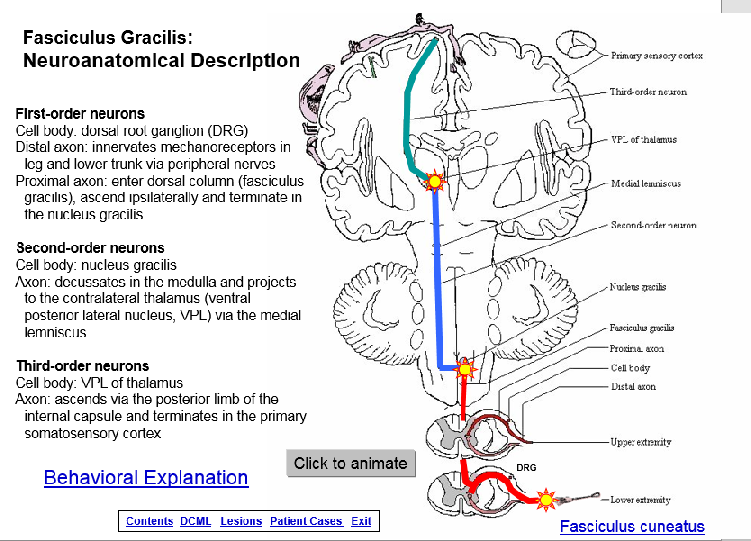
**Title and Focus of Activity:** Clinical Application of DCML Tract *Linking foundational and clinical sciences*

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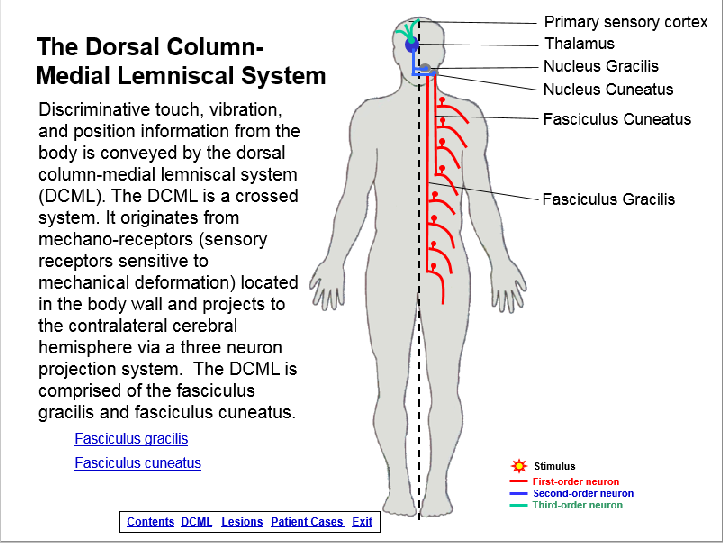
**Course Information**: Neuroscience, adjunctive learning activity within a neuroscience course

**Learning Activity Description:**  This patient case-based learning activity is intended as adjunct to lecture on the structure and function of the dorsal column-medial lemniscal system (DCML) and clinical presentation of patients with lesions of the DCML. Its advantage is that it parallels the clinical reasoning involved in examining the effects of lesions of the DCML, i.e., it presents simultaneously and in parallel both the behavioral level (clinical presentation) and anatomical level information about lesions at various levels of the DCML. It contains 5 interactive lesion lessons and 3 patient cases with feedback. It utilizes computer animation to show the injury occurring (scalpel), the neuroanatomy affected, and the clinical impairment’s presented by the patient.

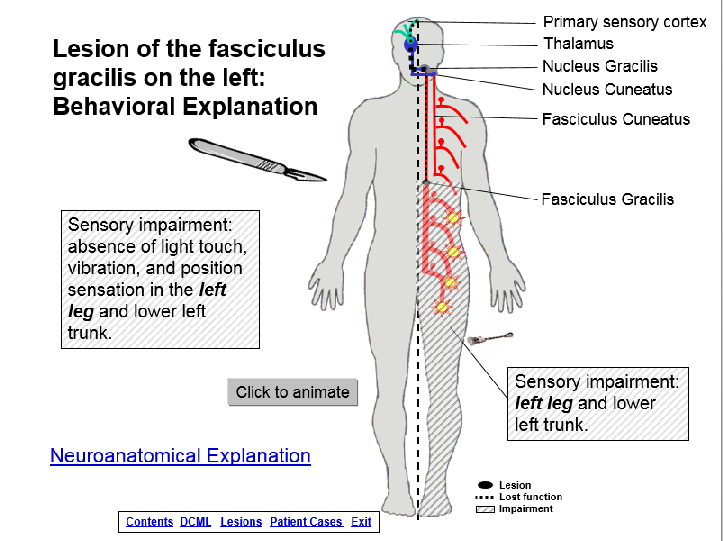
Below are example screen shots from relevant content. See PowerPoint: *Dorsal Column-Medial Lemniscus.*

