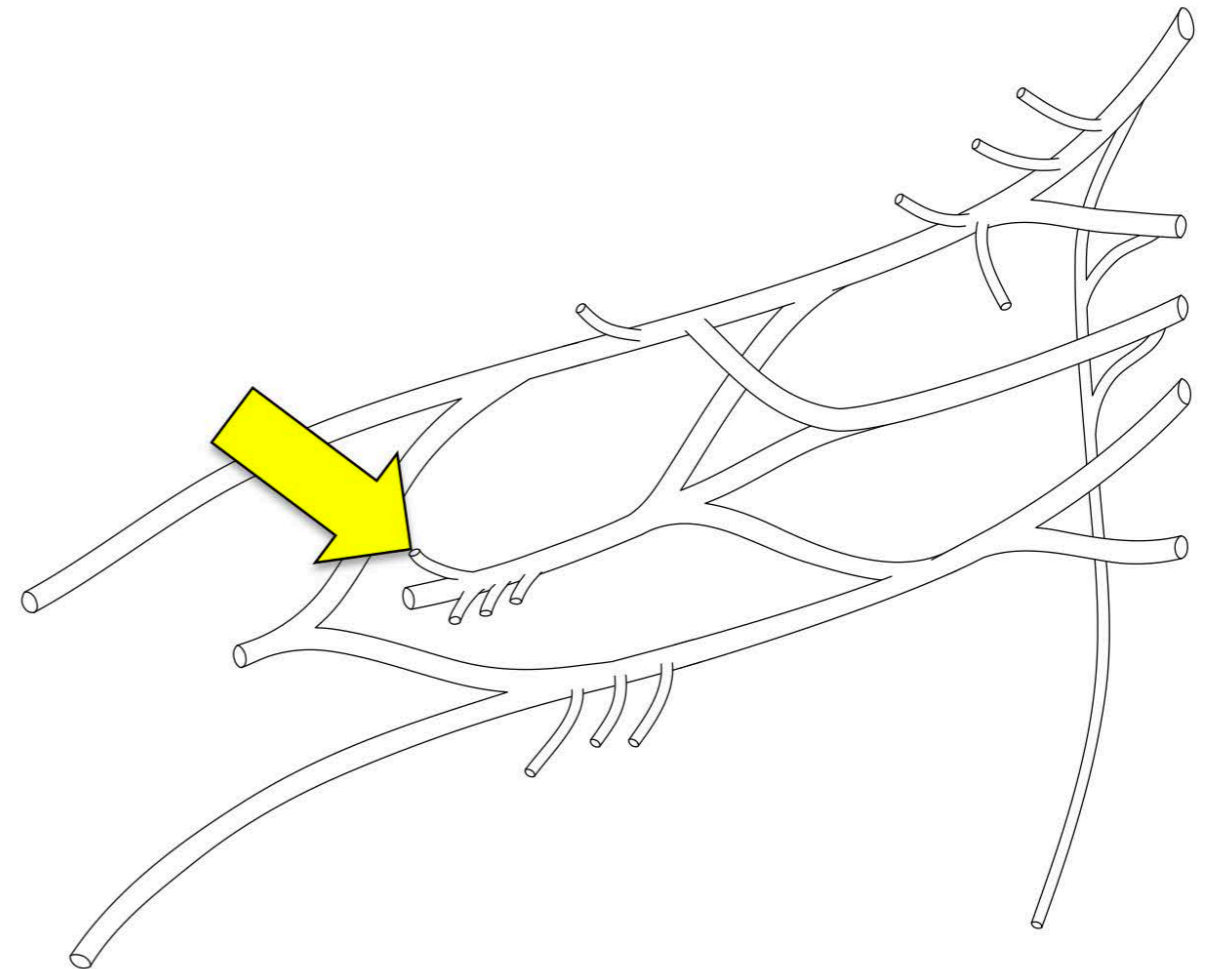
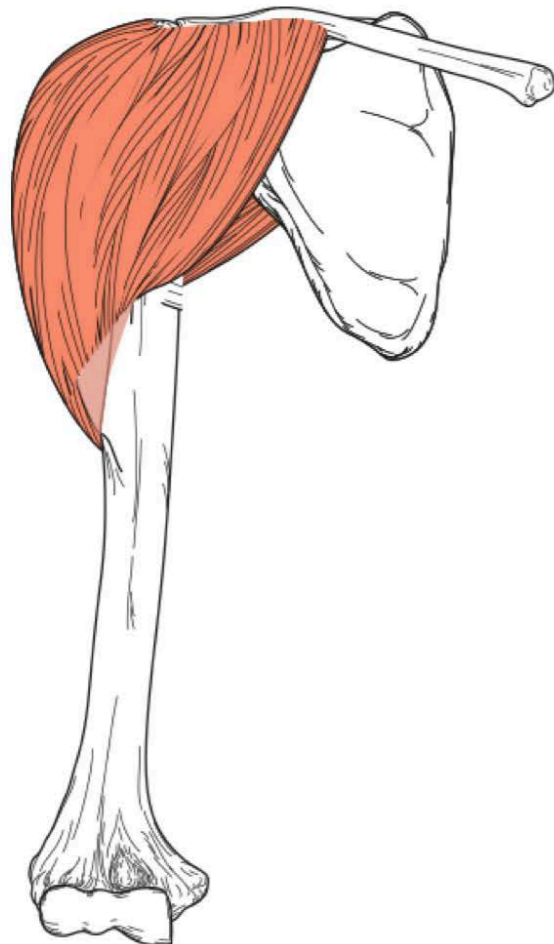
B

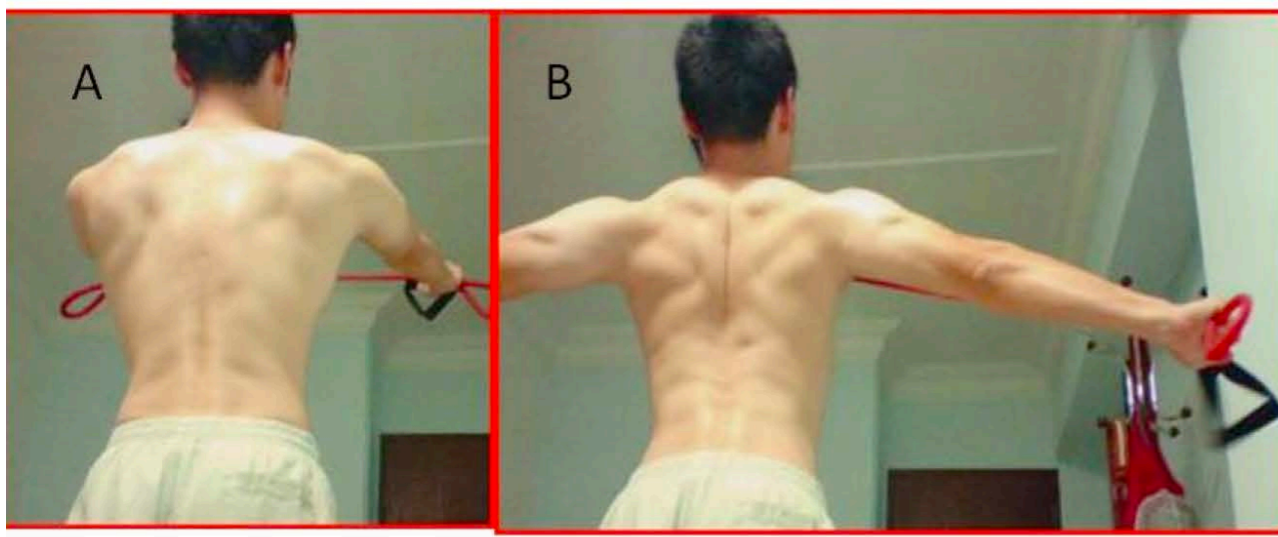


Axillary nerve

Deltoid

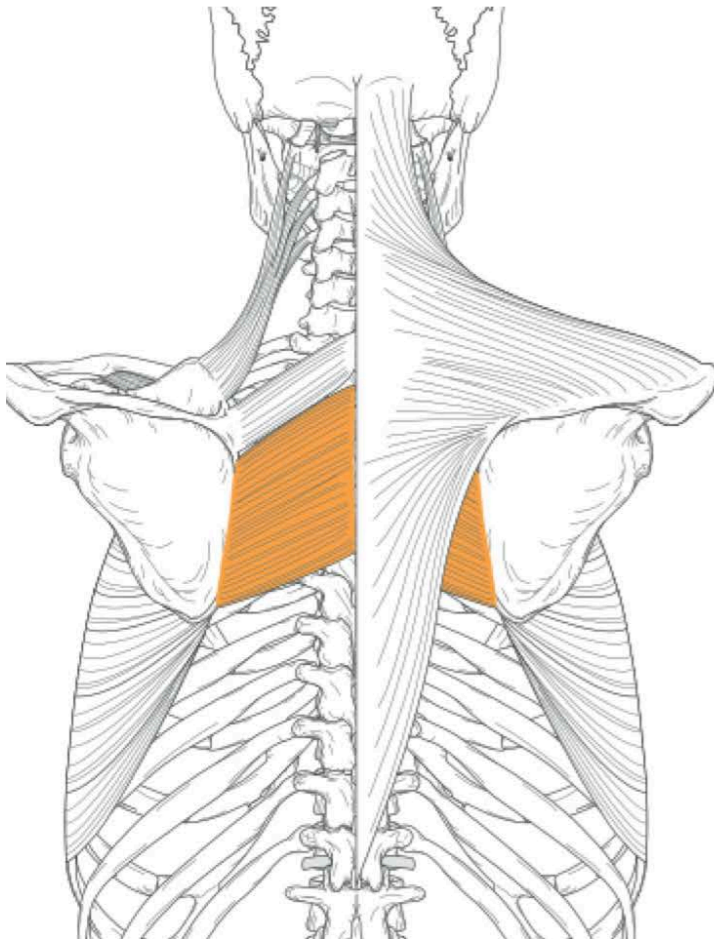
Glenohumeral abduction



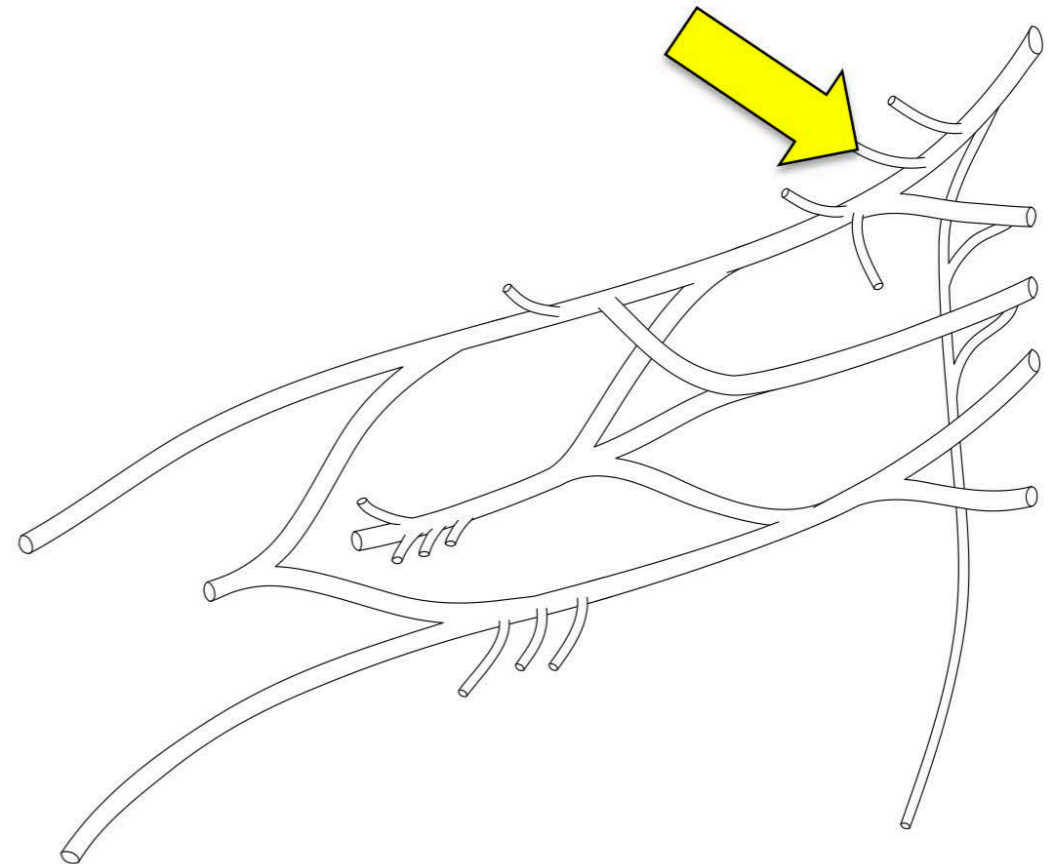


Scapula retraction

Rhomboid major and minor



Dorsal scapular nerve

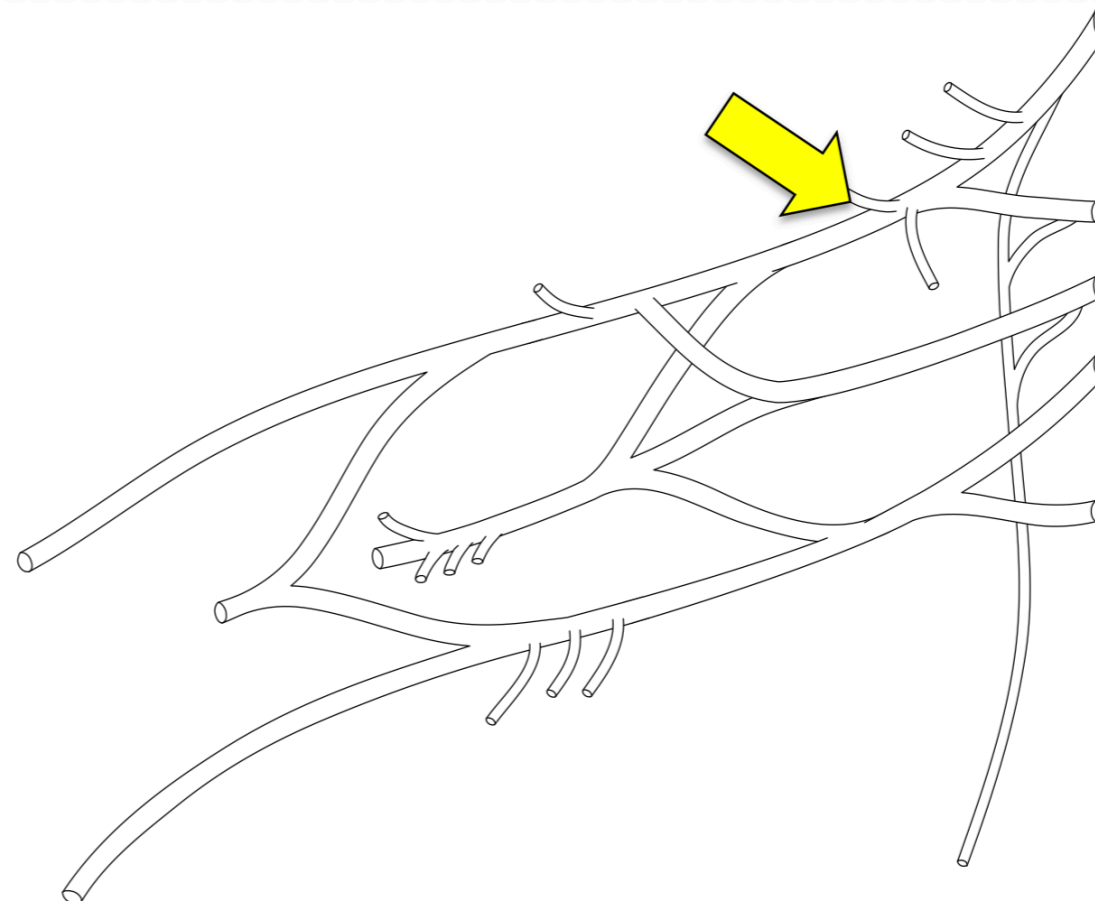
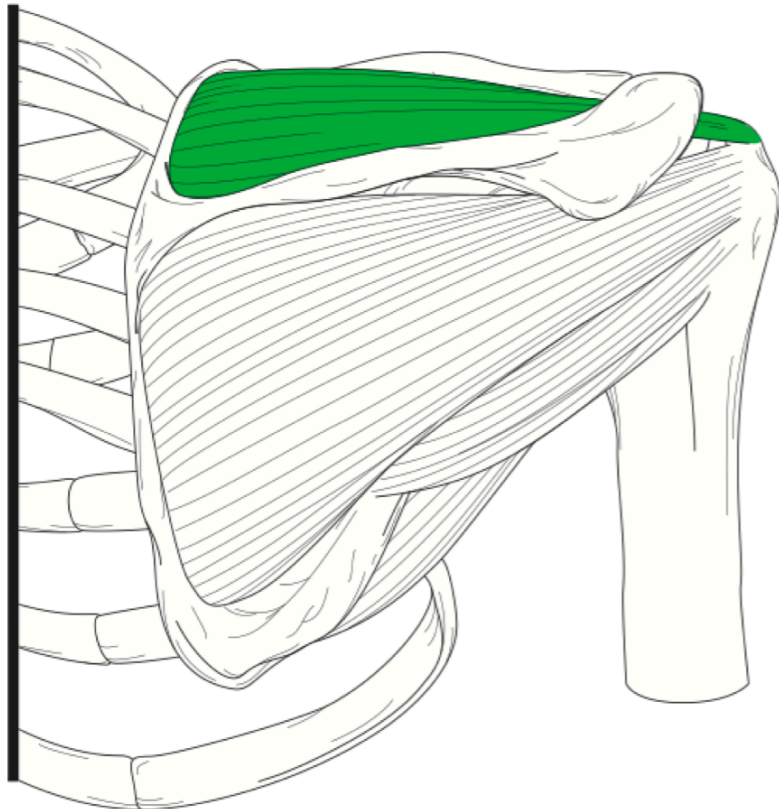


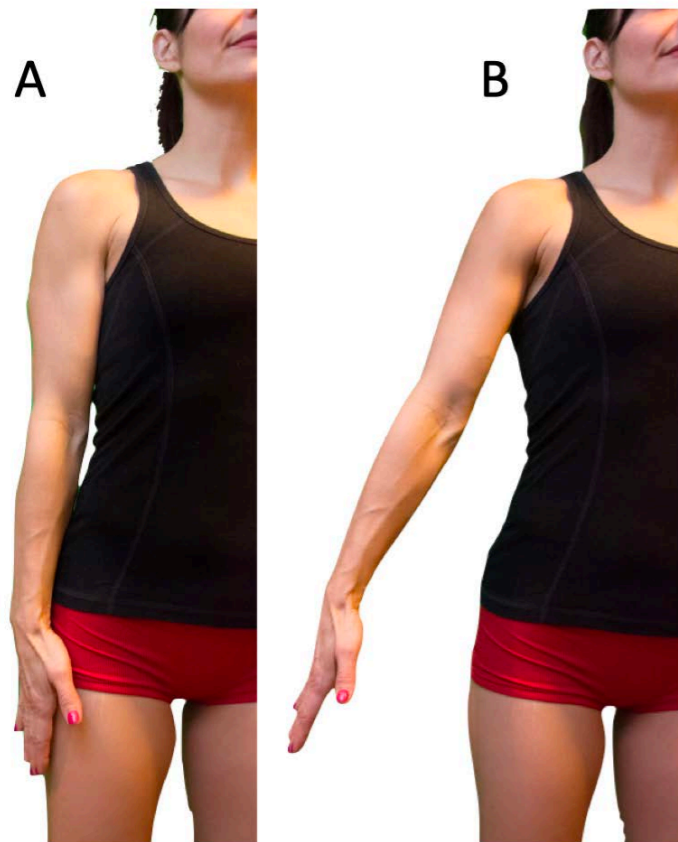


Suprascapular nerve

Supraspinatus

Glenohumeral abduction (15°)

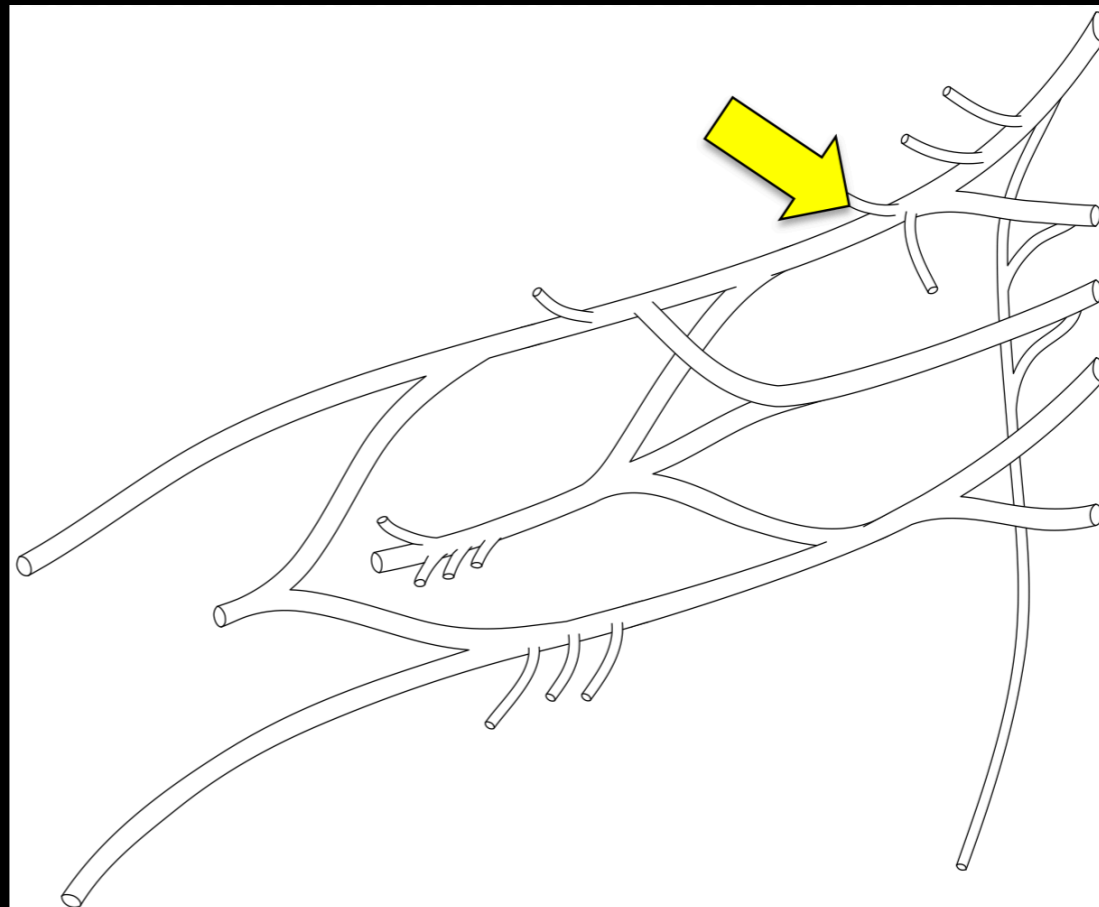
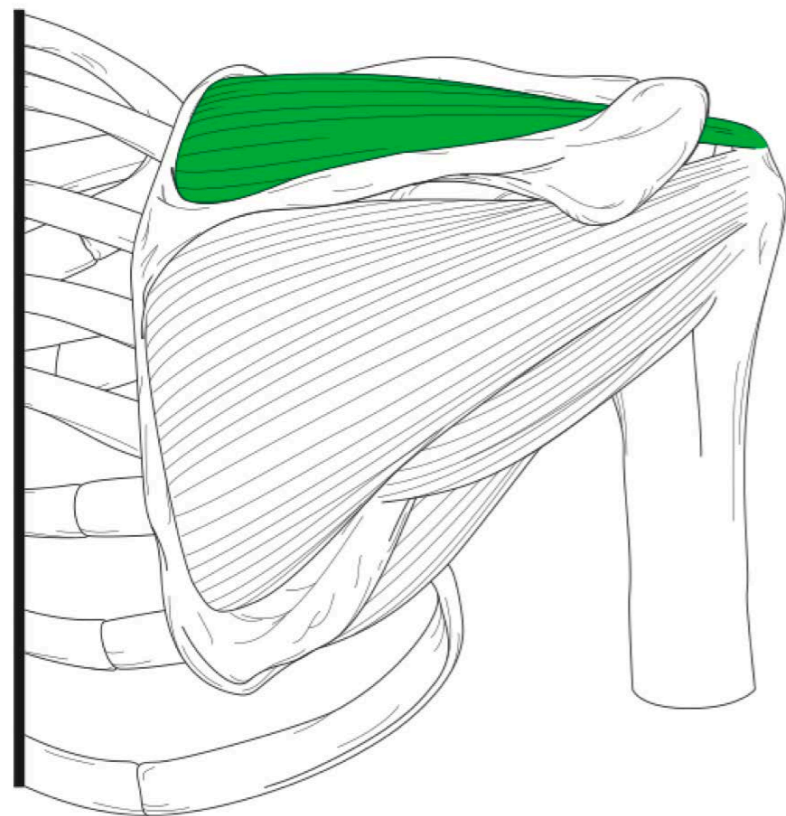