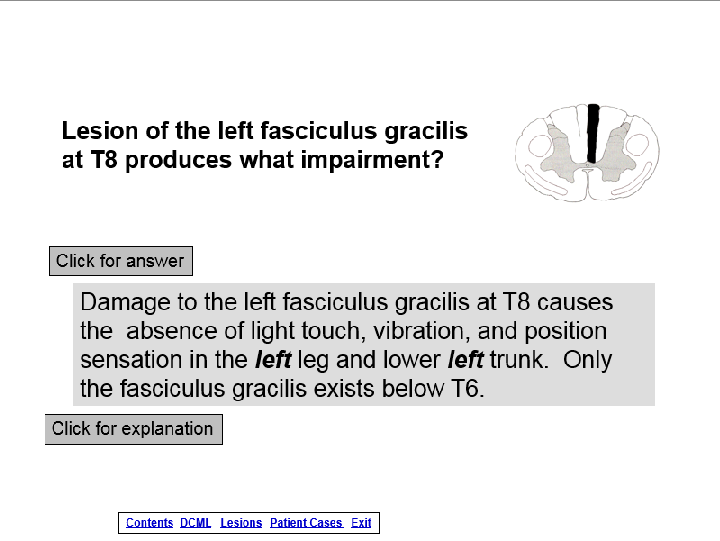


Screen shot showing DCML. Description of function. Click on Fasciculus Gracilis reveals Slide showing somatotopic organization of



next slide. fasciculus gracilis including light touch, stimulus, first- , second-, and third-order neurons. “Click to animate” portrays information traveling from stimulus throughout the fasciculus gracilis

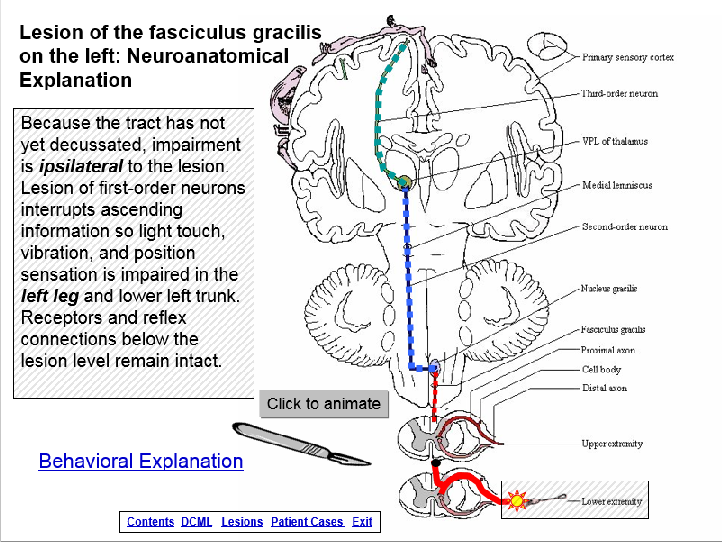




Screen shot showing diagram of lesion and Example of behavioral explanation.

question about clinical impairment. “Click for “Click to animate” produces 1) scalpel causing answer” reveals the answer. “Click for the lesion, 2) brush showing clinical test,

explanation” reveals behavioral explanation. 3) first-order neuron interrupted by lesion, (next screen). 4) shaded area indicating area of damage and clinical presentation of impairment.



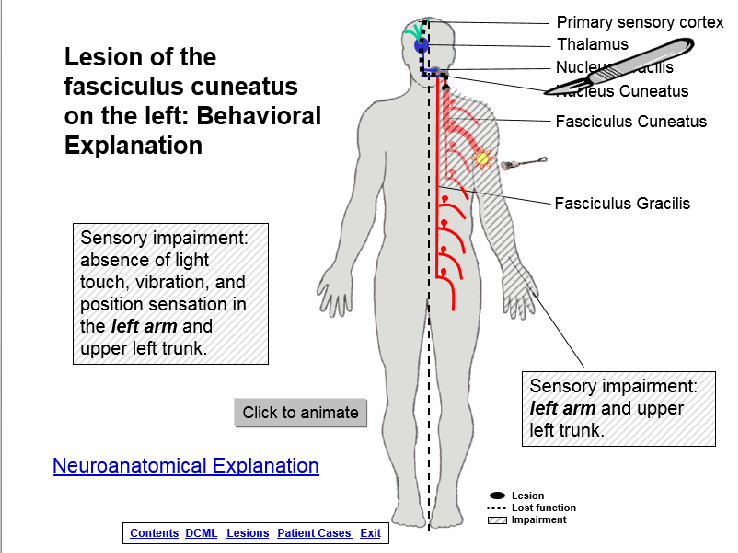
Example of neuroanatomical explanation.