Suprascapular nerve

Supraspinatus

Glenohumeral abduction (15°)



A



B

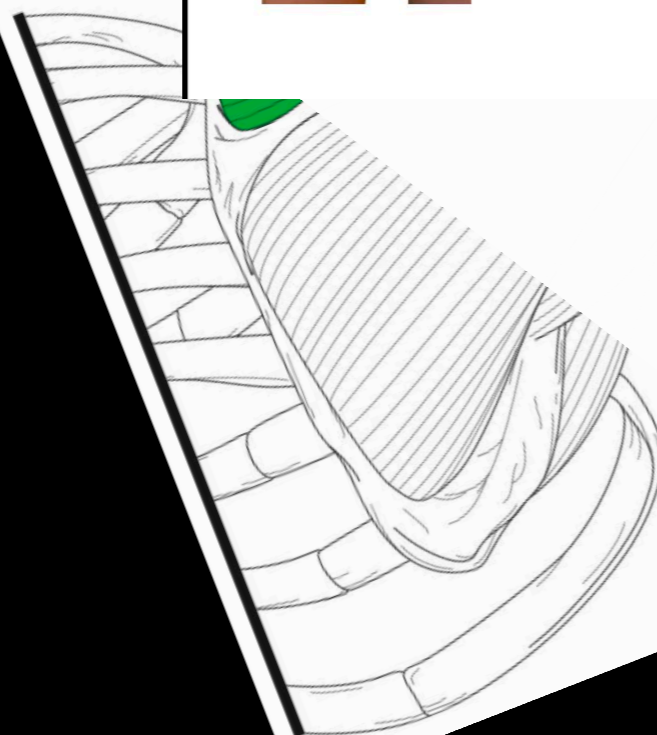
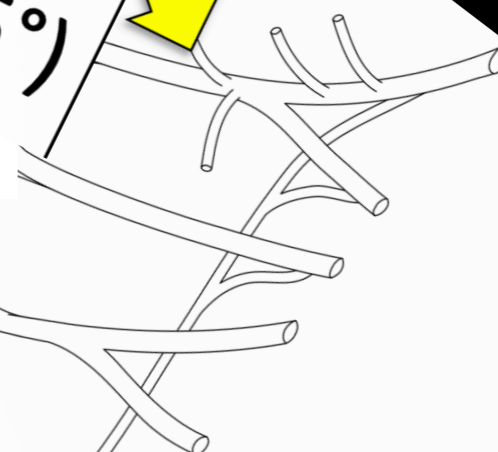


Glenohumeral abduction (15°)



brachial plexus

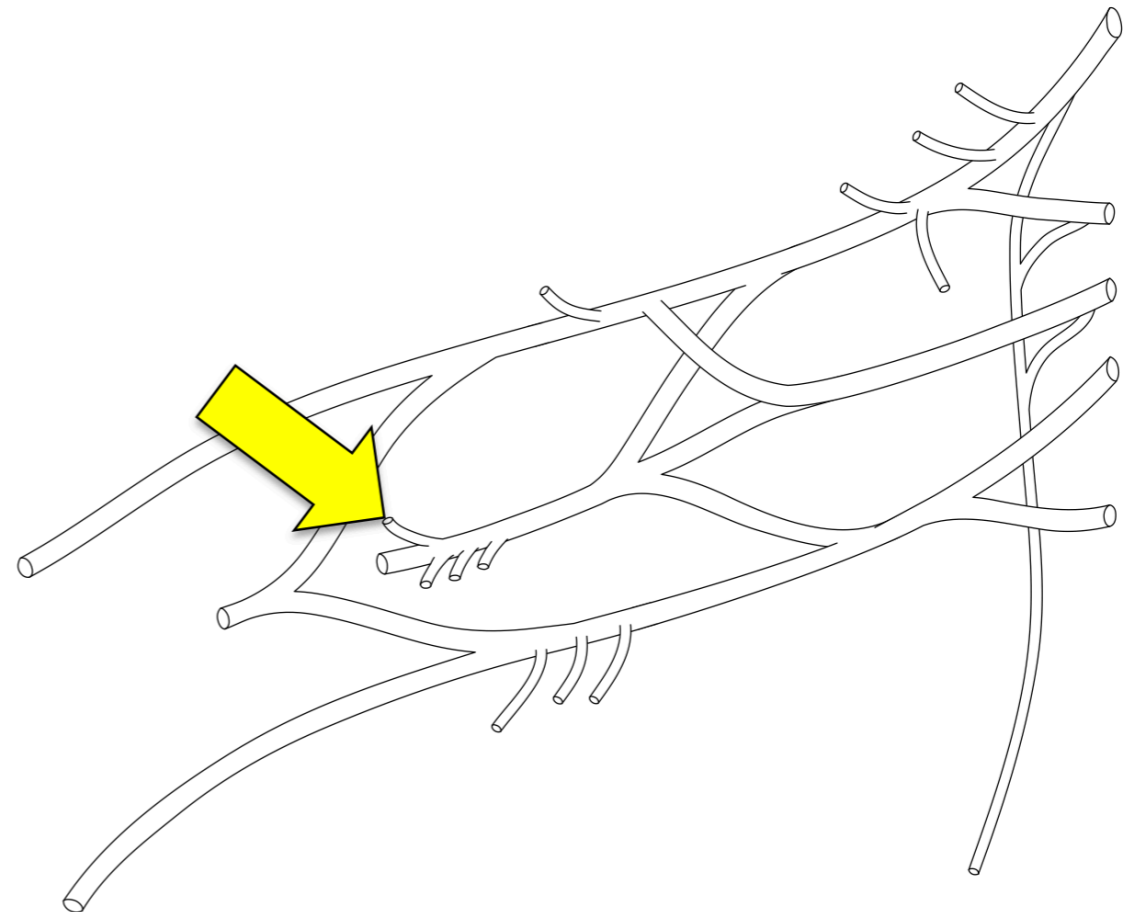
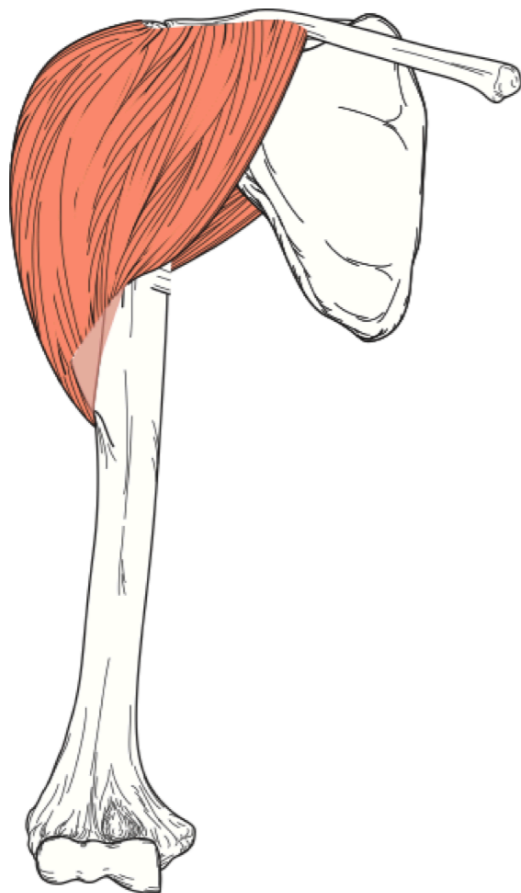
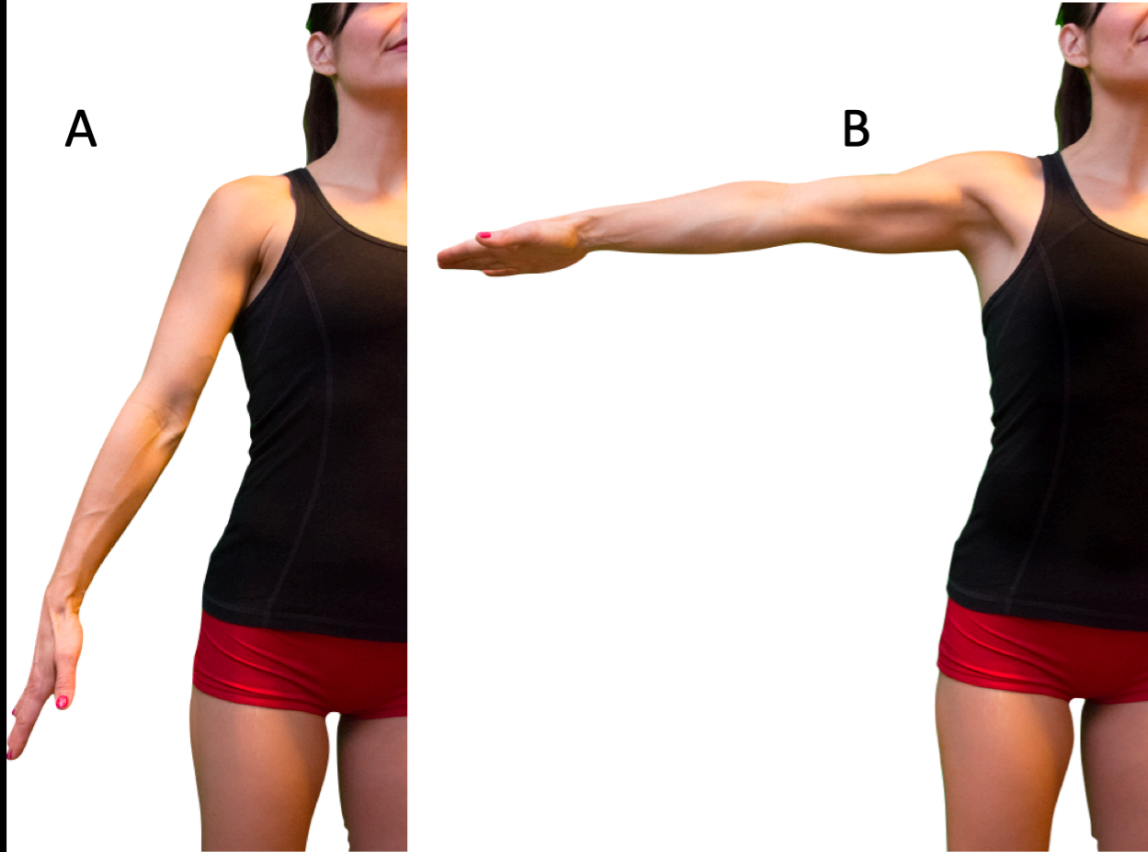
subscapularis

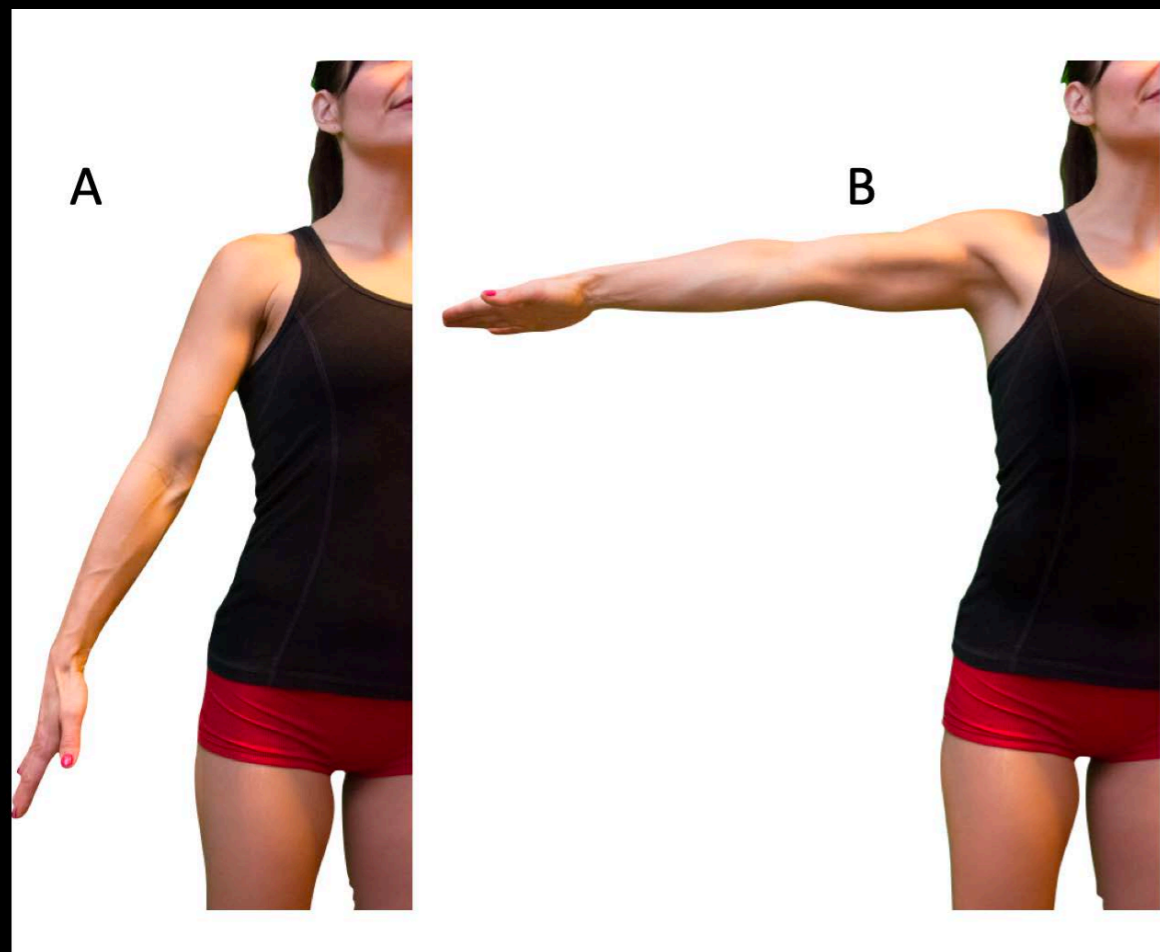


Axillary nerve

Deltoid

Glenohumeral abduction

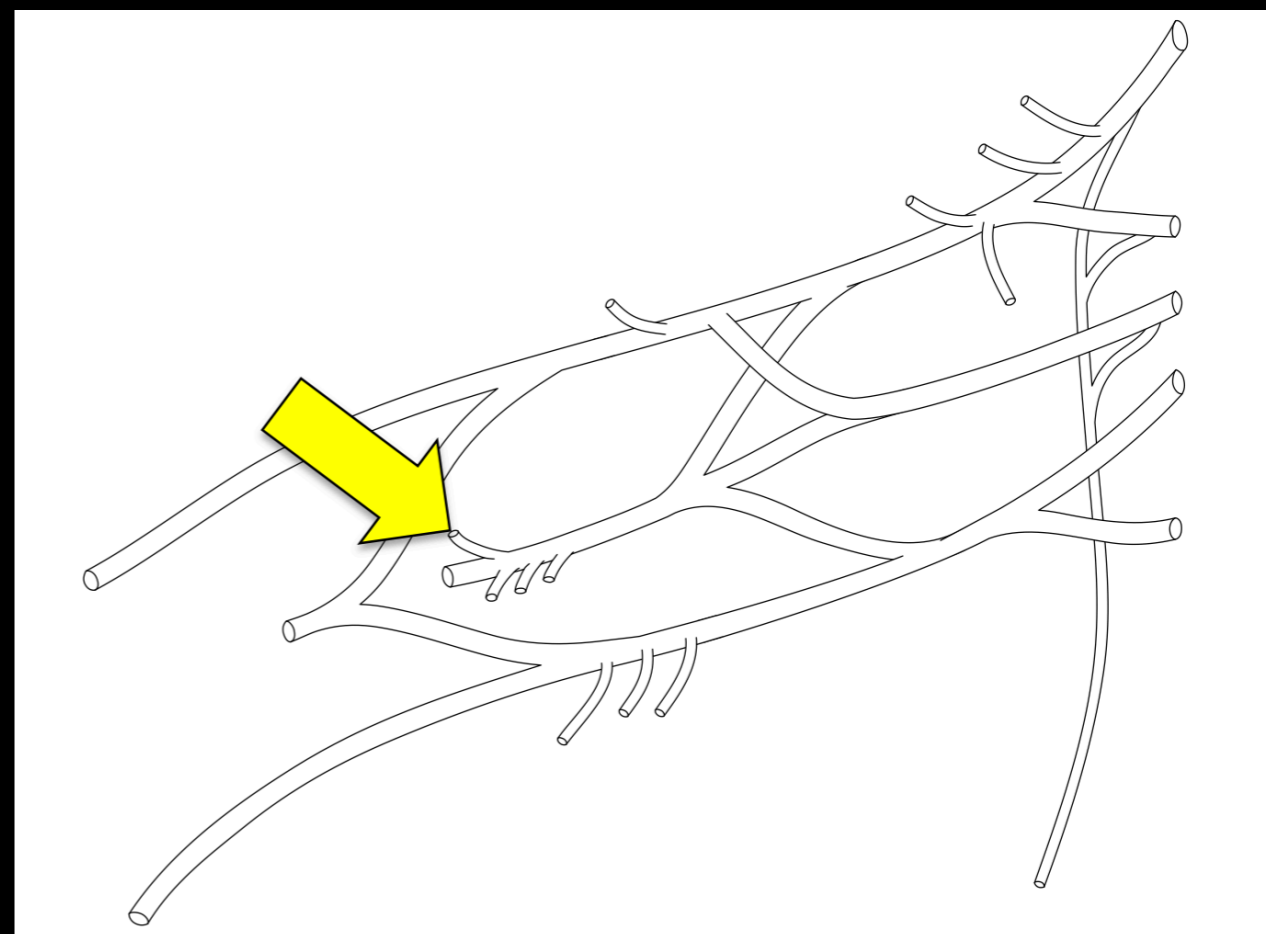
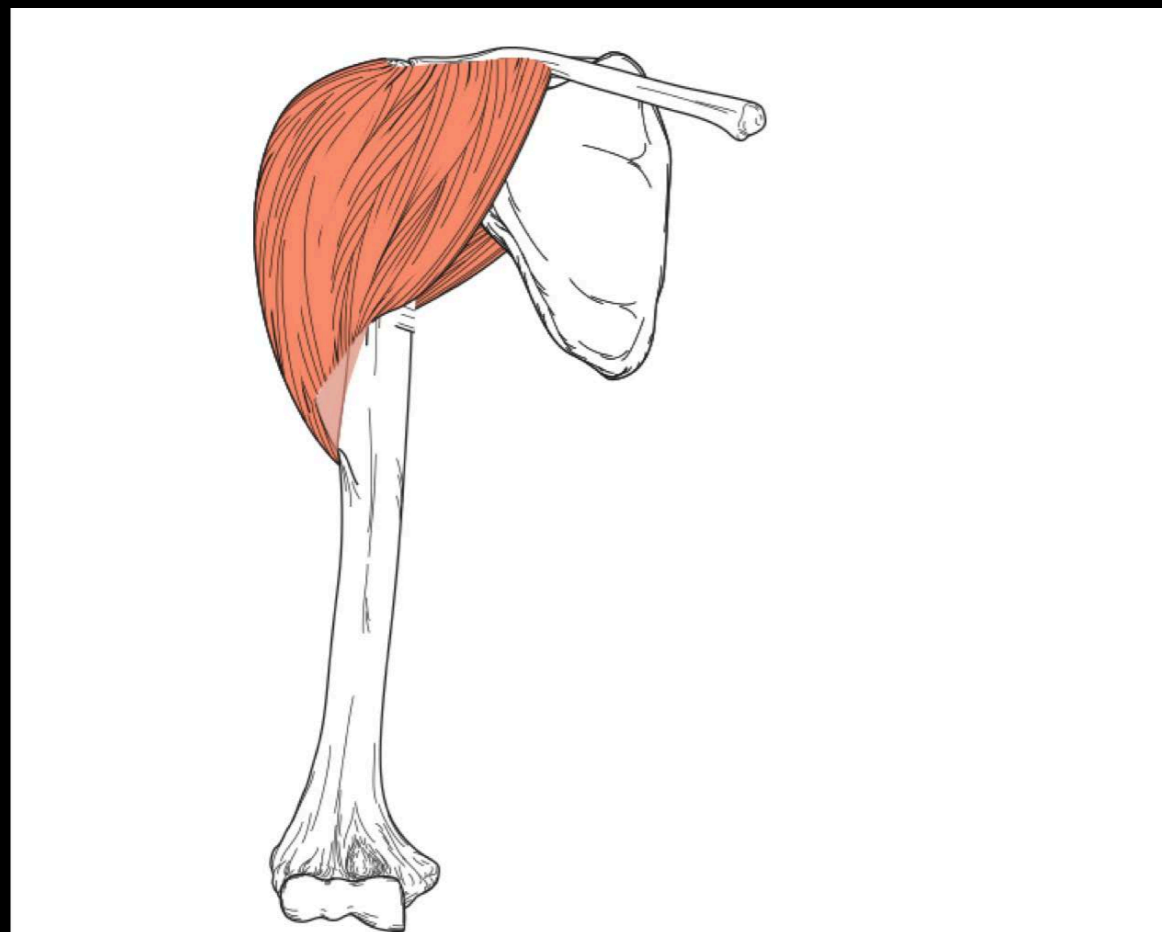


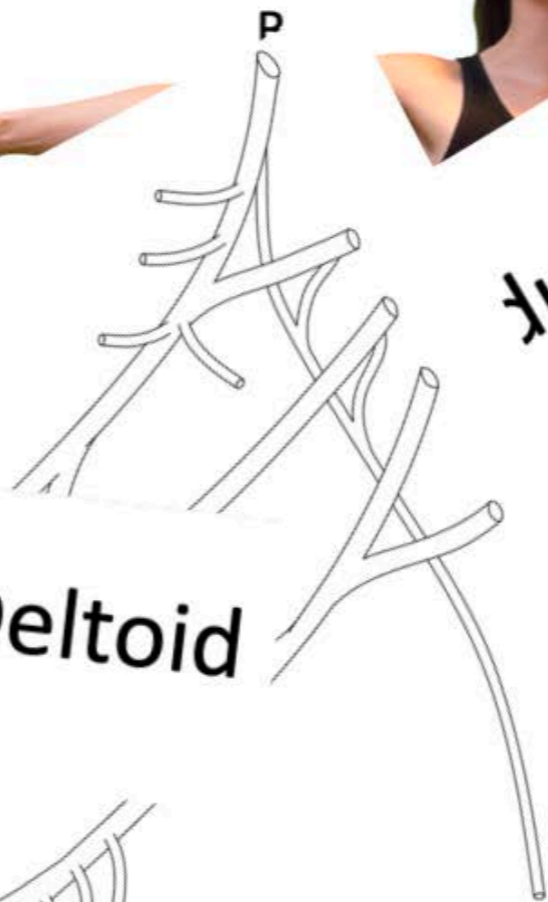


Axillary nerve

Deltoid

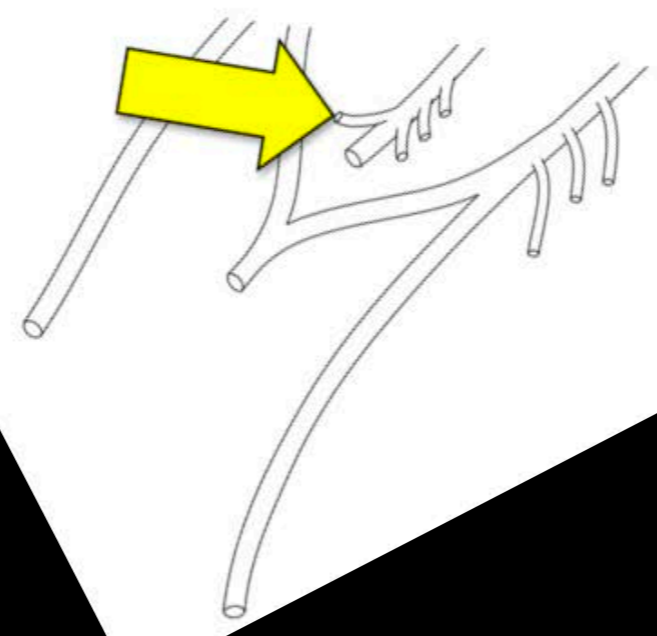
Glenohumeral abduction

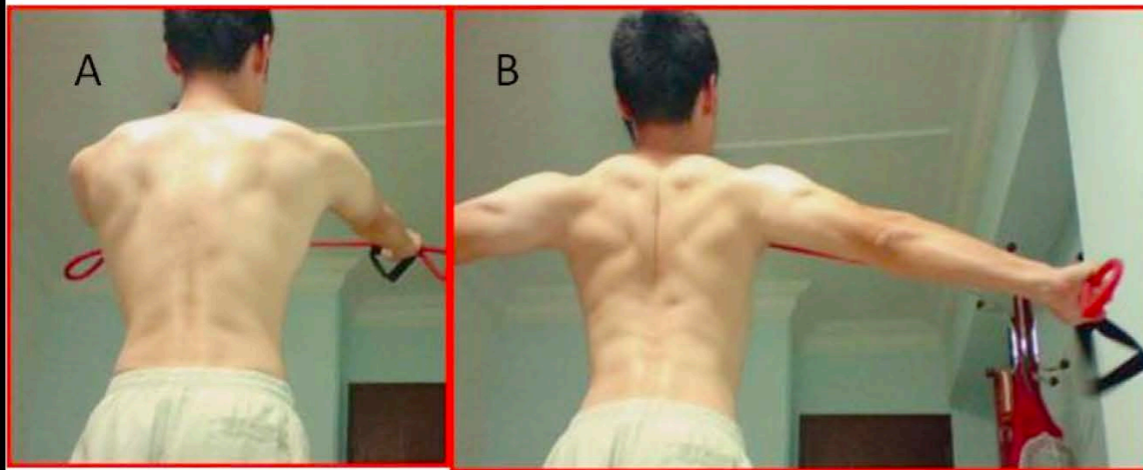




uction

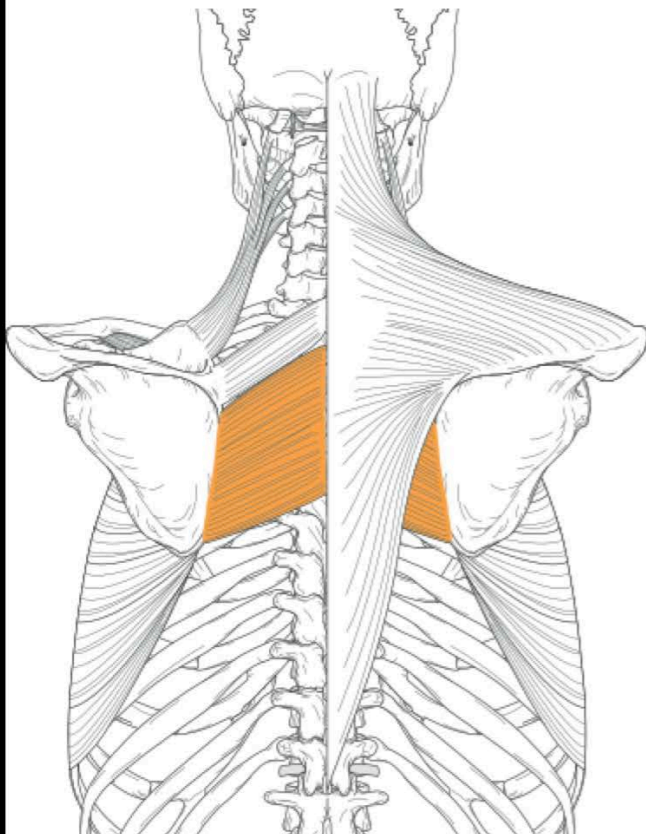
Deltoid



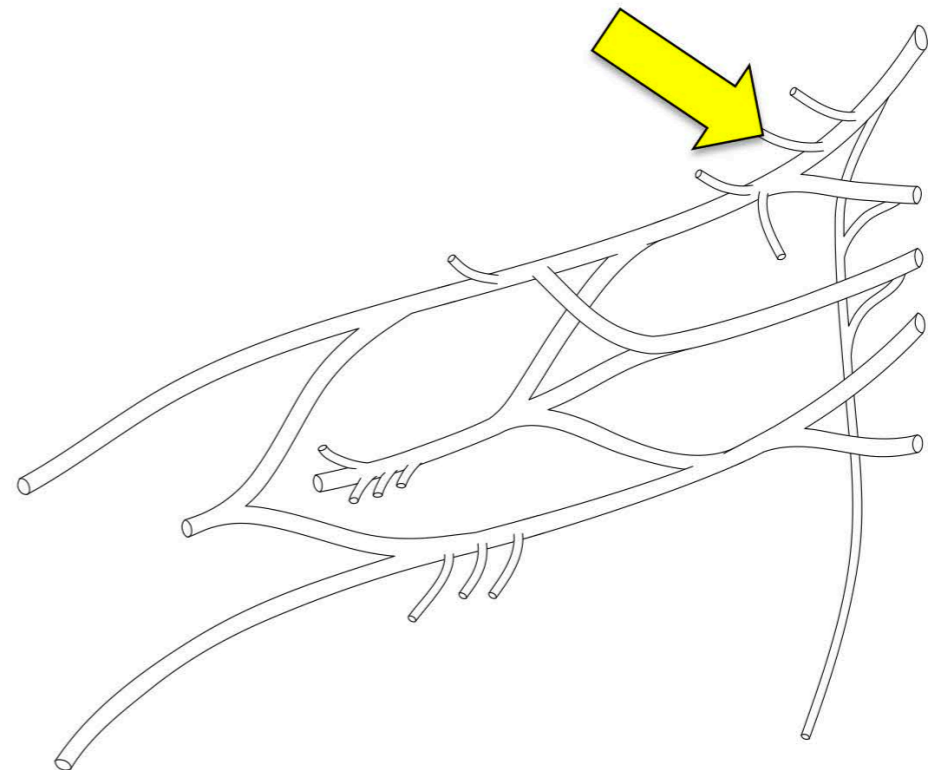


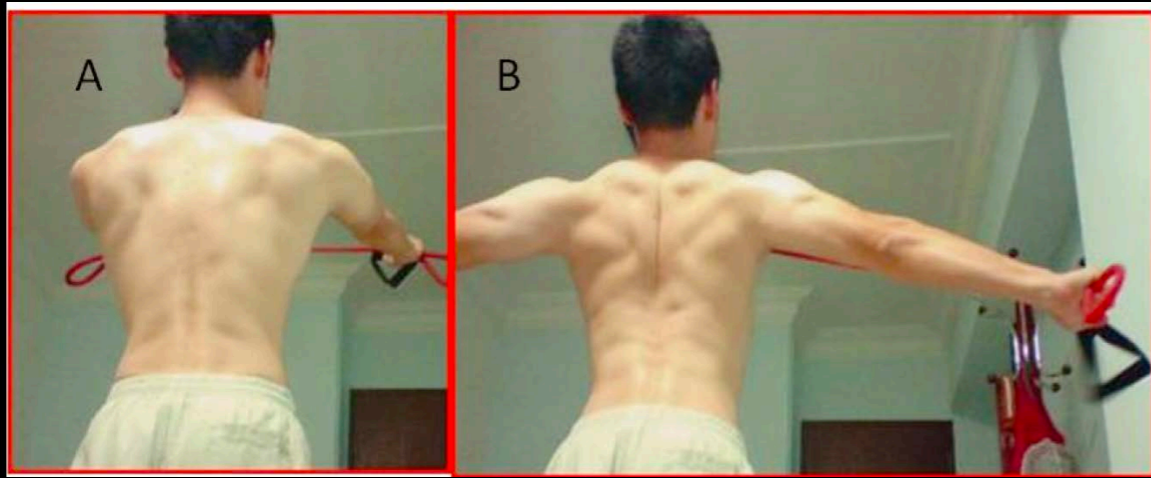
Scapula retraction

Rhomboid major and minor



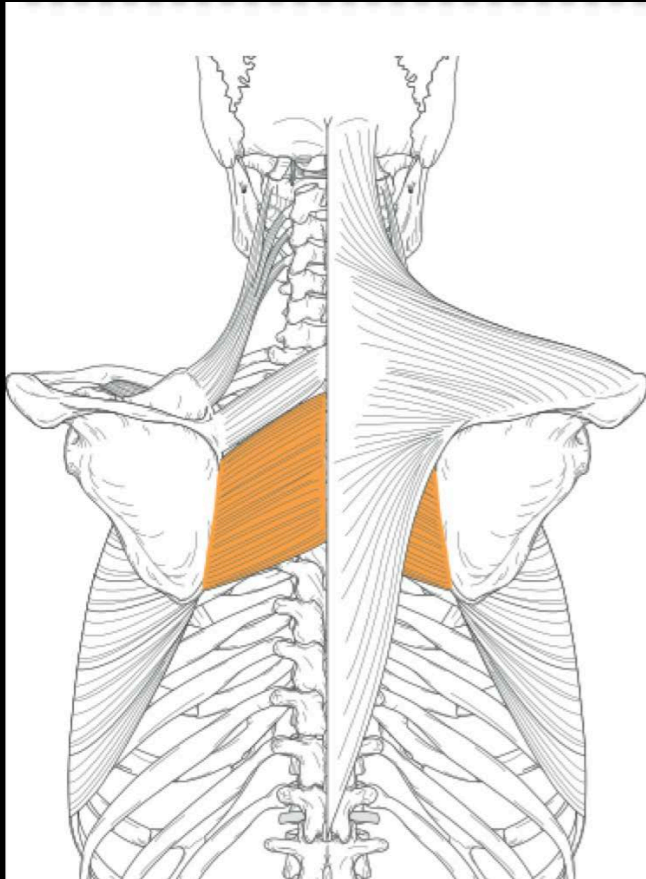
Dorsal scapular nerve



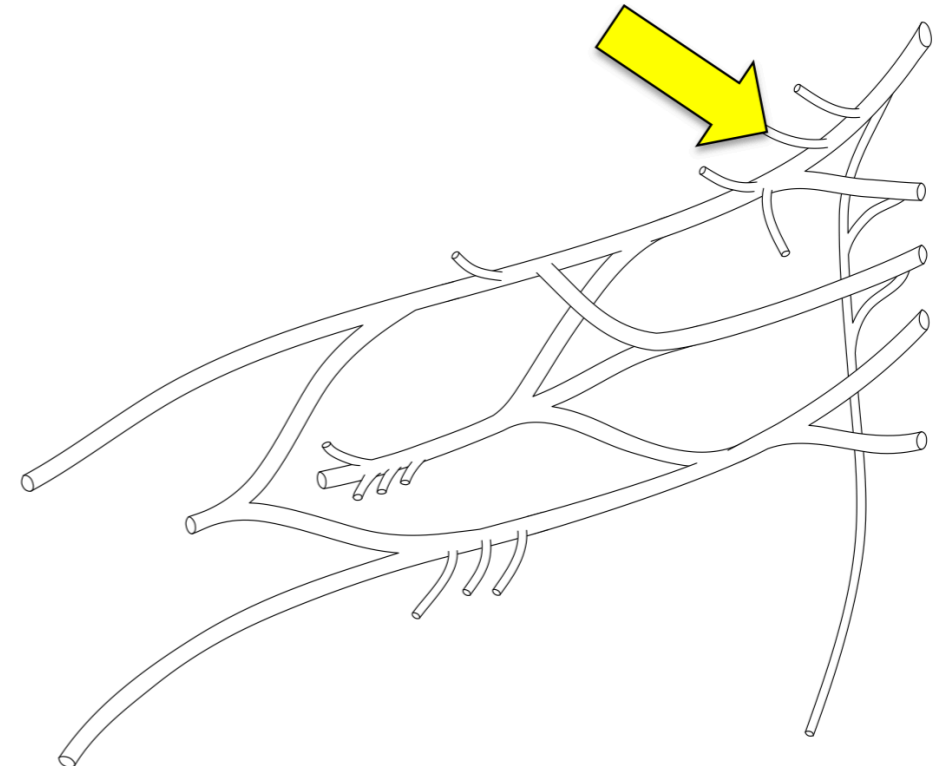


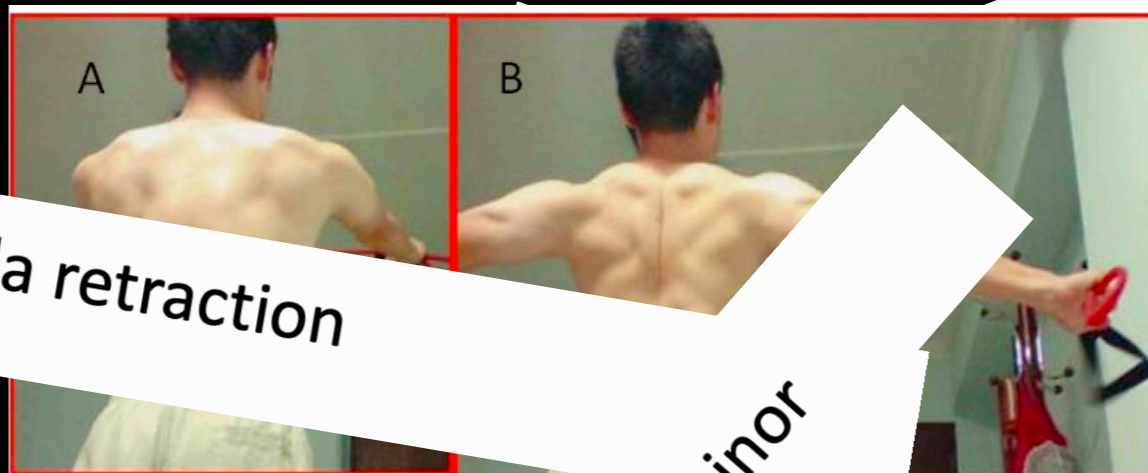
Scapula retraction

Rhomboid major and minor



Dorsal scapular nerve

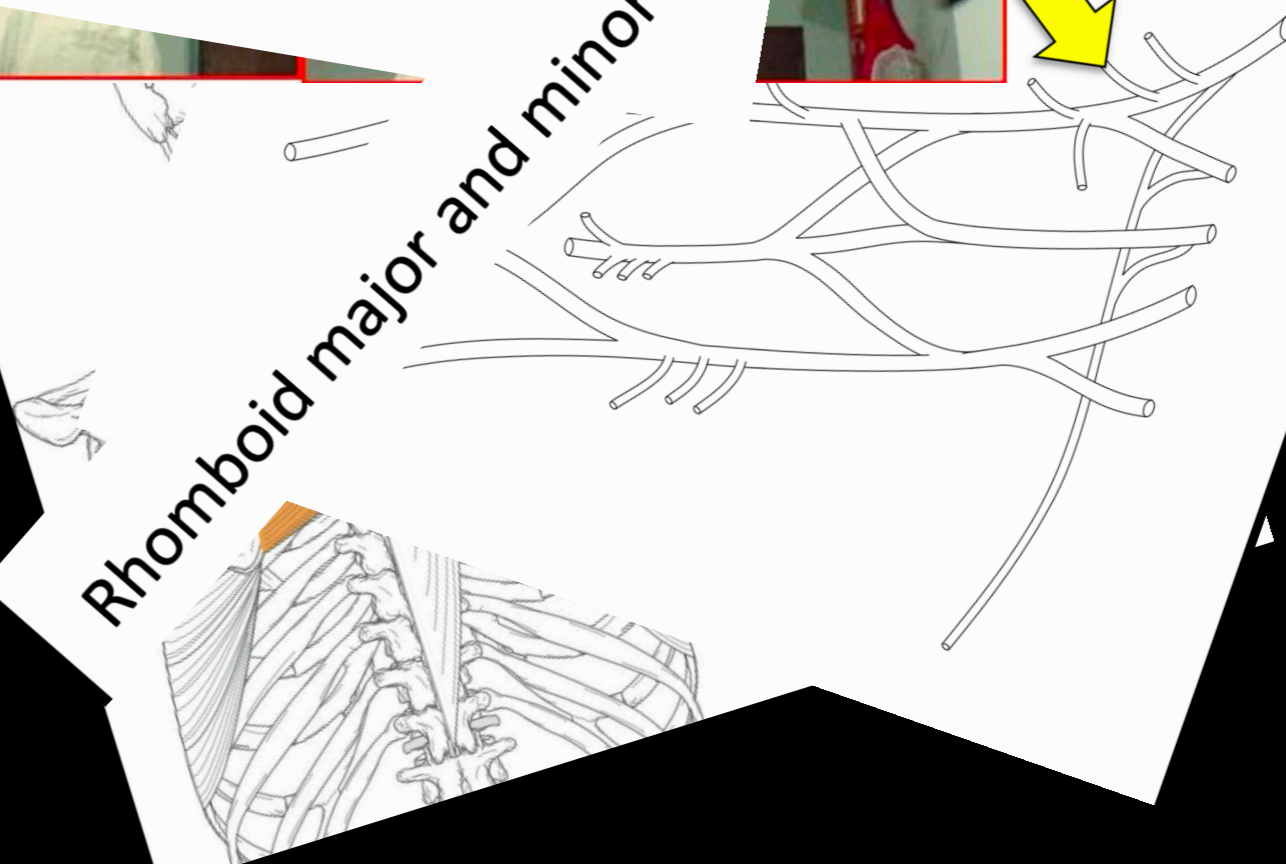


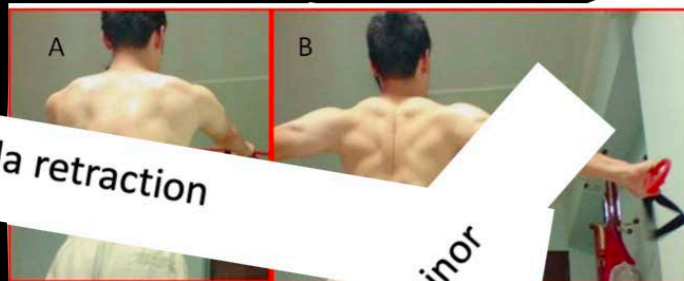


Scapula retraction

Rhomboid major and minor

ular nerve

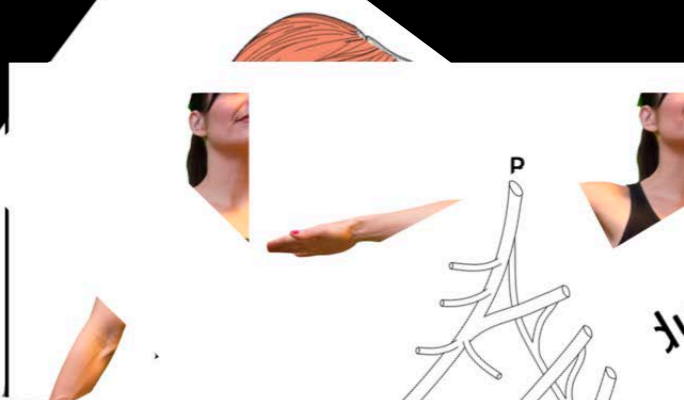
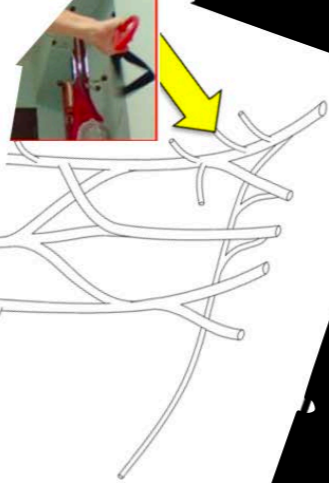




Scapula retraction

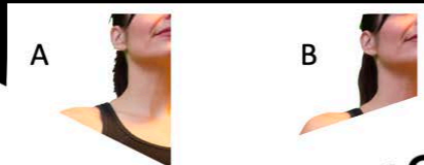
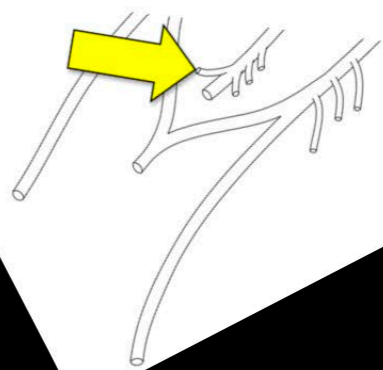
ular nerve

Rhomboid major and minor



uction

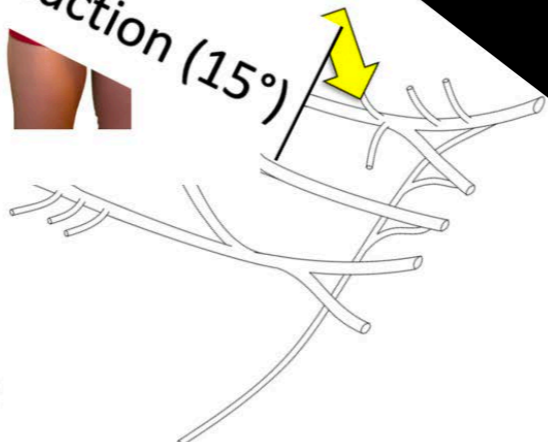
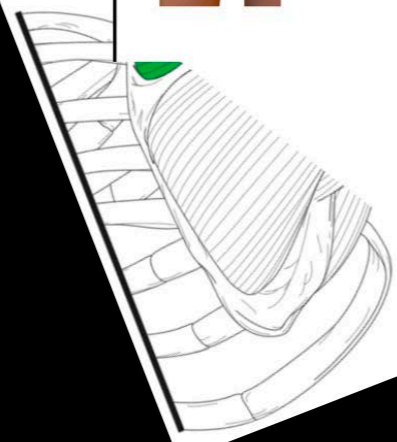
Deltoid

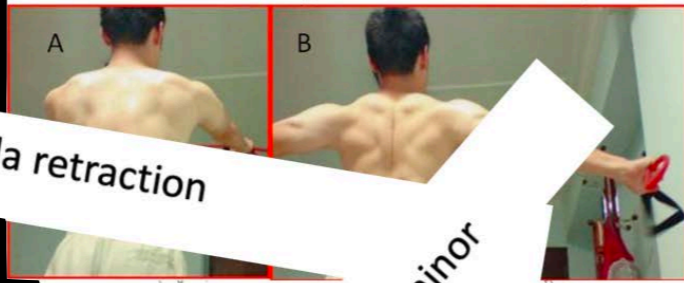


Glenohumeral abduction (15°)

brascapular nerve

braspinatus





Scapula retraction

axillary nerve

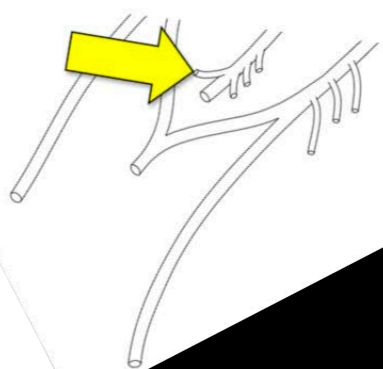
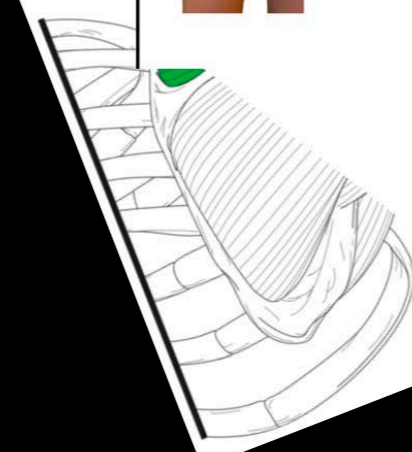
Rhomboid major and minor

Glenohumeral

adduction

Deltoid

abduction



P



Scapula retraction

ular nerve

Rhomboid major and minor

Gly

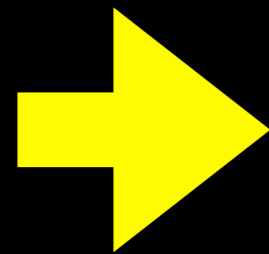


odu



Deltoid

luction



Student, Resident, Fellow ...