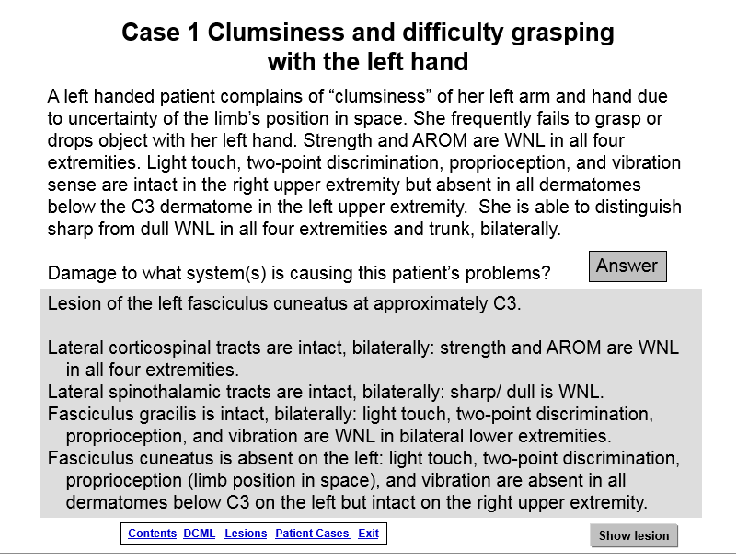
“Click to animate” produces 1) scalpel causing

the lesion, 2) brush showing clinical test,

3) first-order neuron interrupted by lesion,

4) text box explaining clinical findings.





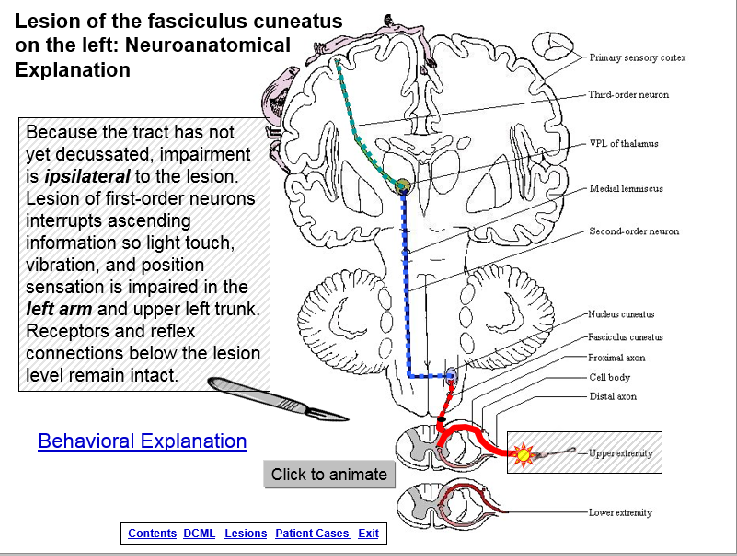
Screen shot of patient case asking damage Screen shot of Behavioral Explanation.

to what structure is causing the patient’s problems. “Click to animate” produces scalpel

“Click for answer” reveals answer. damaging cuneatus. Animation shows stimulus and first-order neuron failing at lesion site.

Clicking on Show Lesion brings next slide. Text boxes show sensory impairment. Clicking on Neuroanatomical Explanation

leads to next slide.



Screen shot of Neuroanat. Explanation.

“Click to animate” produces scalpel damaging

cuneatus, transmission fails at lesion. Text box

explains clinical findings at the anatomical level.

Time for student to complete the activity: 1. preparation for activity outside of/before class: 1-3 hours 2. class time completion of the activity: NA

Readings/other preparatory materials: Knowledge of the anatomy, physiology, pathophysiology, and clinical presentation of damage to the DCML.

Learning Objectives: 1. describe, in detail, the structure and function of the dorsal column-medial lemniscal system (fasciculus gracilis and fasciculus cuneatus). 2. given a lesion, identify the signs and symptoms that would be expected. 3. given a patient case (examination results and chief complaint), identify the location of the lesion causing the signs and symptoms. 4. correlate neurology information between the behavioral and neuroanatomical levels.

Methods of evaluation of student learning: Traditional written exams that cover this and similar material.

The effects of using this learning module have not been examined. In previous research, a similar learning module, as a stand-alone activity not coupled with lecture on the same material, demonstrated the ability to significantly increase student knowledge about the anatomy and clinical effects of lesions of the spinal cord and student’s clinical self-efficacy.1

1McKeough, DM; Drumheller N, Gardner E, Barakatt, ET. THE EFFECTS OF A COMPUTER-BASED LEARNING MODULE ON STUDENTS’ KNOWLEDGE OF SPINAL CORD LESIONS, Annual Conference of the California Physical Therapy Association, Poster Presentation, 2013.