Glenohumeral joint
 Glenohumeral joint
 Triceps
 Infraspinatus
 nerve
 Biceps brachii
 Supraspinatus
 ilar nerve
 flexion
 humeral ext
 Glenohumeral internal rotation
 Supi
 humeral ex
 Axilla
 cutaneous nerve
 Upper and lower
 Subscapularis muscle
 pular nerve



Glenohumeral abduction

Biceps brachii

Radial nerve

Infraspinatus

Glenohumeral abduction (15°)

Elbow extension

Elbow flexion

Triceps brachii

Teres minor

Brachialis

Supination

Suprascapular nerve

Supraspinatus

Glenohumeral internal rotation

Glenohumeral external rotation

Deltoid

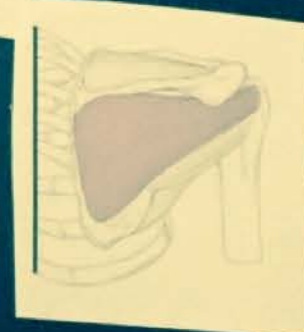
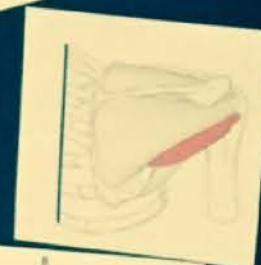
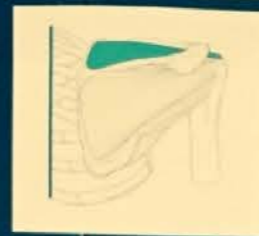
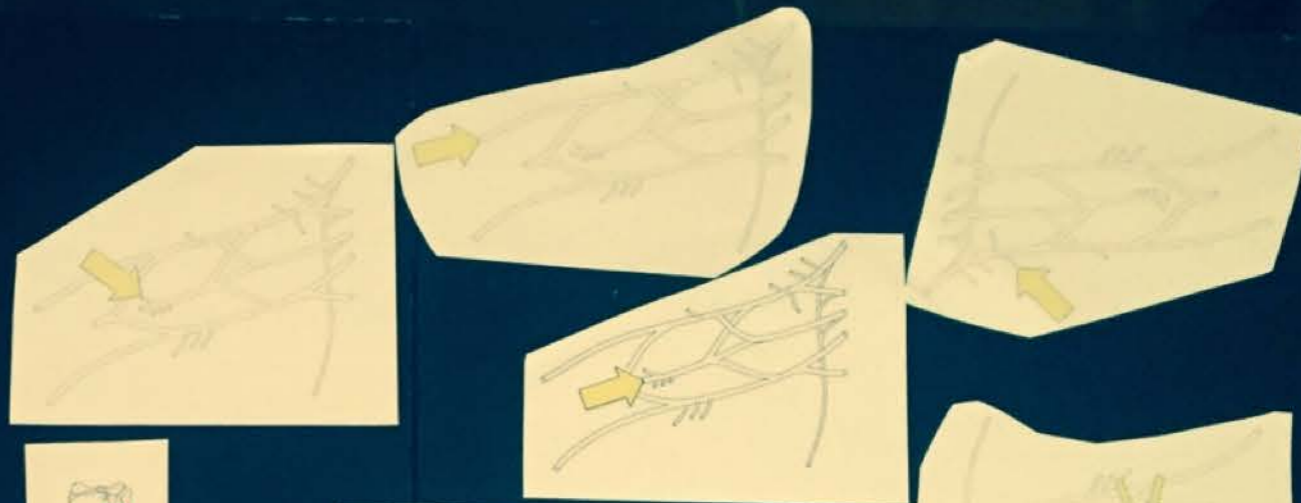
Axillary nerve

Glenohumeral external rotation

Musculocutaneous nerve

Upper and lower subscapular nerve

Subscapularis muscle



Biceps brachii

Infraspinatus

Brachialis

Triceps brachii

Teres minor

Supraspinatus

Deltoid

Glenohumeral abduction

Elbow extension

Elbow flexion

Glenohumeral abduction (15°)

Supination

Glenohumeral internal rotation

Glenohumeral external rotation

Glenohumeral external rotation

Subscapularis muscle

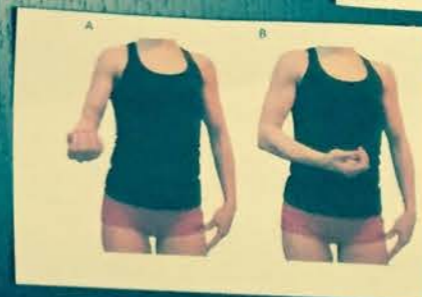
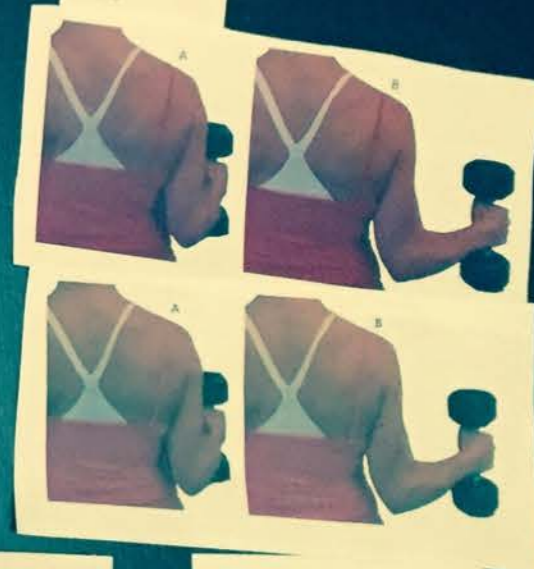
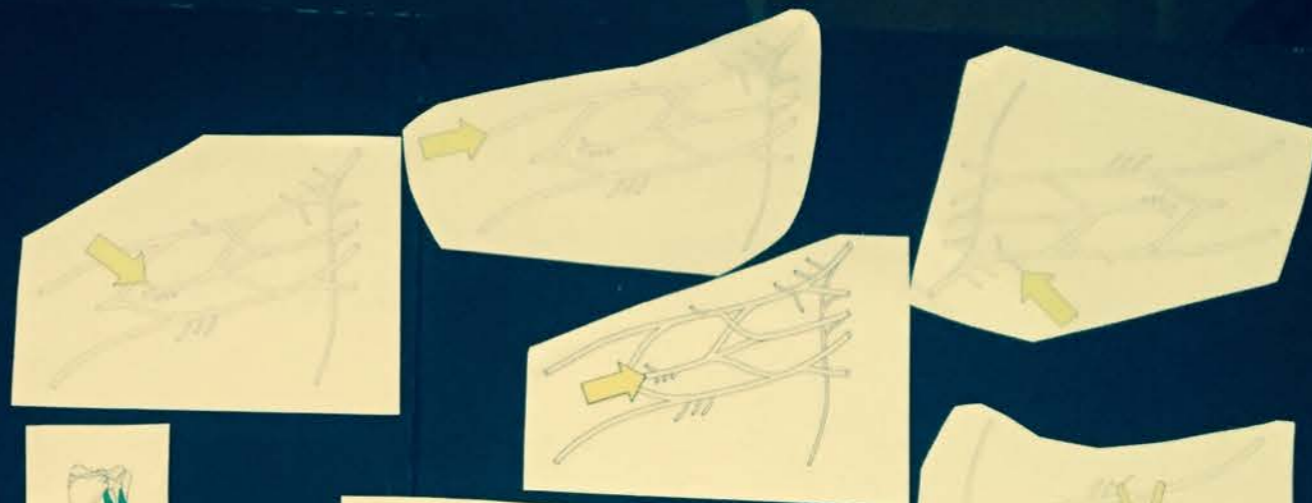
Suprascapular nerve

Radial nerve

Axillary nerve

Musculocutaneous nerve

Upper and lower subscapular nerve



Muscles

Biceps brachii
Infraspinatus
Brachialis
Triceps brachii
Teres minor
Supraspinatus
Deltoid

Glenohumeral abduction
Elbow extension
Elbow flexion
Glenohumeral abduction (15°)
Supination
Glenohumeral internal rotation
Glenohumeral external rotation
Glenohumeral external rotation
Subscapularis muscle

Actions

Suprascapular nerve

Radial nerve

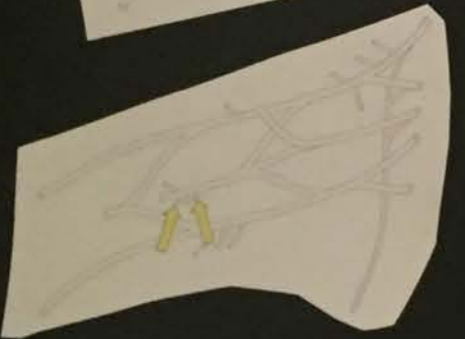
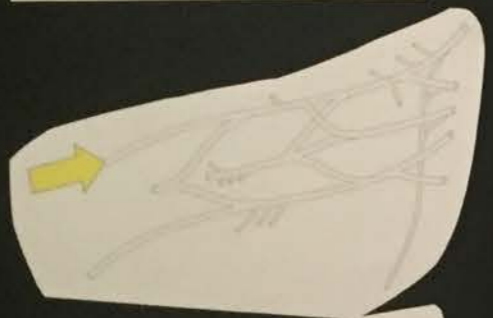
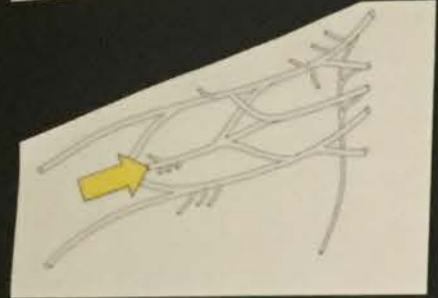
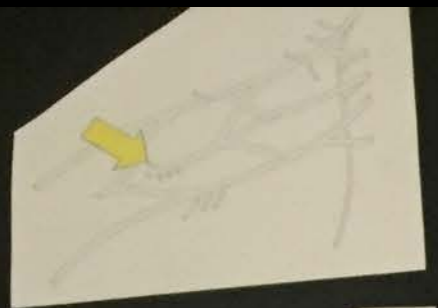
Axillary nerve

Musculocutaneous nerve

Upper and lower subscapular nerve

Nerves





Biceps brachii

Brachialis

Infraspinatus

Subscapularis muscle

Deltoid

Triceps brachii

Elbow flexion

Supination

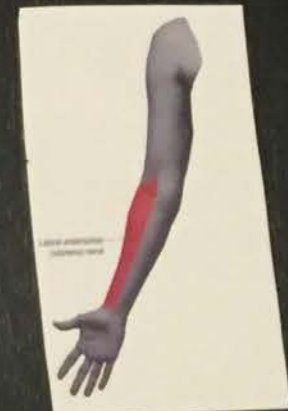
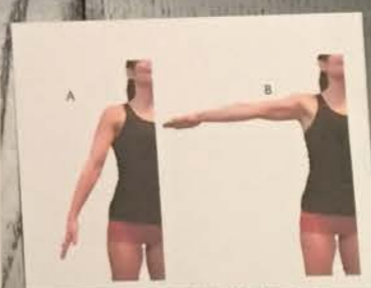
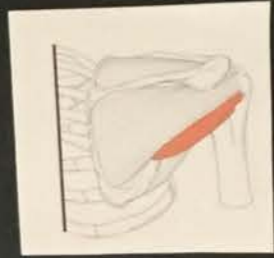
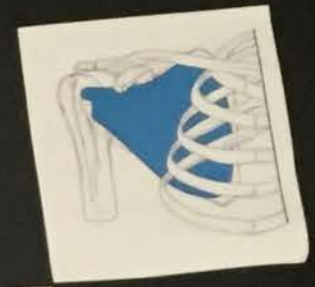
Elbow extension

Glenohumeral abduction

Glenohumeral abduction (15°)

Glenohumeral external rotation

Glenohumeral internal rotation



Suprascapular nerve

Radial nerve

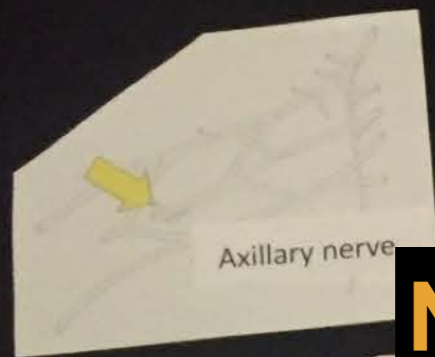
Upper and lower subscapular nerve

Musculocutaneous nerve

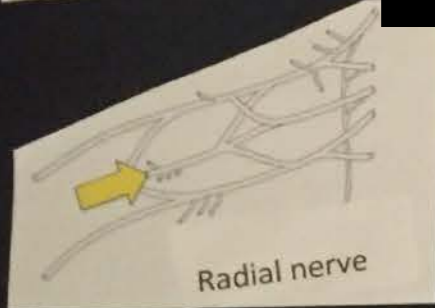
Axillary nerve



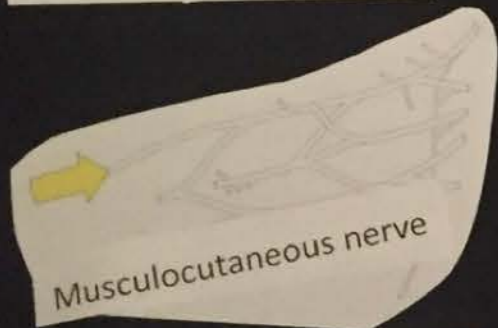
Nerves



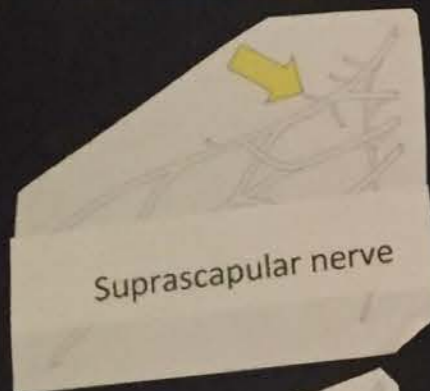
Axillary nerve



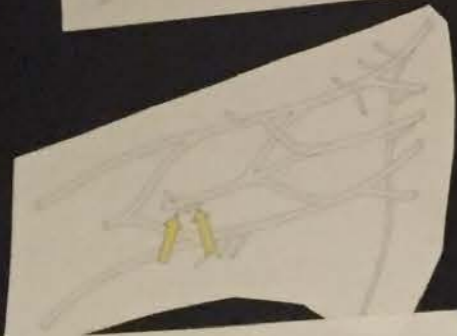
Radial nerve



Musculocutaneous nerve



Suprascapular nerve



Upper and lower subscapular nerve

Muscles



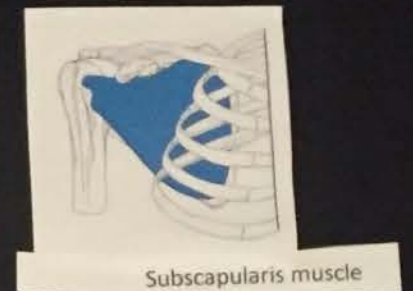
Deltoid



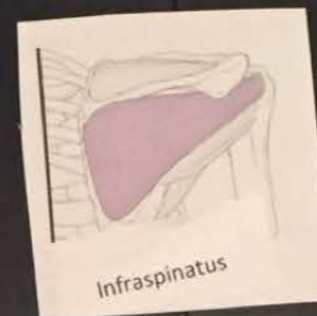
Brachialis



Triceps brachii



Subscapularis muscle



Infraspinatus



Teres minor



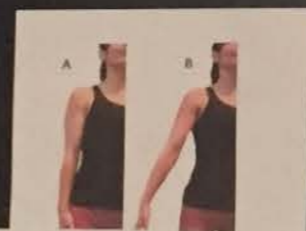
Supraspinatus



Biceps brachii



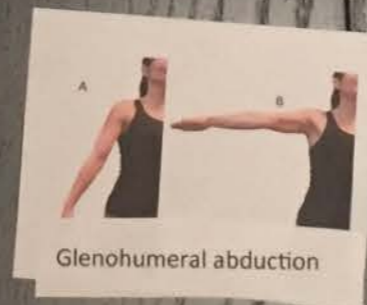
Glenohumeral external rotation



Glenohumeral abduction (15°)



Glenohumeral internal rotation



Glenohumeral abduction



Supination

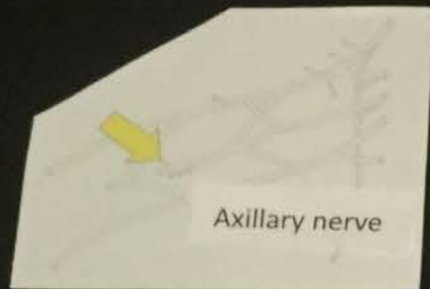


Elbow extension

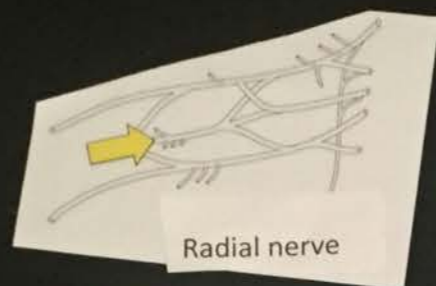


Elbow flexion

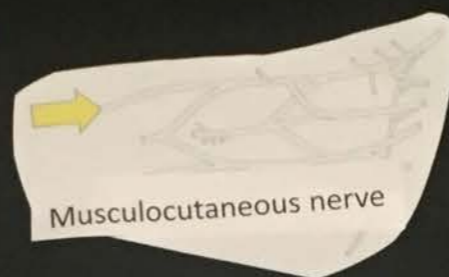
Actions



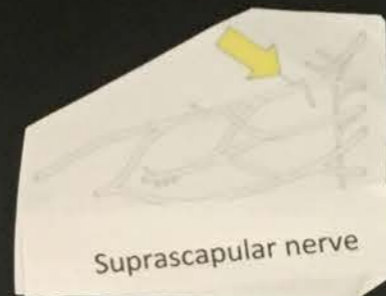
Axillary nerve



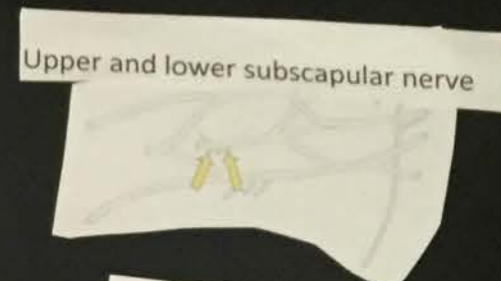
Radial nerve



Musculocutaneous nerve



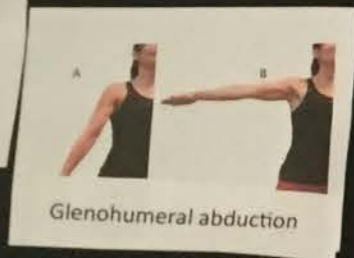
Suprascapular nerve



Upper and lower subscapular nerve



Deltoid



Glenohumeral abduction



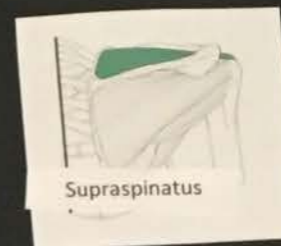
Triceps brachii



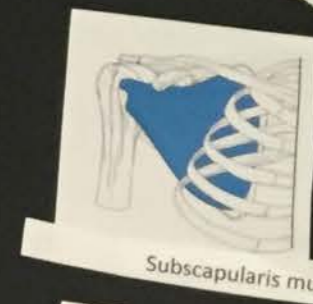
Biceps brachii



Supination



Supraspinatus



Subscapularis muscle



Teres minor



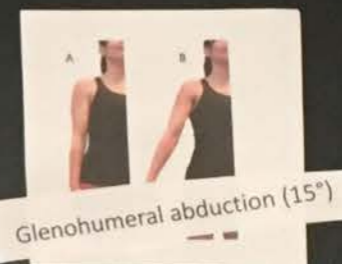
Elbow extension



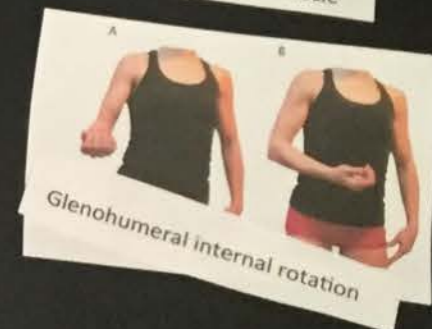
Brachialis



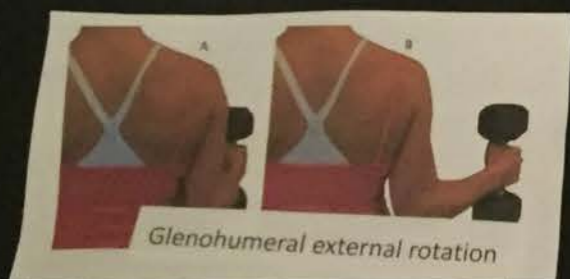
Elbow flexion



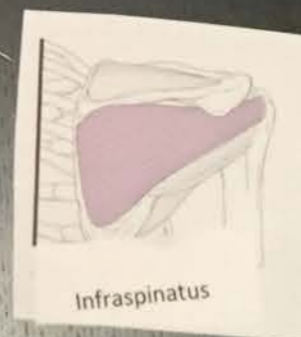
Glenohumeral abduction (15°)



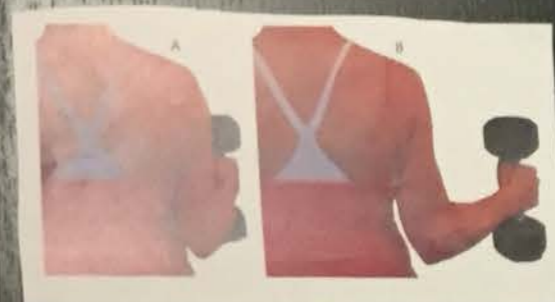
Glenohumeral internal rotation



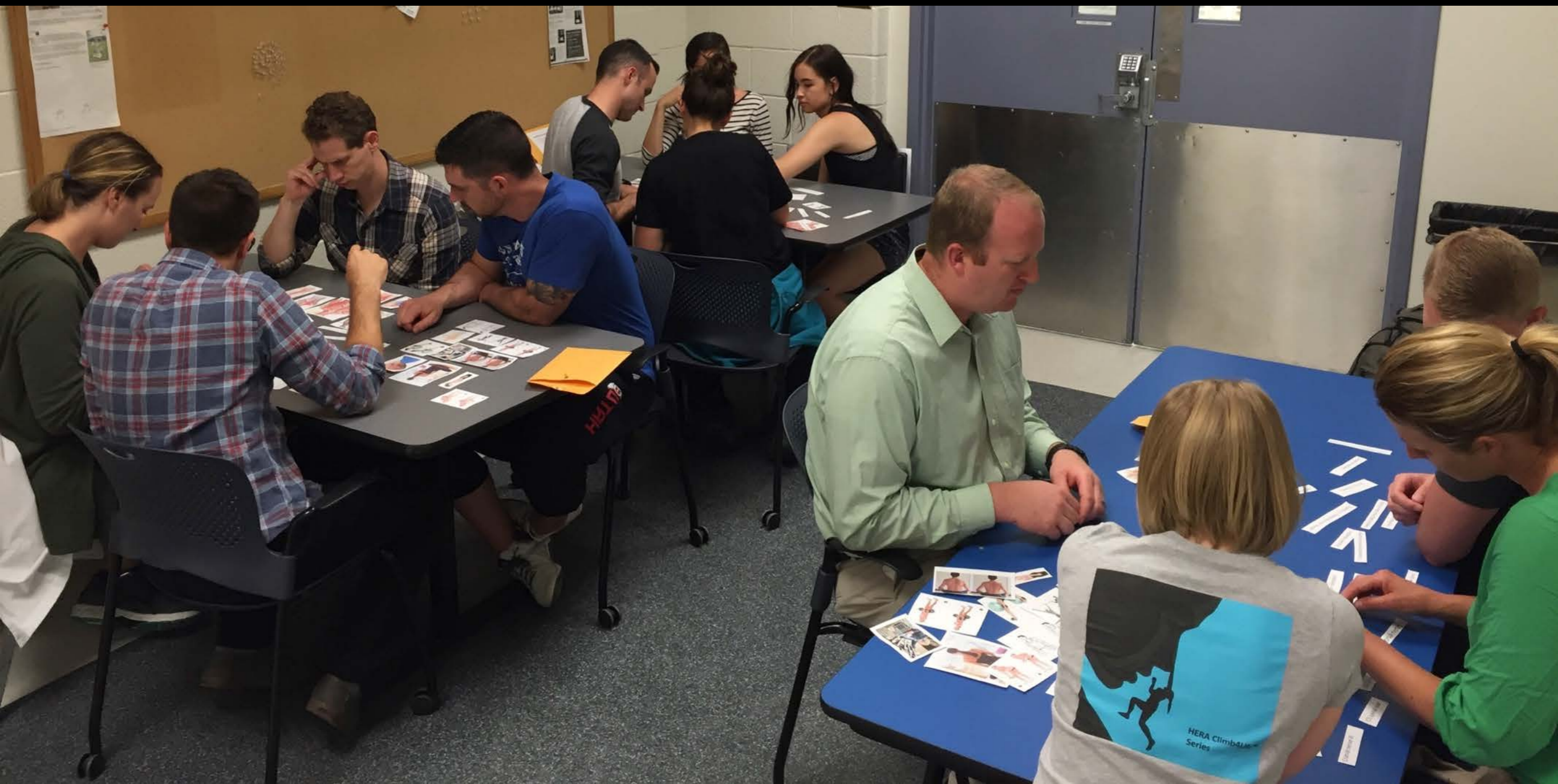
Glenohumeral external rotation

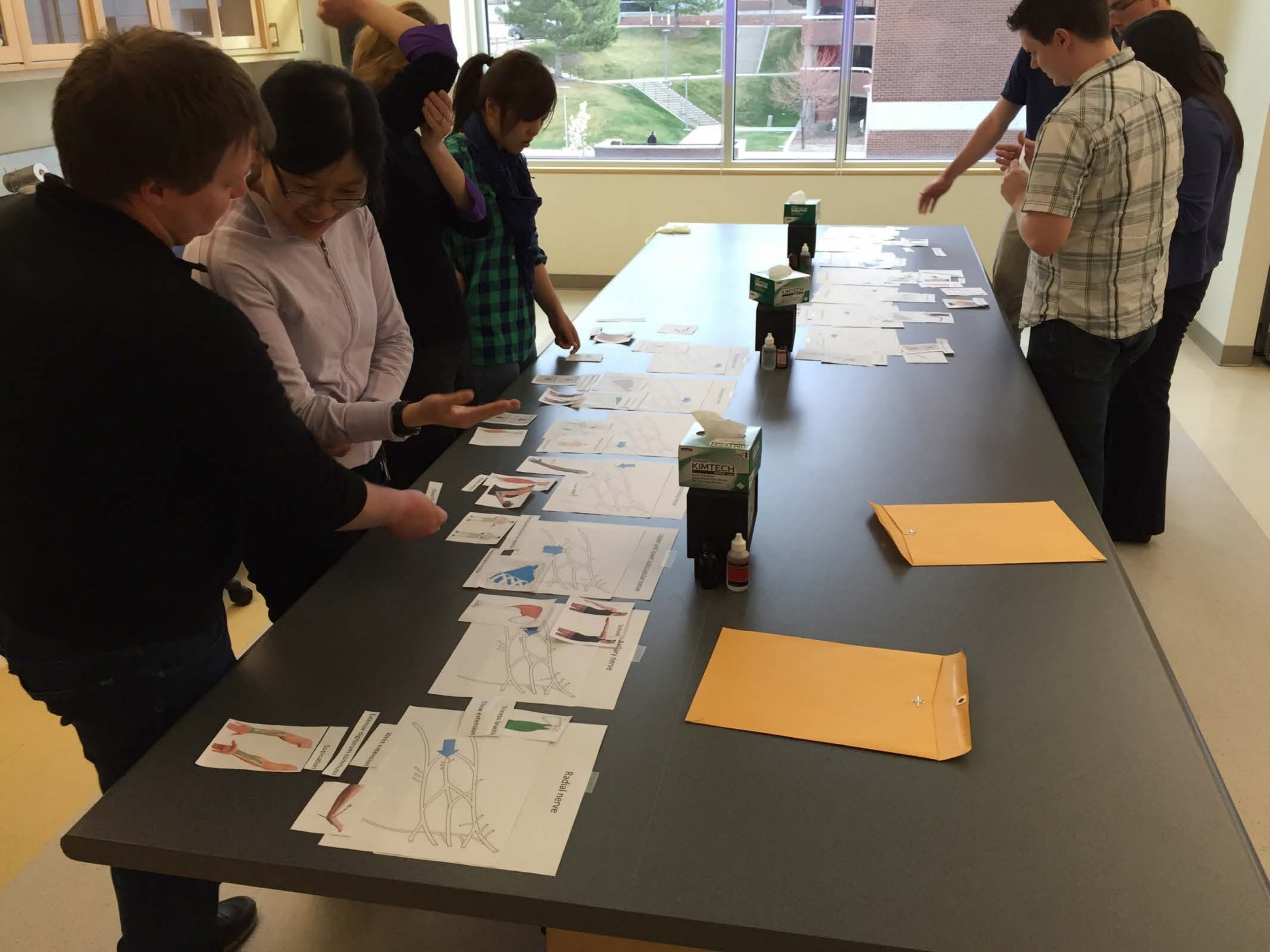


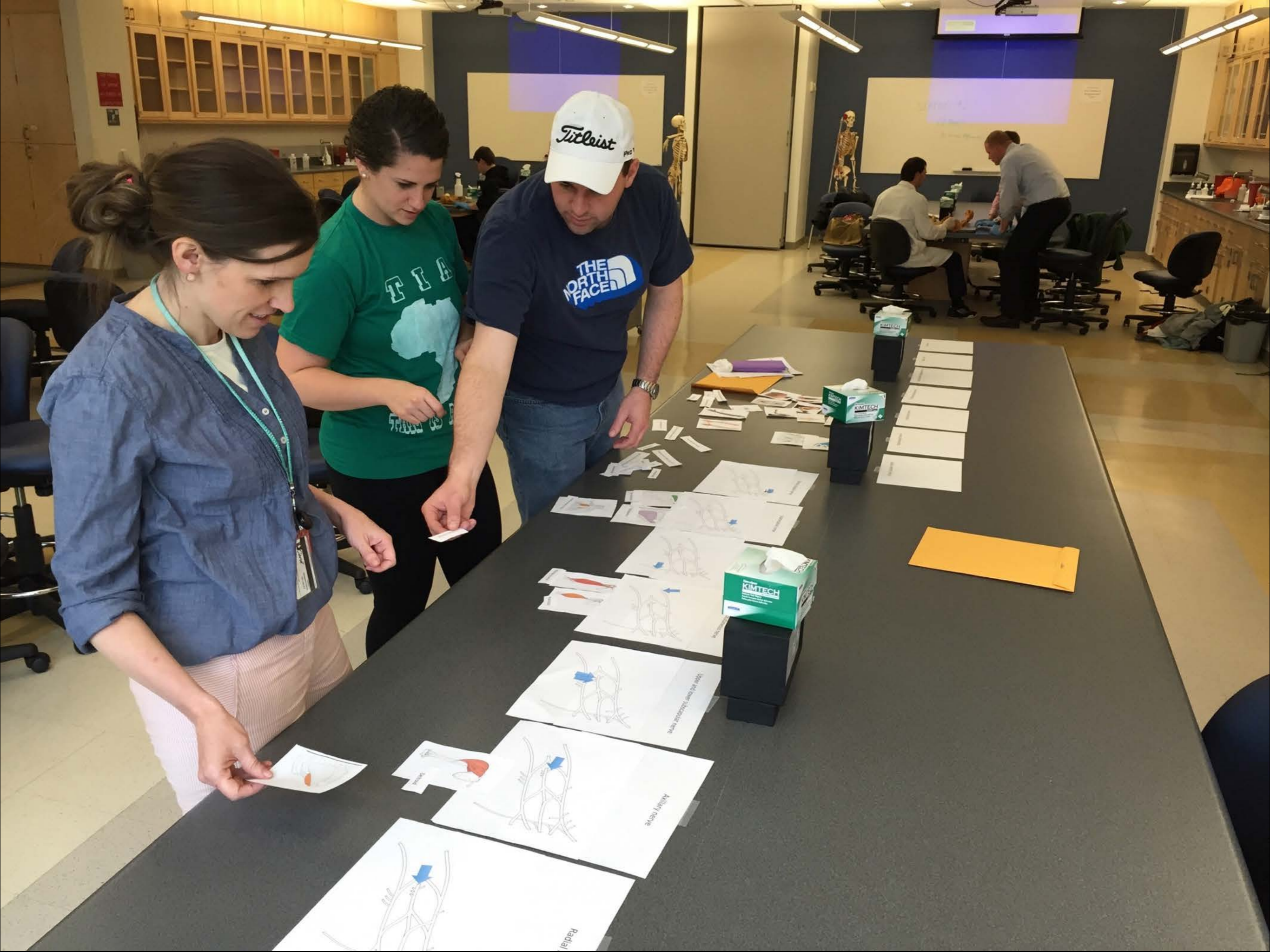
Infraspinatus



Glenohumeral external rotation



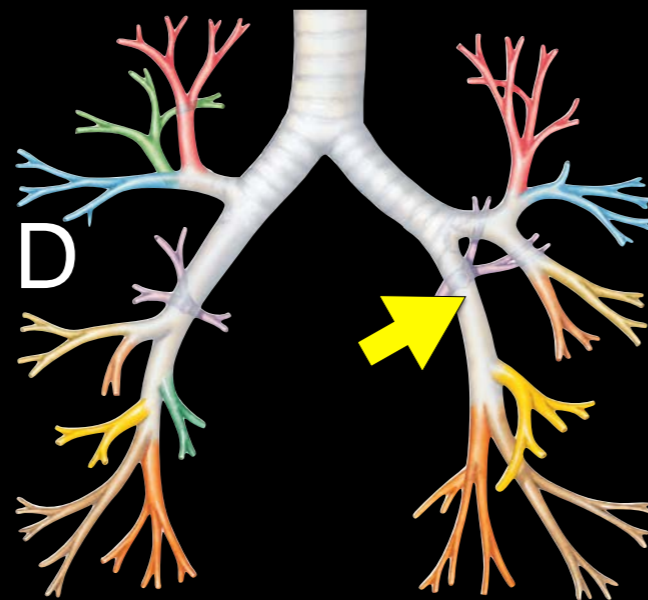
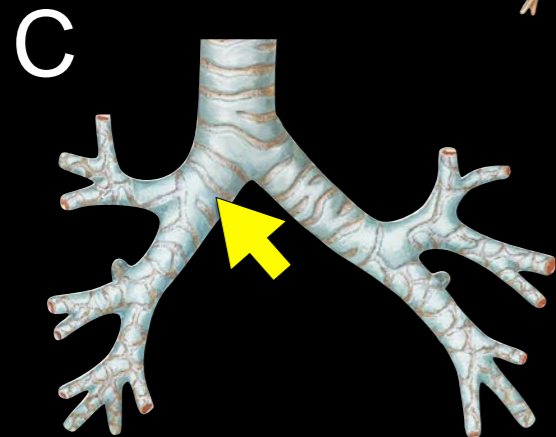
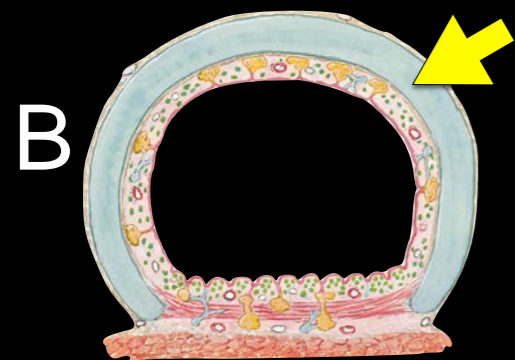
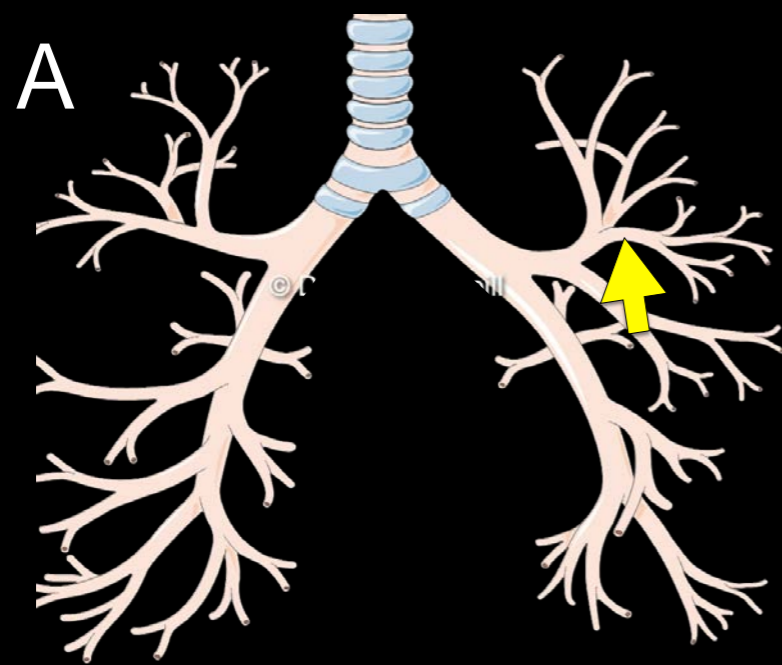






Foundational Activities

There are 4 trios below ... find them

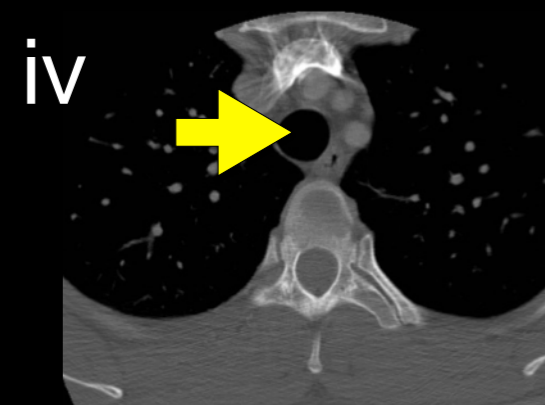
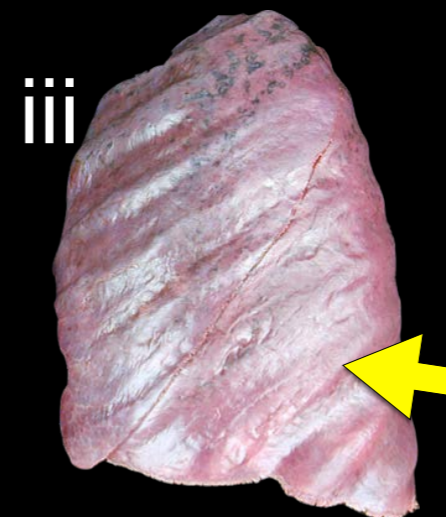
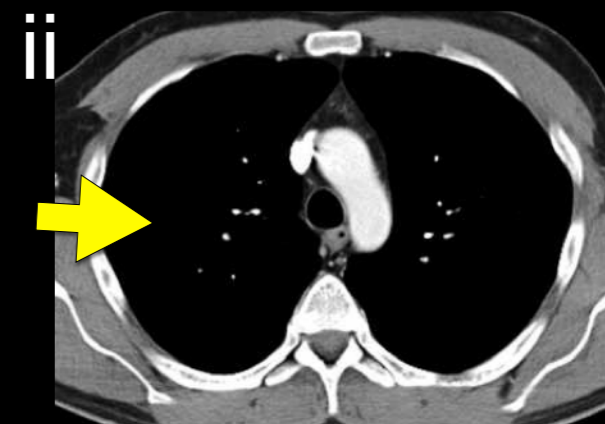
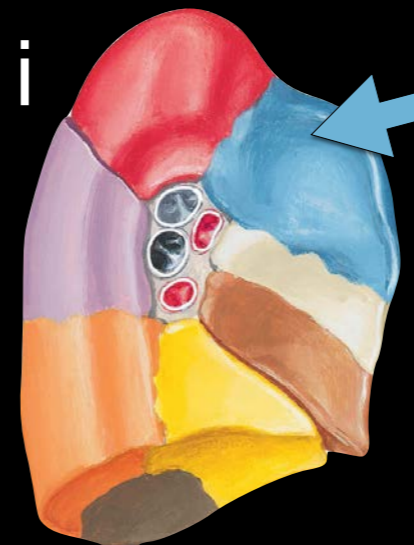


2 on the left
and
3 on the right

Contains "C"
shaped cartilage
rings

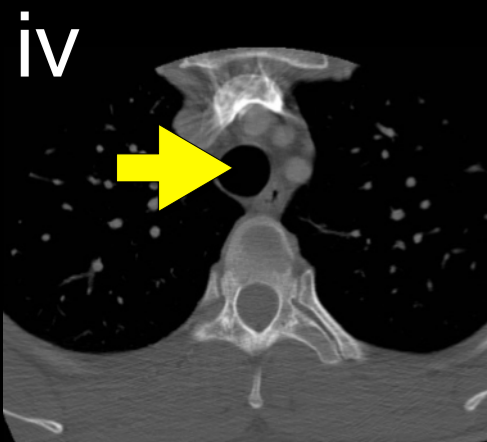
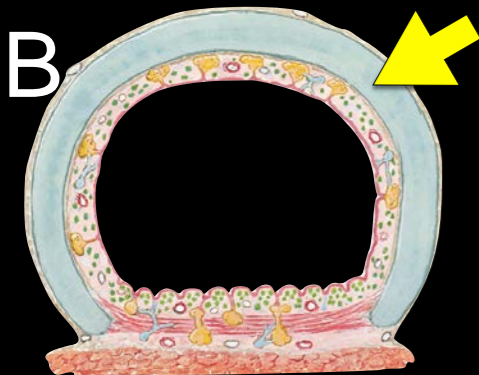
Supplies a
bronchopulmonary
segment

Wider, shorter and
more vertical than
the left



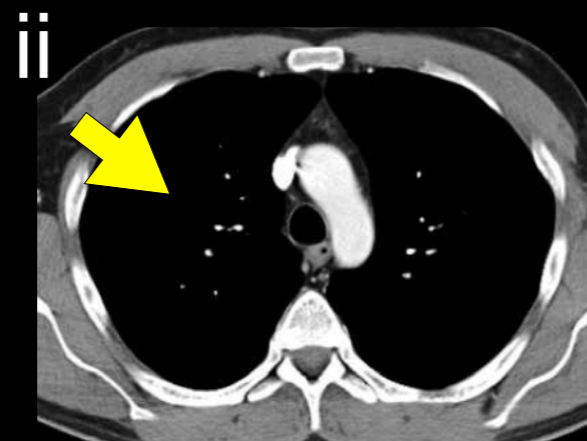
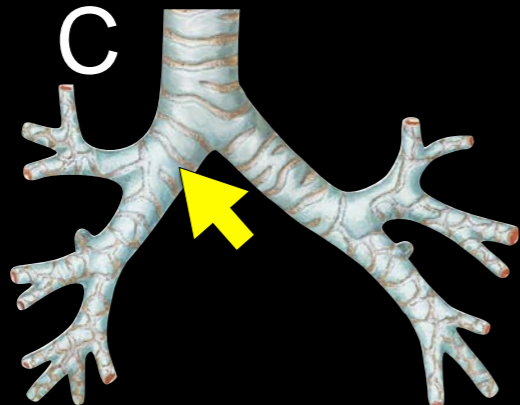
There are 4 trios below ... find them

Trachea



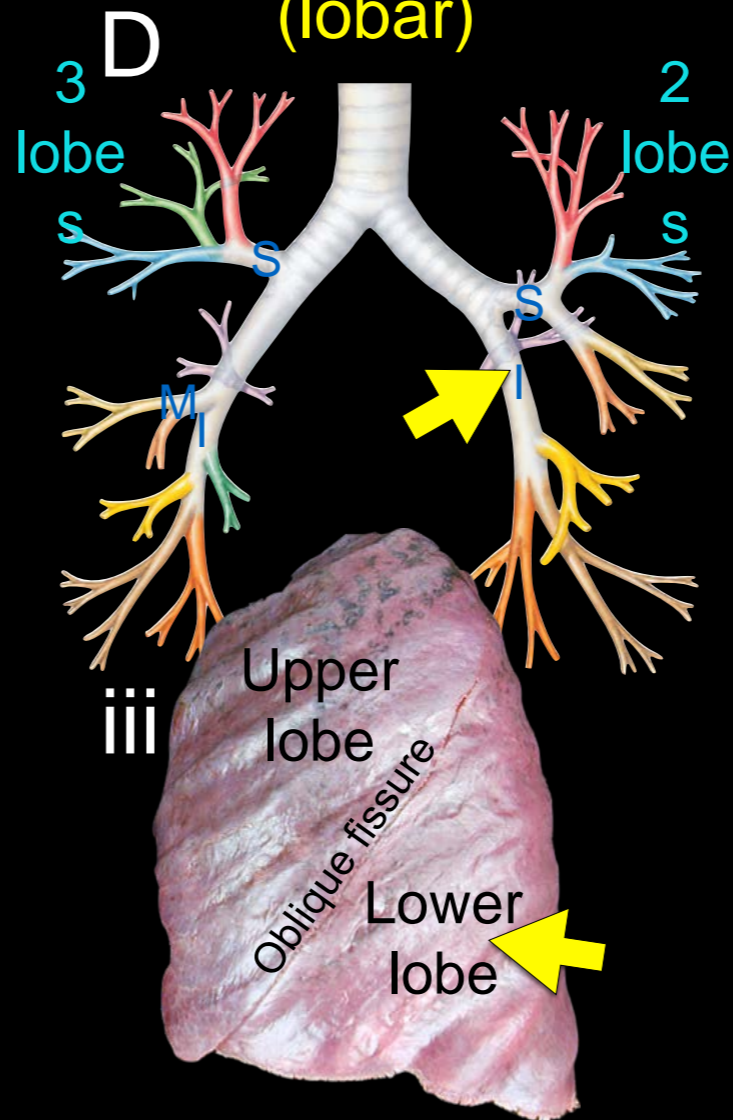
Contains "C"
shaped cartilage
rings

1° bronchus
(main)



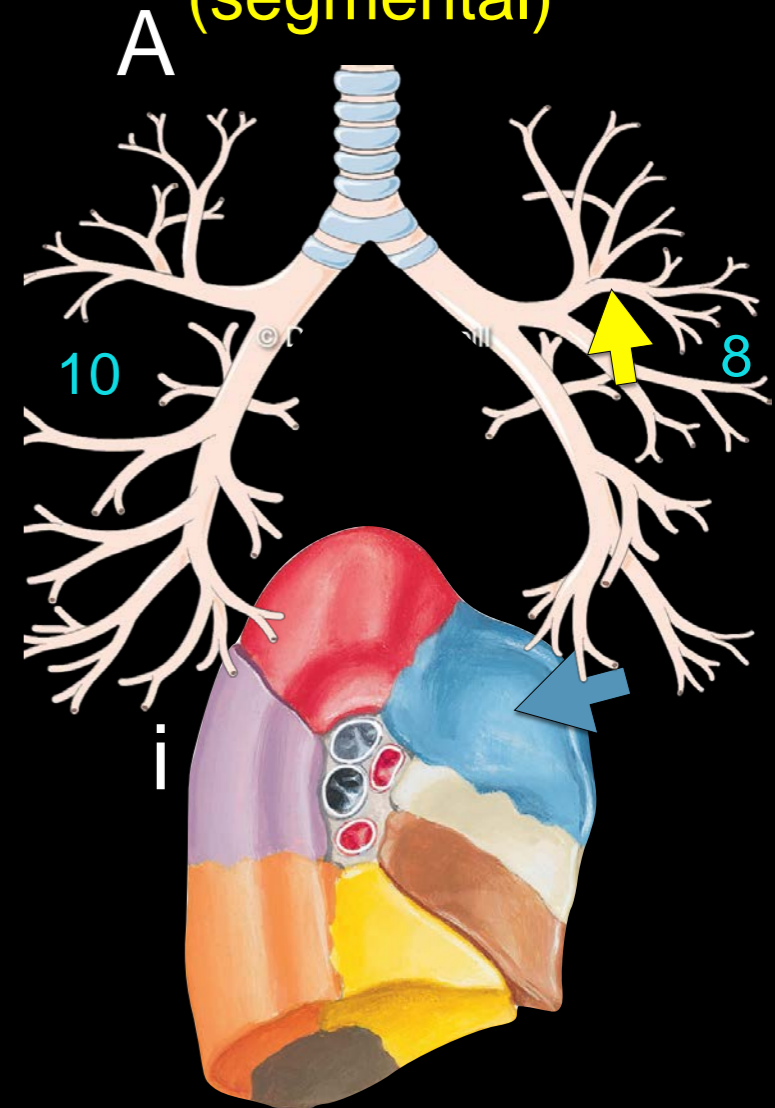
Wider, shorter and
more vertical than
the left

2° bronchus
(lobar)



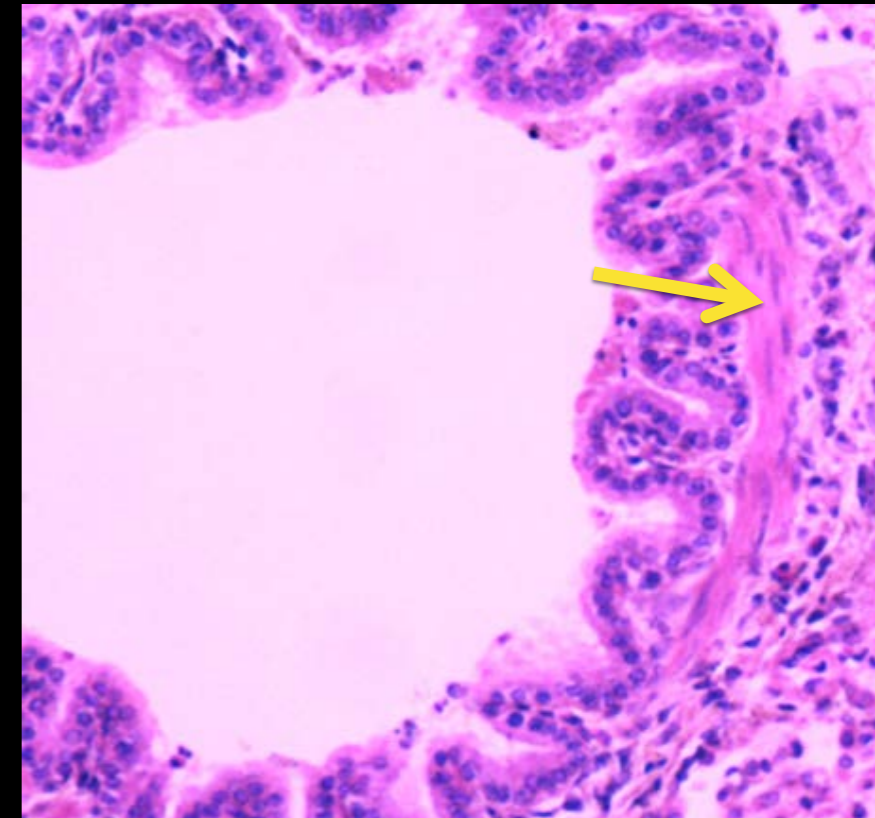
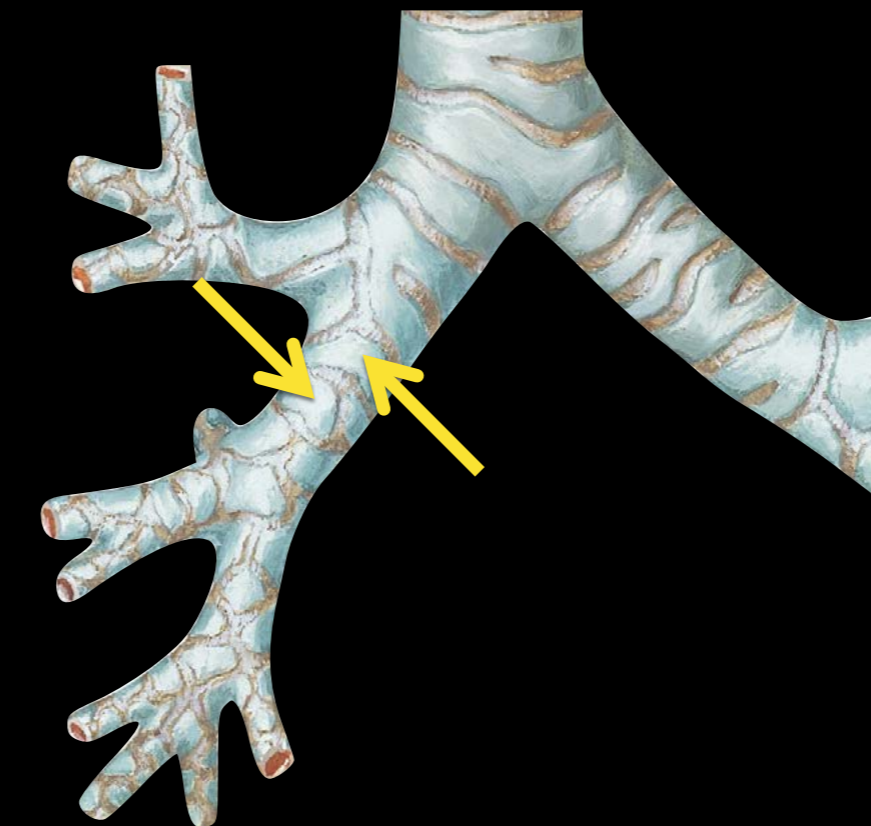
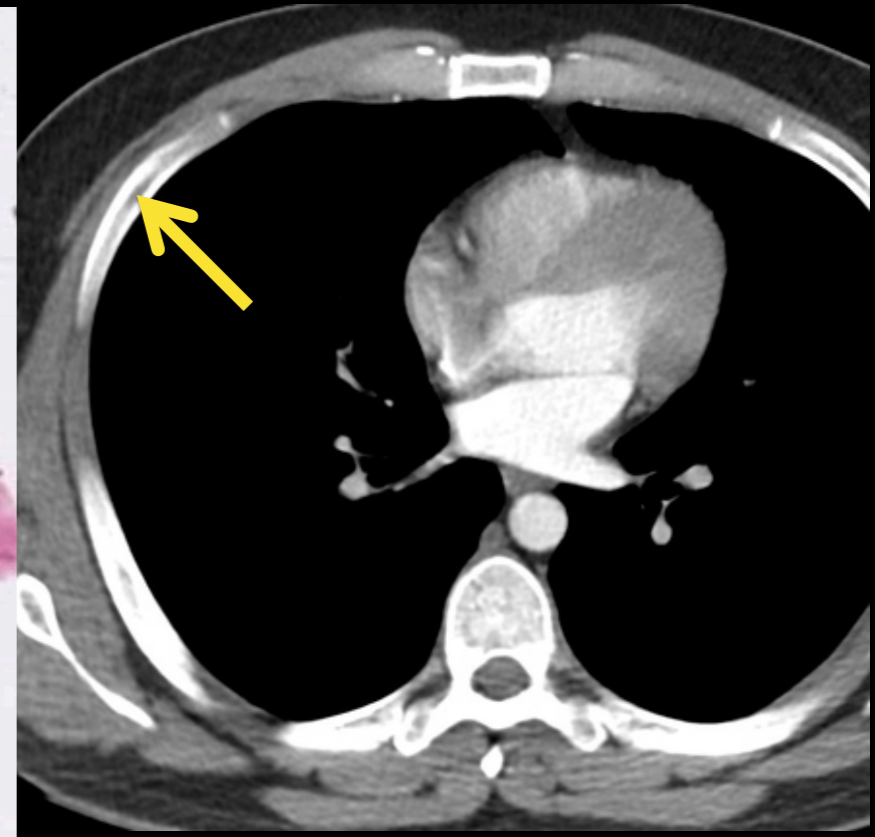
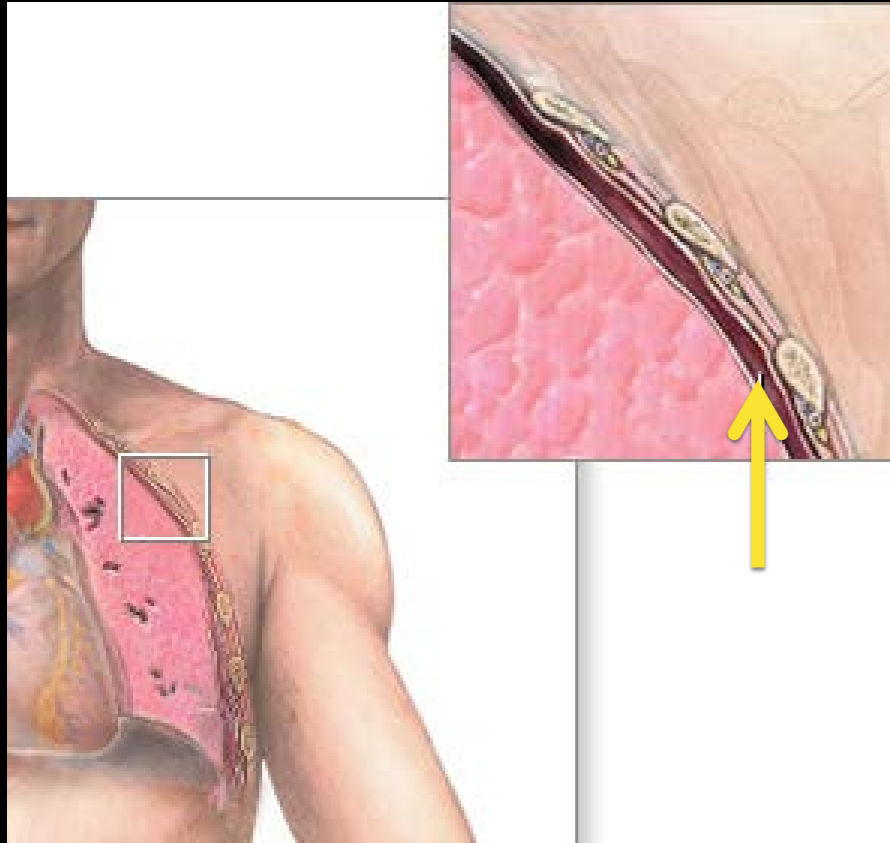
2 on the left and
3 on the right

3° bronchus
(segmental)

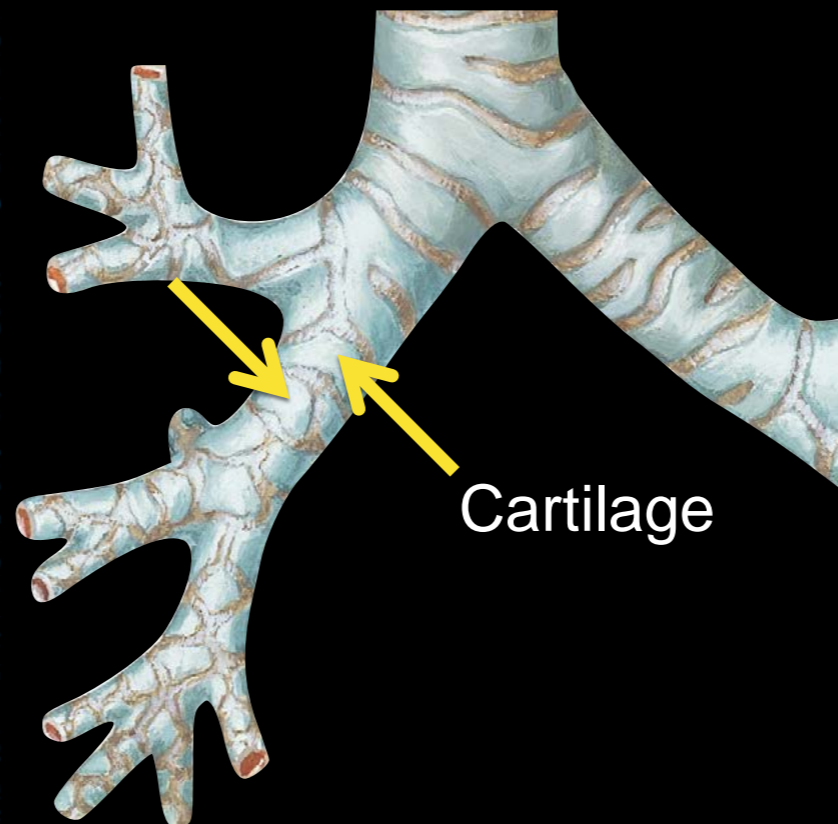
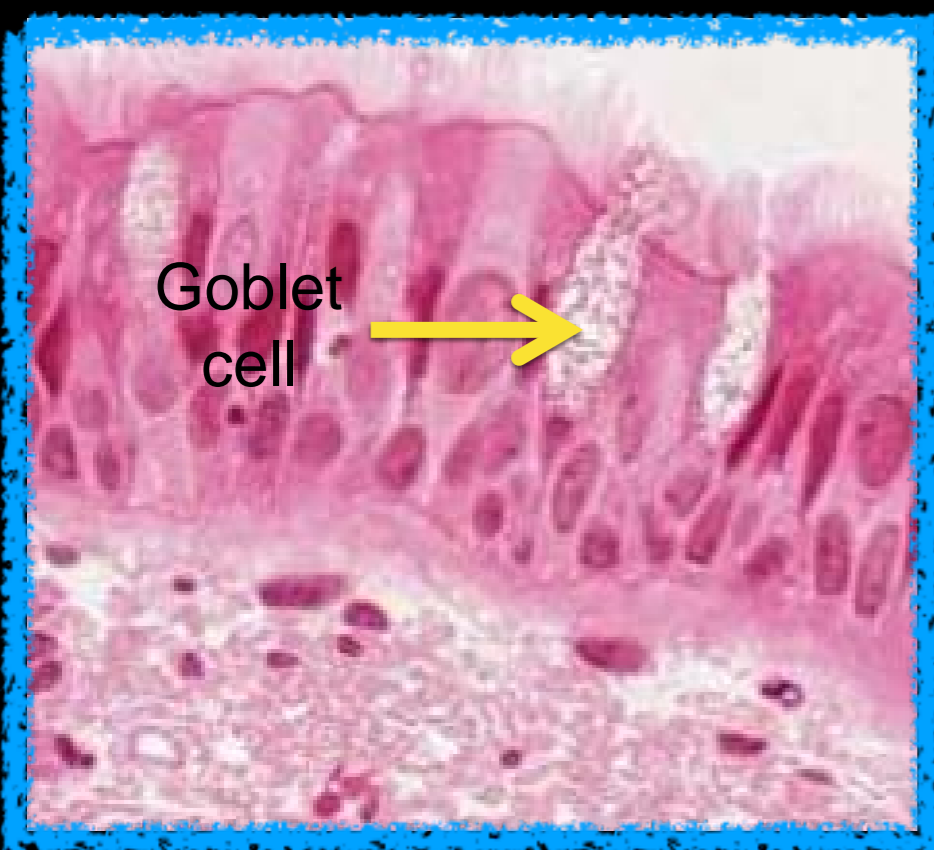
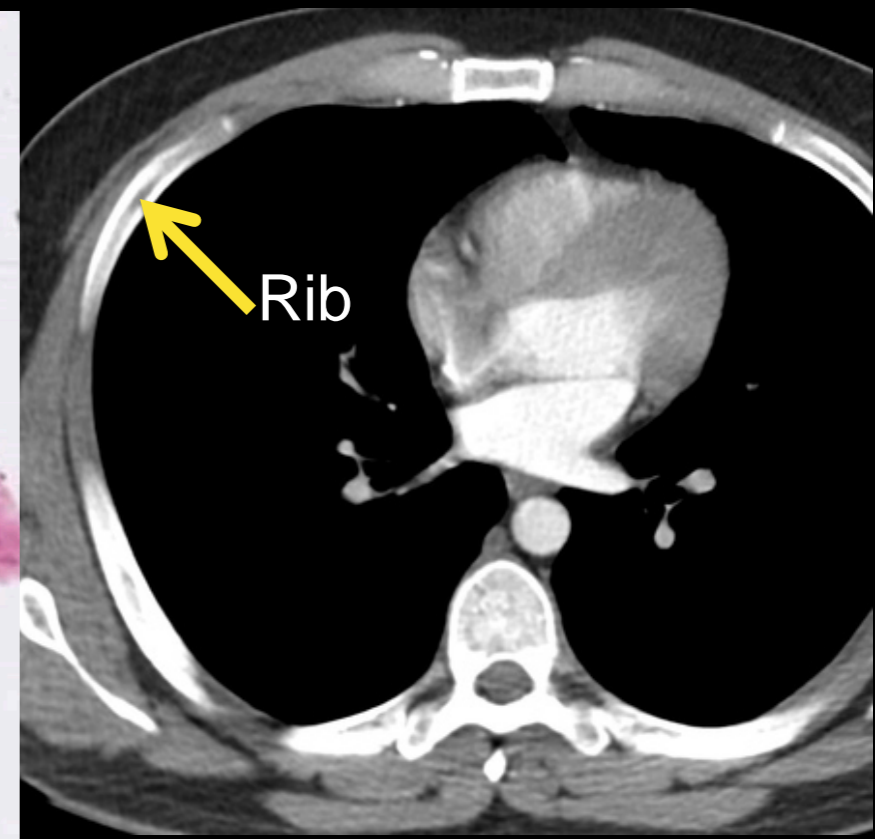
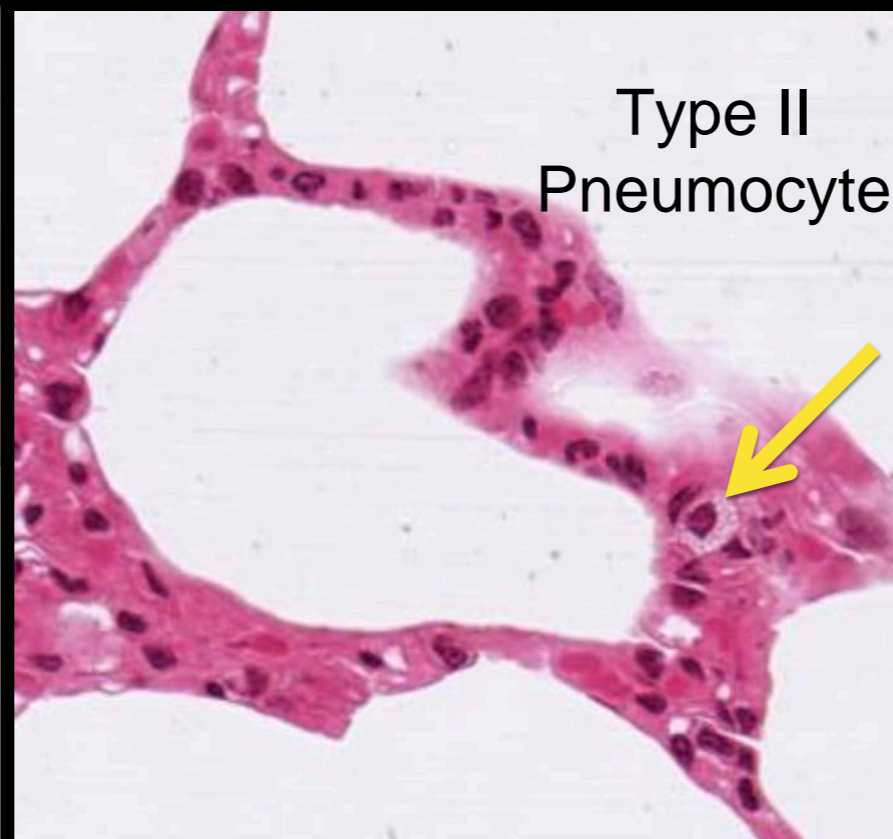
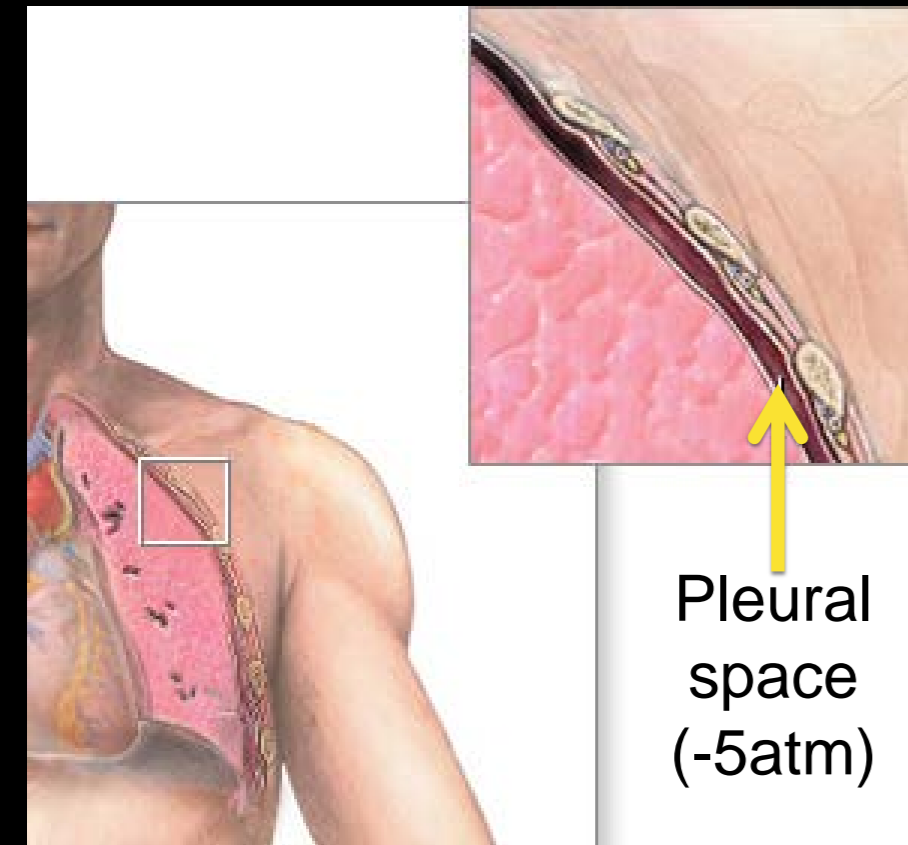


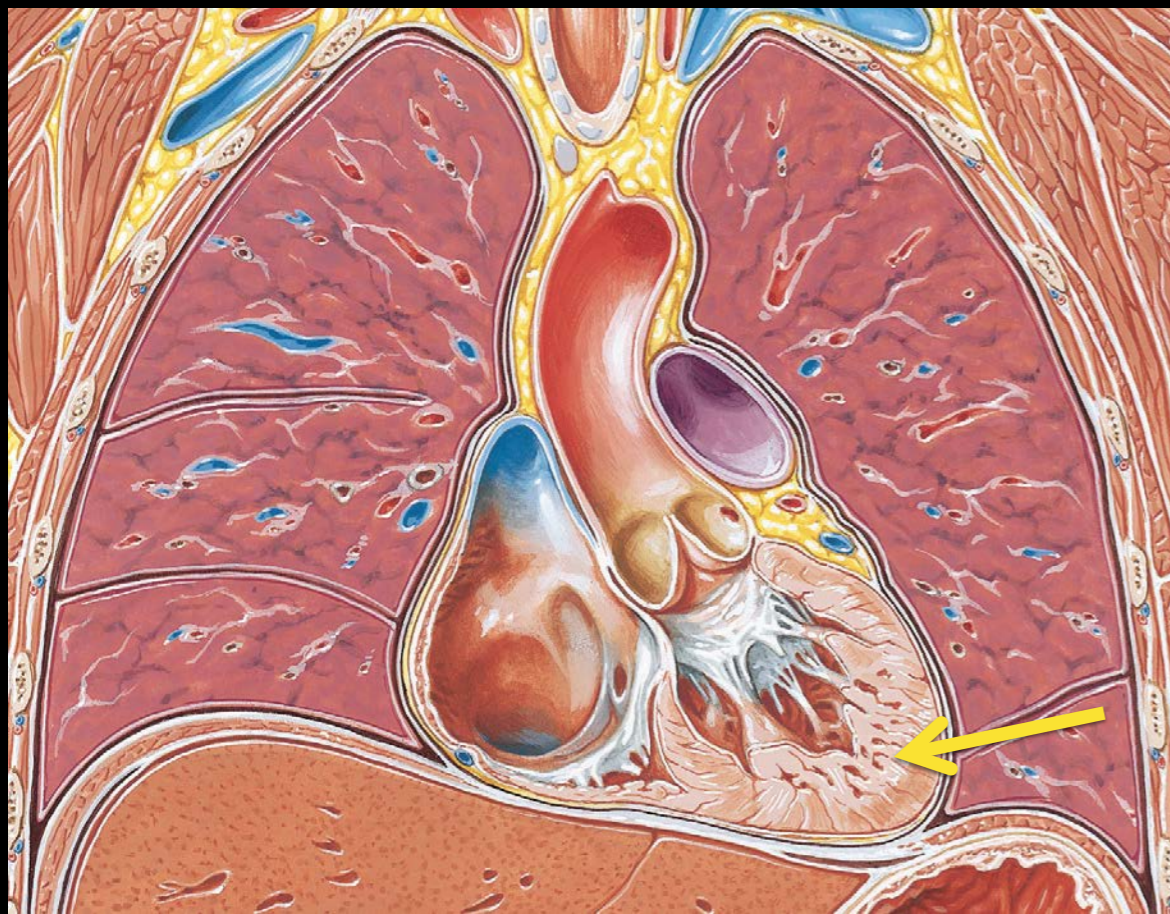
Supplies a
bronchopulmonary
segment

One of these things is not like the others ...

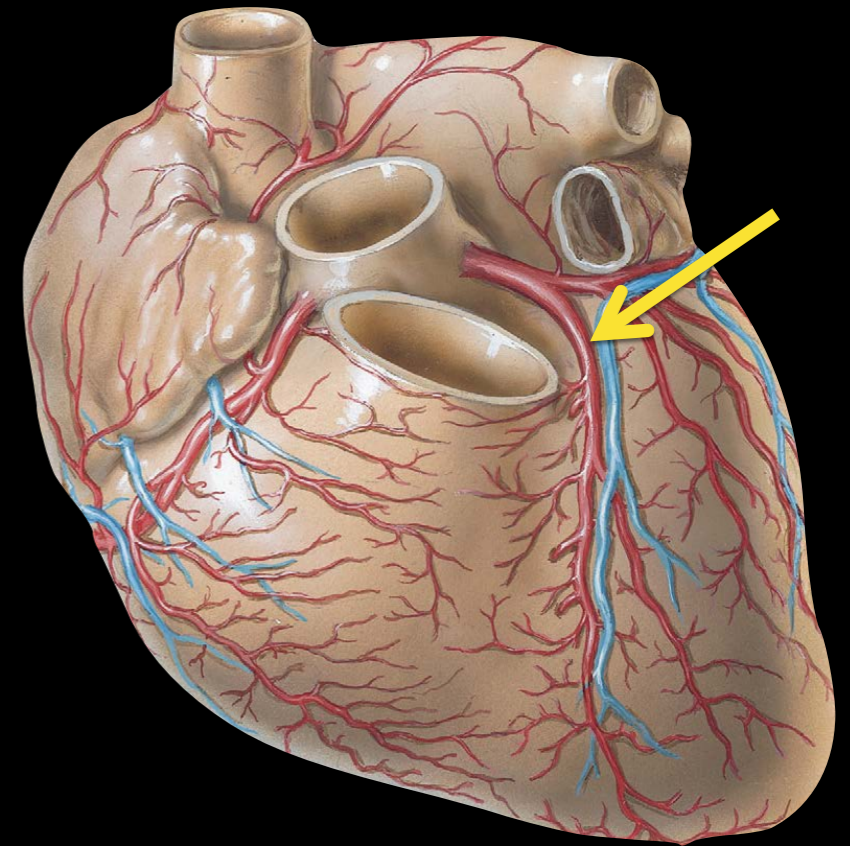


One of these things is not like the others ...

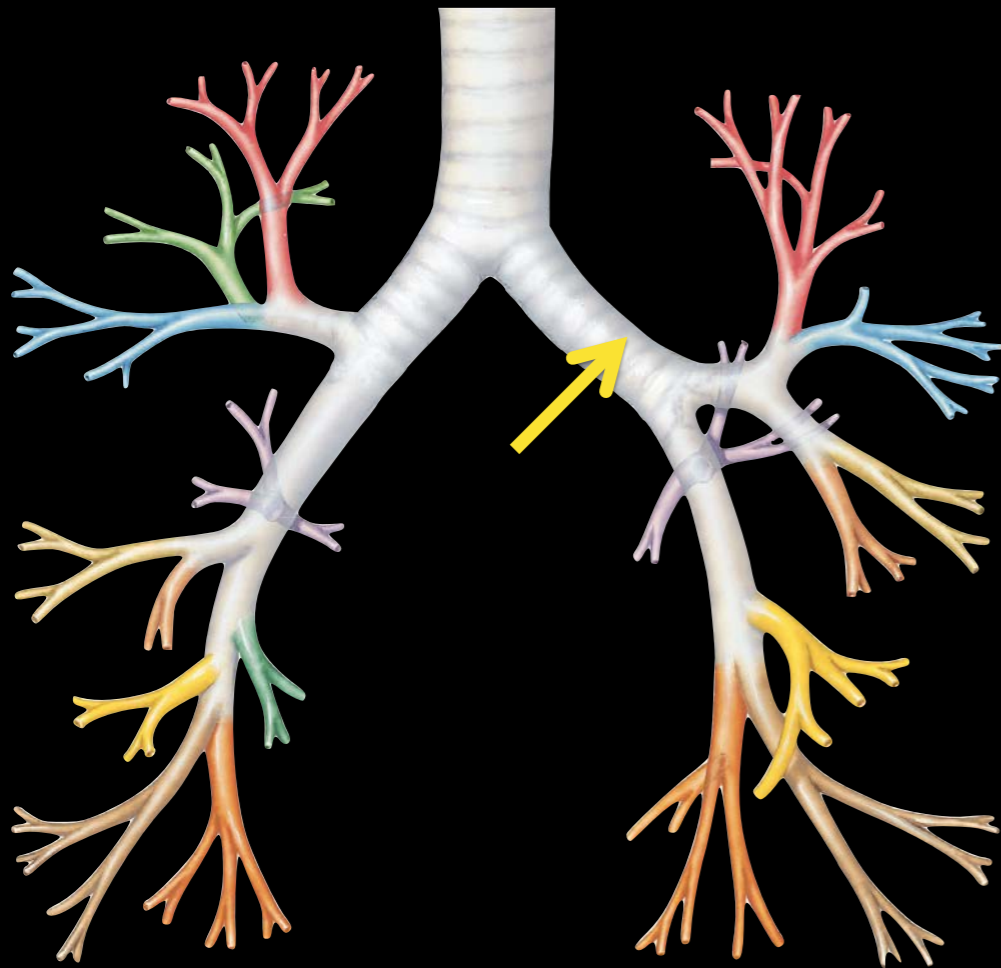




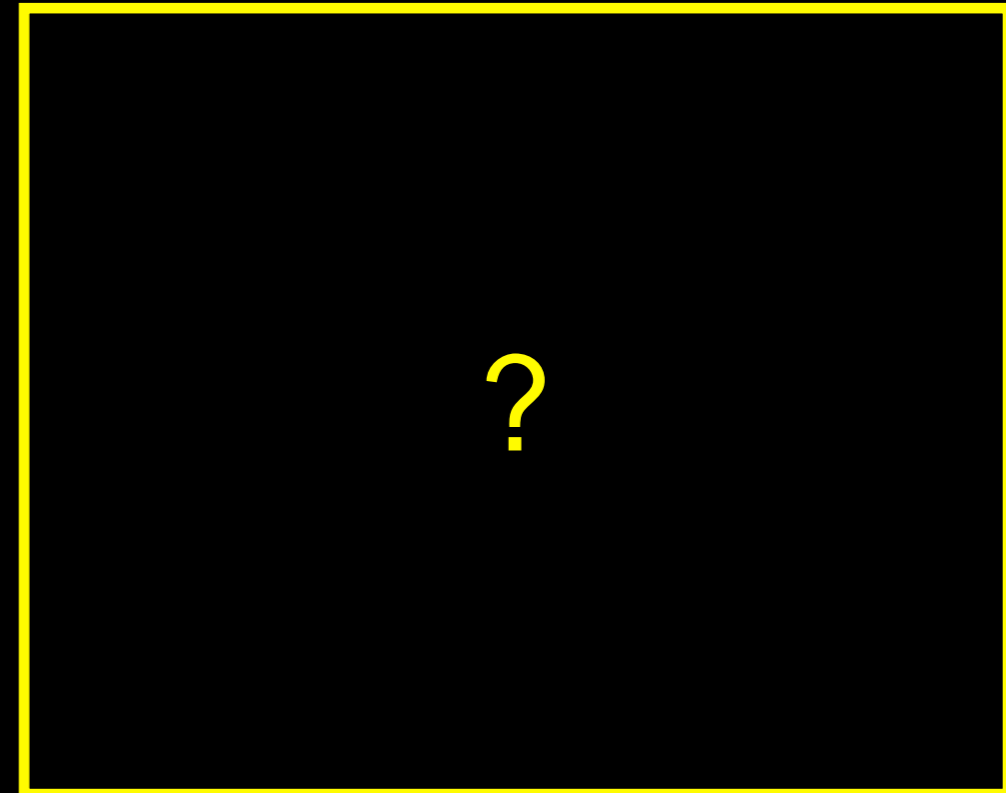
...is to ...

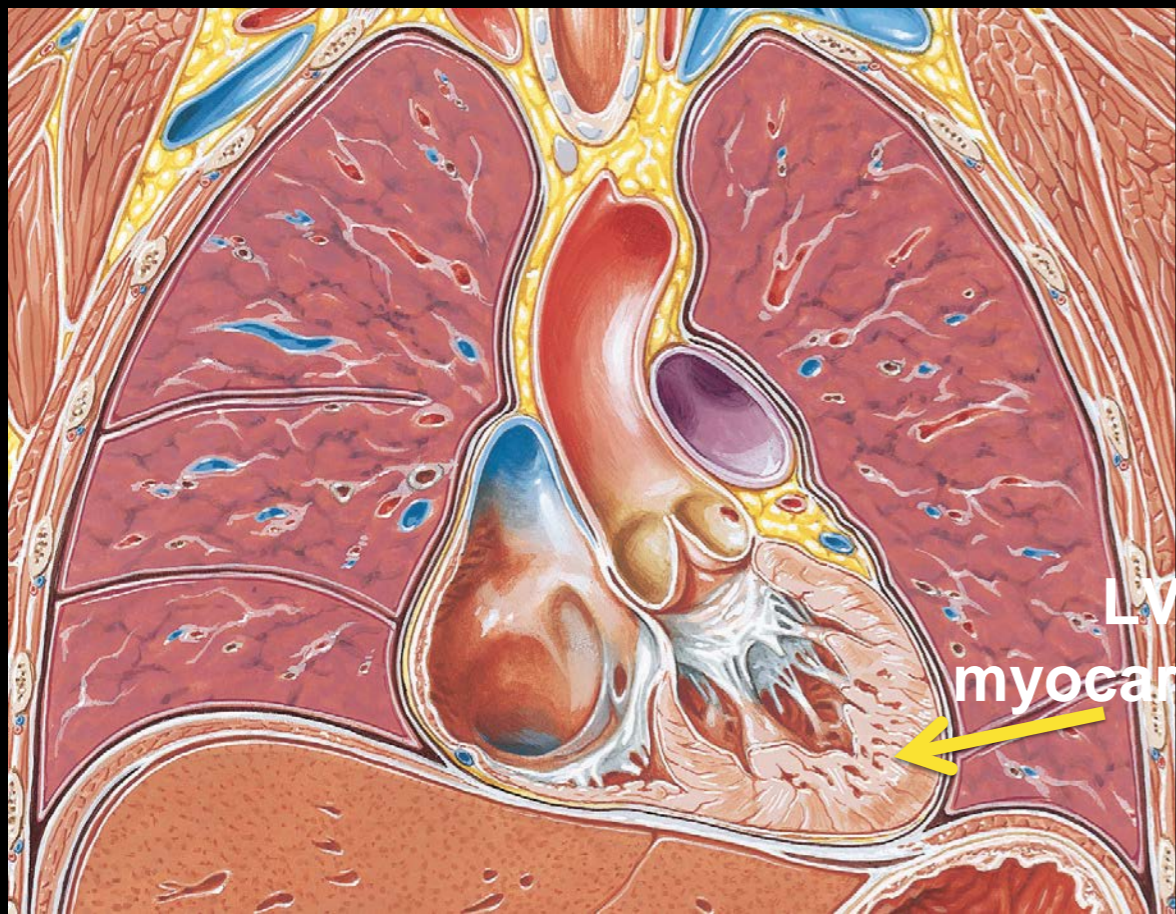


AS

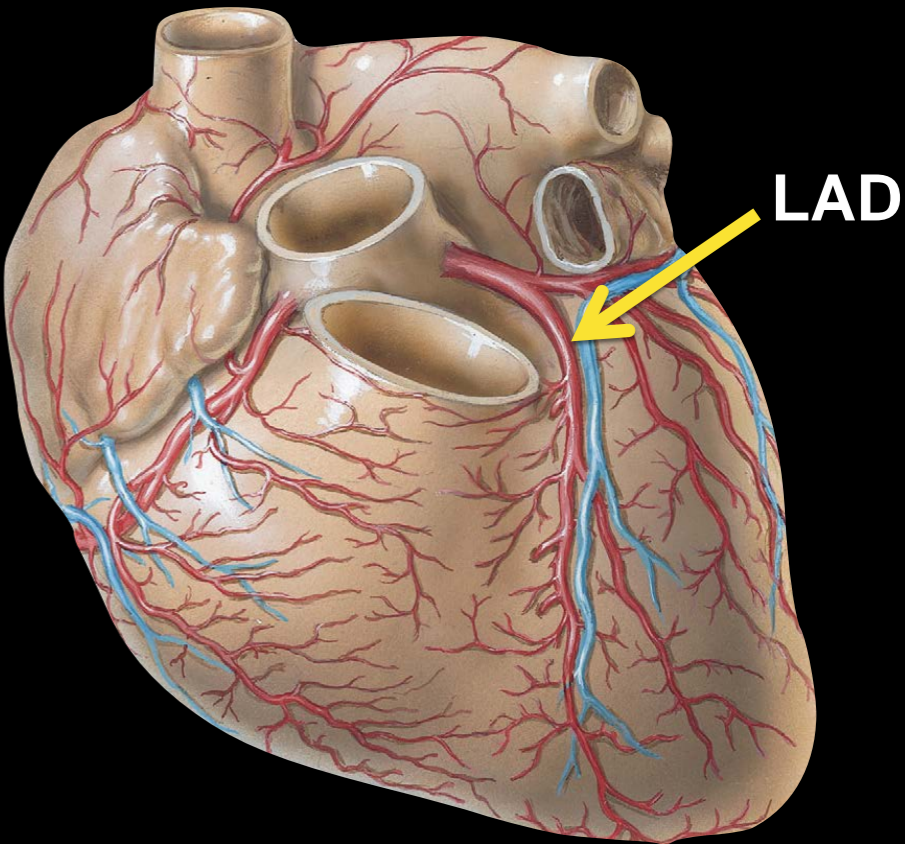


...is to ...

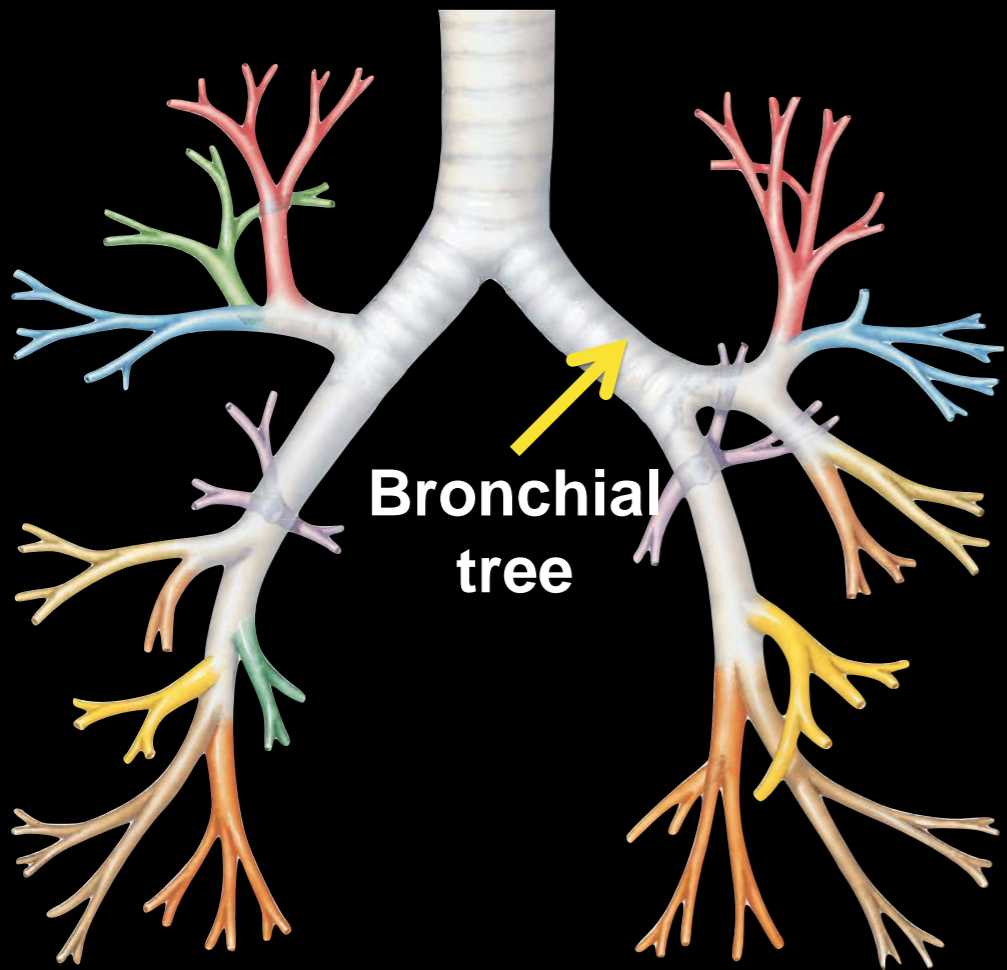




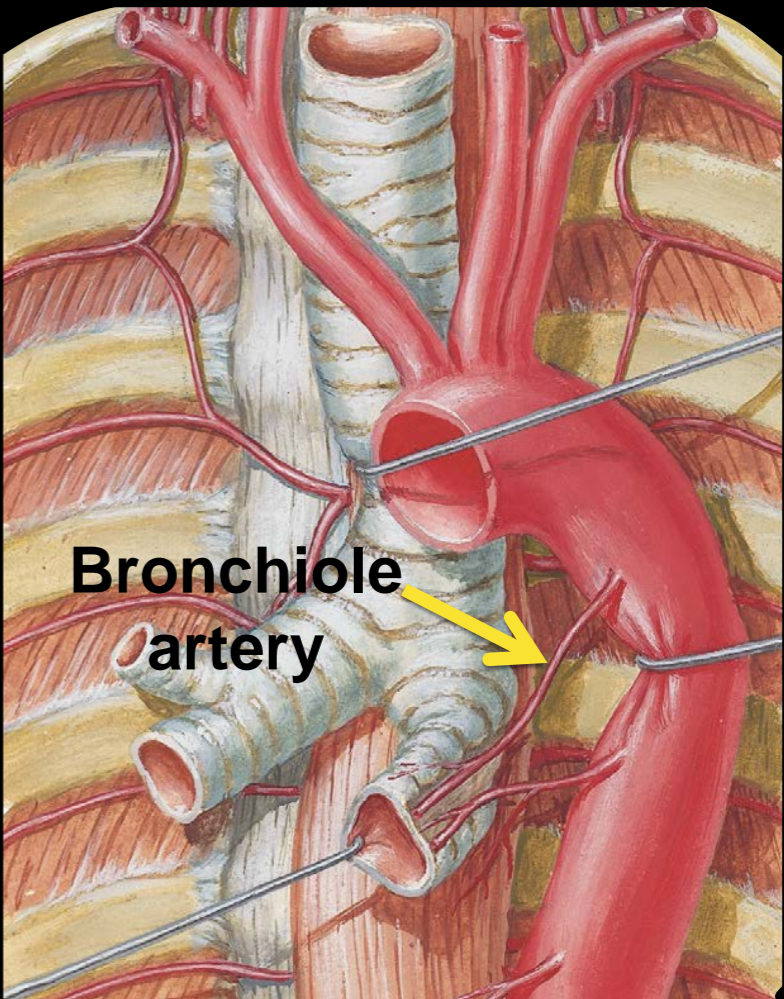
...is to ...

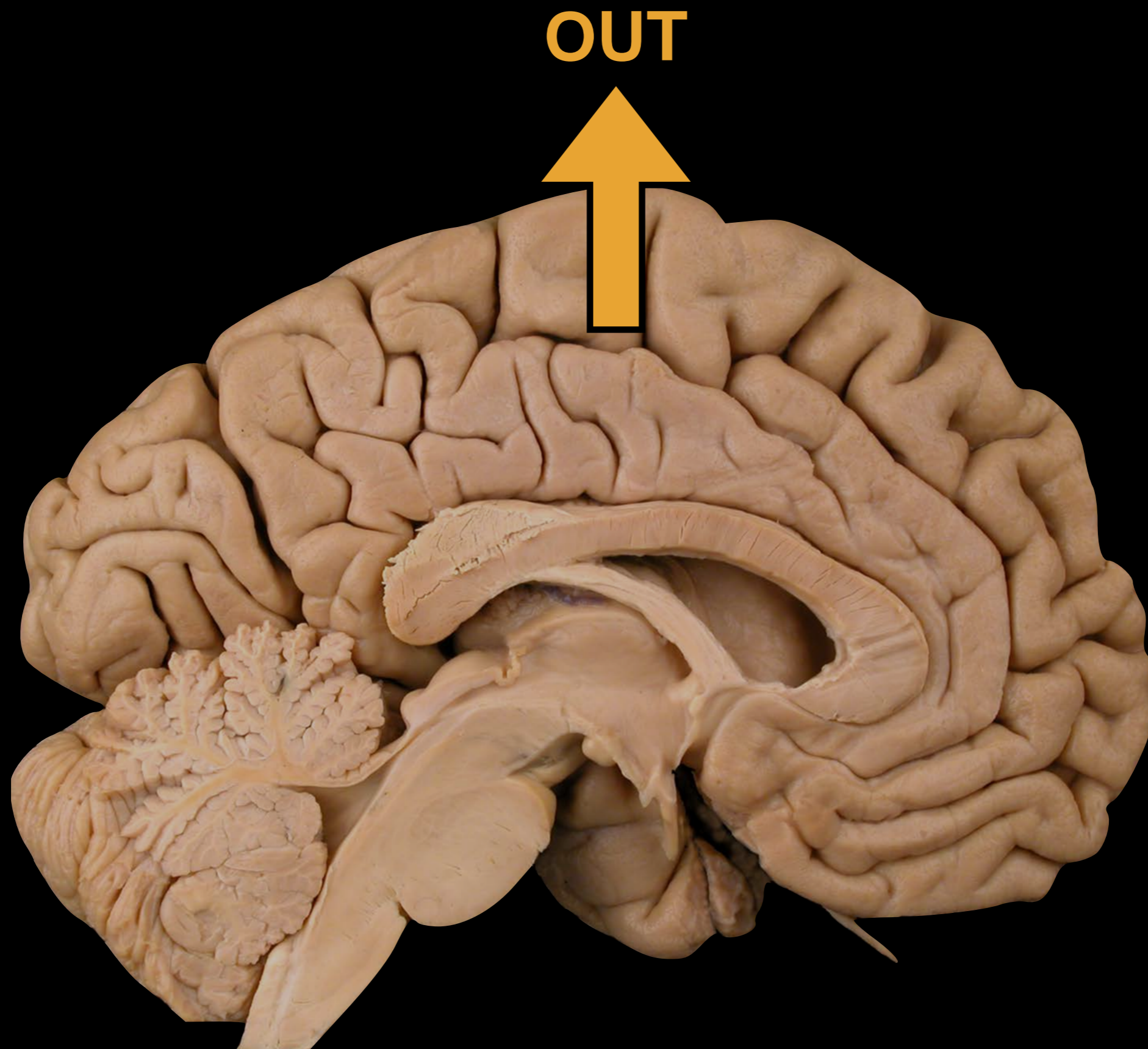


AS



...is to ...





Do you know what the problem
with teaching/learning is?

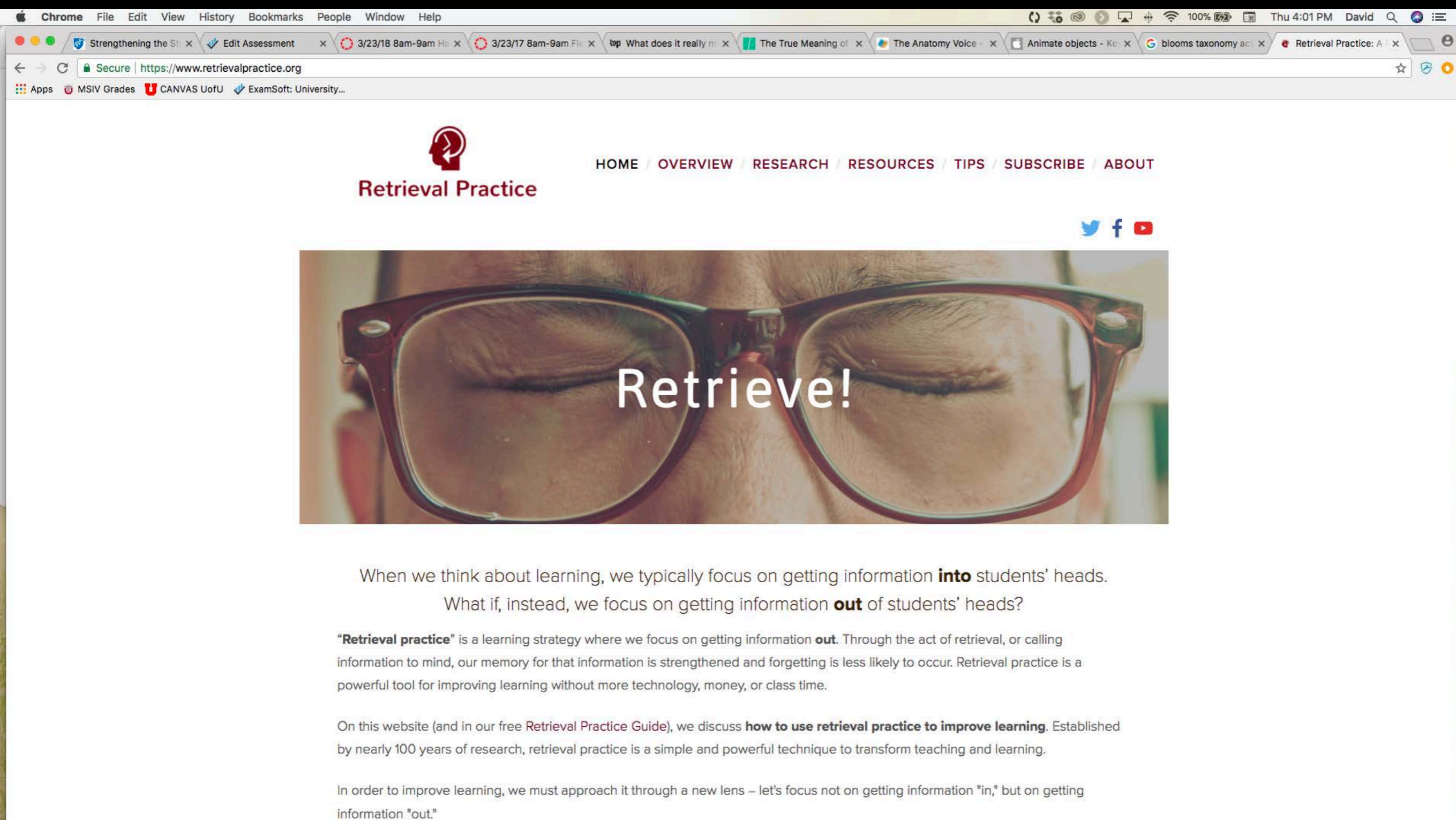
We always assumed it
happened



In a Nut-Shell

- **Retrieval practice = Effective & meaningful for long-term learning**
- **Retrieval practice + Repetition + Spacing = Optimal learning**
- **Retrieval practice is helpful when teaching new content and linking it with review content**

RetrievalPractice.org




Chrome File Edit View History Bookmarks People Window Help




Strengthening the S... Edit Assessment 3/23/18 8am-9am He... 3/23/17 8am-9am Fl... top What does it really m... The True Meaning of... The Anatomy Voice -... Animate objects - Ke... blooms taxonomy ac... Retrieval Practice: A...


Secure | https://www.retrievalpractice.org

Apps MSIV Grades CANVAS UofU ExamSoft: University...

 Retrieval Practice

HOME / OVERVIEW / RESEARCH / RESOURCES / TIPS / SUBSCRIBE / ABOUT



Retrieve!

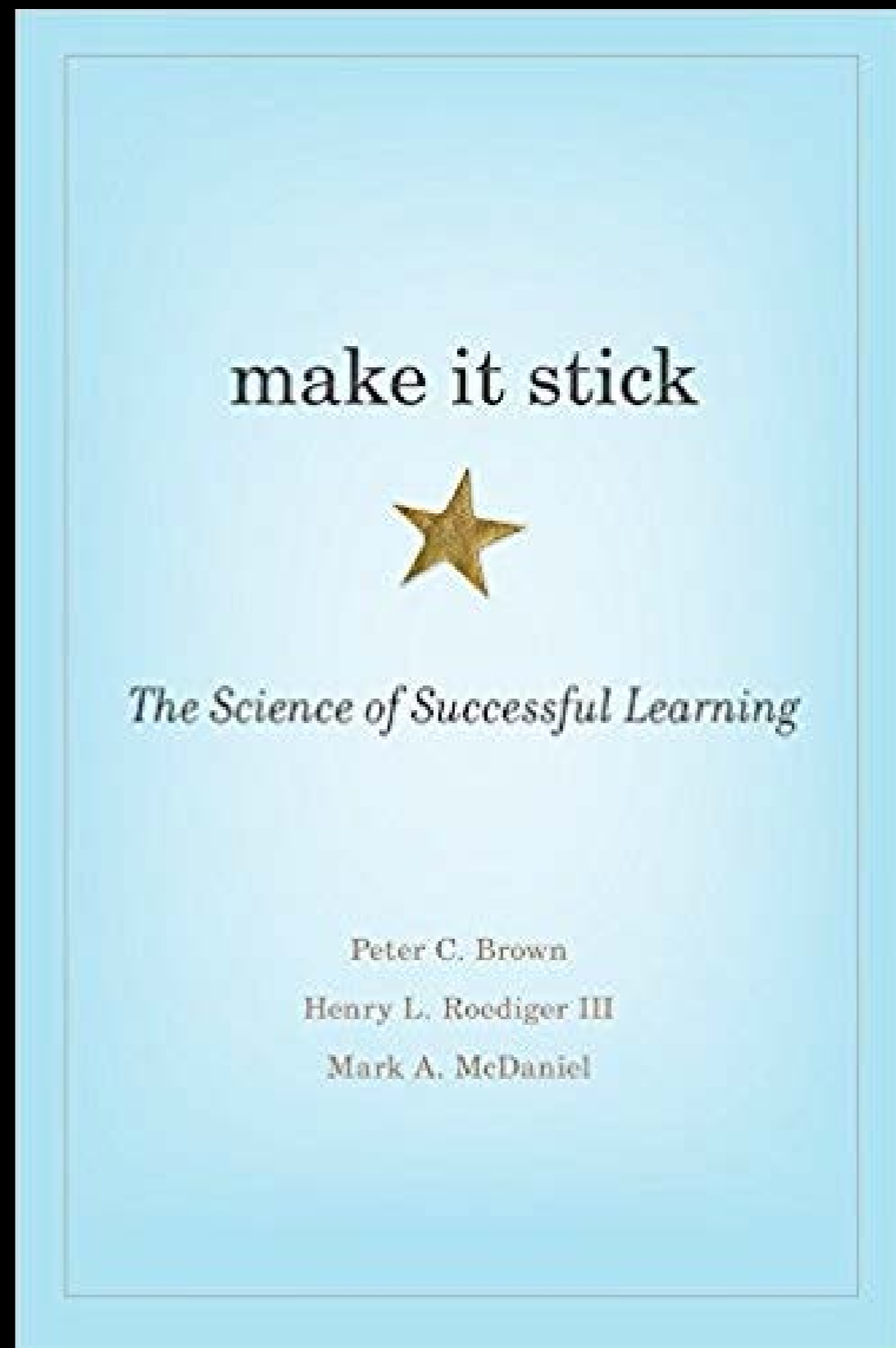
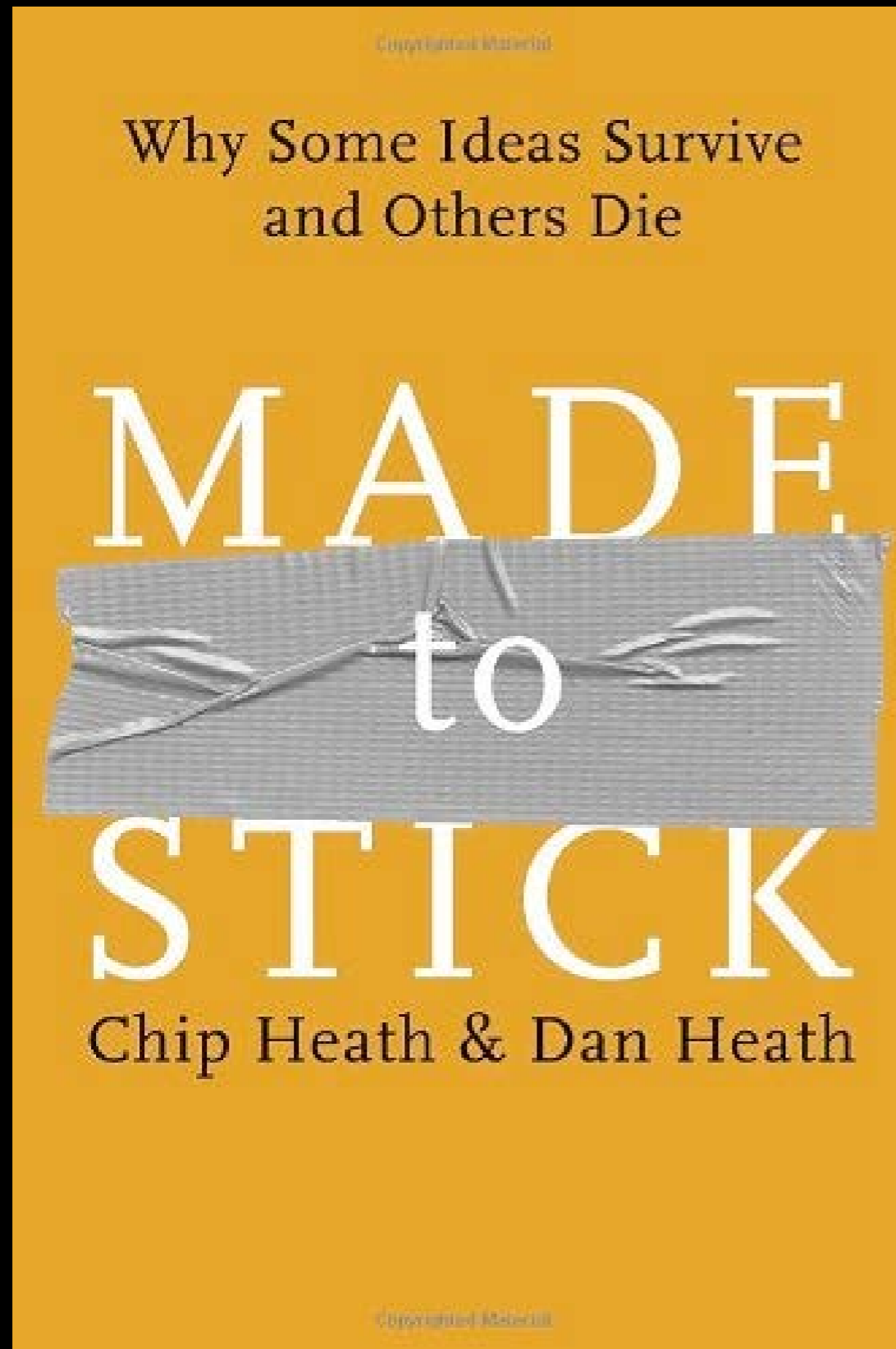
When we think about learning, we typically focus on getting information **into** students' heads. What if, instead, we focus on getting information **out** of students' heads?

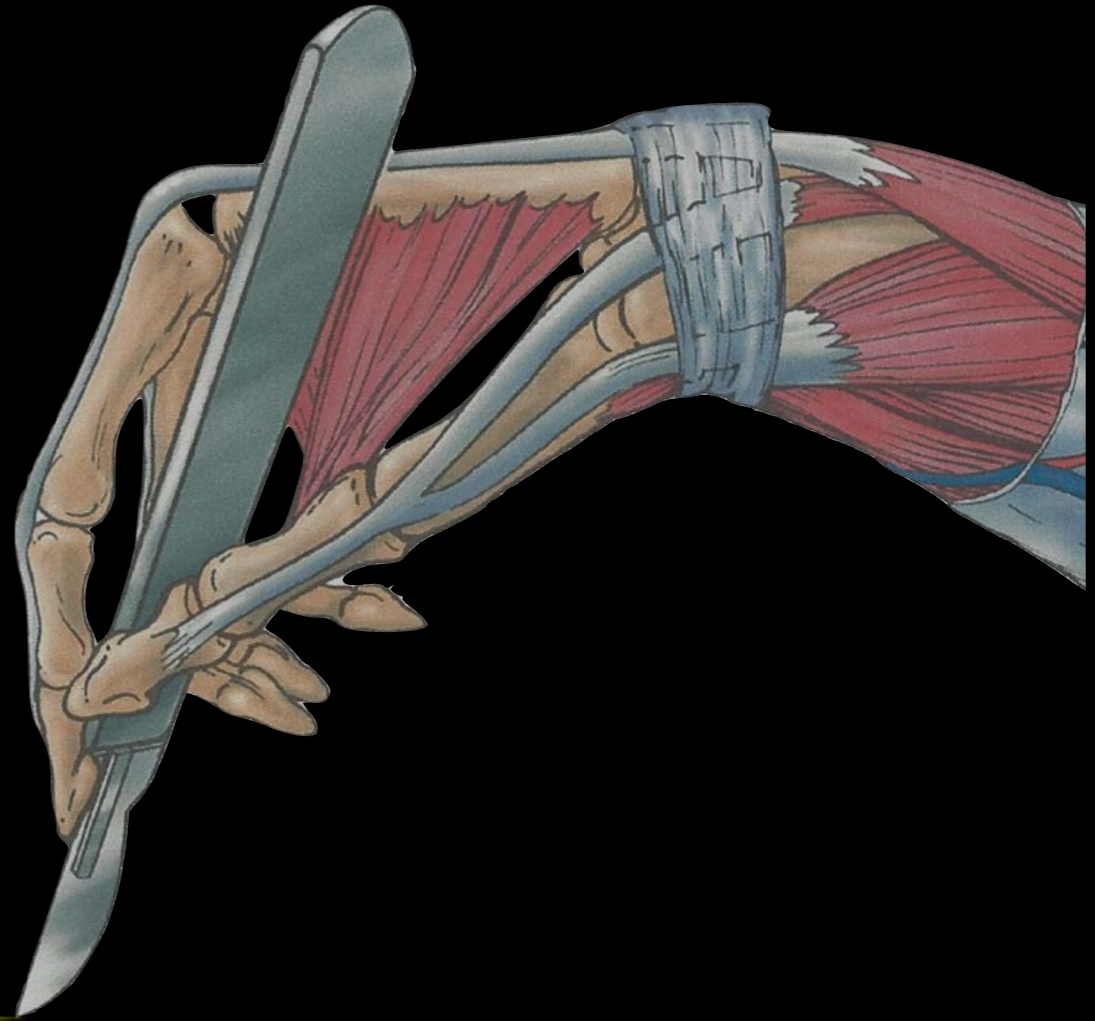
"Retrieval practice" is a learning strategy where we focus on getting information **out**. Through the act of retrieval, or calling information to mind, our memory for that information is strengthened and forgetting is less likely to occur. Retrieval practice is a powerful tool for improving learning without more technology, money, or class time.

On this website (and in our free [Retrieval Practice Guide](#)), we discuss **how to use retrieval practice to improve learning**. Established by nearly 100 years of research, retrieval practice is a simple and powerful technique to transform teaching and learning.

In order to improve learning, we must approach it through a new lens – let's focus not on getting information "in," but on getting information "out."

Acknowledgements





Thank-you