# Montague – CTE Scholar
# Gladys Y. Ko (2007-2008)
## Department of Veterinary Integrative Biosciences

# An interactive web-based comparative functional neuroanatomy course for undergraduate students

Traditionally, neuroanatomy is a course heavily taught in the classroom setting in professional schools. Through the development of technology in multi-media and computer sciences, there are computer-based learning and teaching tools available for a neuroanatomy curriculum. However, after examining these neuroanatomy programs either freely available through the web or purchased commercially, it becomes apparent that none of these programs can be used without any classroom teaching by experienced instructors. It is impossible for self-motivated students to learn these materials on their own. In my experience through teaching Mammalian Functional Neuroanatomy (VIBS /NRSC 450), I have managed to integrate power point presentation (PPP) images of gross brain / spinal cord, brain / spinal cord sections, and microscopic structures, as well as a few video clips of case studies and animations in my classroom presentations. However, since the original images, video clips, and animations were in different formats, I had to stop PPP and up-load a video clip or animation, which caused significant discontinuities in the classroom presentations, and significant time was wasted on solving technical difficulties. Therefore, it is critical to develop a web-based comprehensive functional neuroanatomy curriculum, such that it will be easier for a course director to use the materials in classroom teaching as well as for distance education. Students themselves can also learn neuroanatomy with instant online learning assessment.

The *objective* of this neuroanatomy learning program initiative is to develop a comprehensive web-based comparative functional neuroanatomy curriculum across dogs, sheep, ox, and humans and to improve the current undergraduate neuroanatomy curriculum taught by the PI in the College of Veterinary Medicine and Biomedical Sciences. A problem-based learning model is applied on the design of this web-based learning program. The greatest advantage to developing a web-based curriculum is that the teaching / learning materials can be accessed from any internet-available area, and it is especially valuable for distance education or self-motivated learning.

The *long-term goal* is to develop a web-based neuroanatomy curriculum that incorporates video clips of the gross brain and spinal cord dissections and correlates with brain / spinal cord sections stained with different types of histological staining to assess microanatomical structure and different anatomical orientations (transverse, horizontal, saggital sections), as well as contains animations to demonstrate important neuroanatomical pathways and functions across higher mammalian species. It will include interactive quiz sets and neurological lesion case studies, so students can have instant feedback learning assessment. This web-based neuroanatomy curriculum potentially can be used for undergraduate and graduate neuroanatomy courses as well as the professional neurology course.

Each learning unit will be organized according to neurological functions, and appropriate case studies will be incorporated, so students will be able to correlate basic knowledge with real-life cases. At the end of each learning unit, interactive quizzes and activities will be incorporated to access students' learning outcomes.

<u>Organization of each learning unit:</u>

--Each unit will start with a simple neurological lesion problem for students to contemplate, and a list of the objective and special terminology of a specific learning unit will follow. Any diagrams, illustrations, texts, animations, and video clips will all be built in.

--At the end of each unit, there are interactive quizzes related with neuroanatomical structures to access the students' basic knowledge.

--At the end of each unit, there will be clinical case studies to access the students' comprehensive applications of what they have learned.

--There will be integrative units for clinical case studies that will require students to integrate knowledge from different learning units to solve certain clinical case studies (e.g. spinal cord injury will require students to integrate their knowledge of sensory and motor systems)

--All of the learning units (especially the display of texts and neuroanatomy parts) will have audio narrations built in for auditory learners.

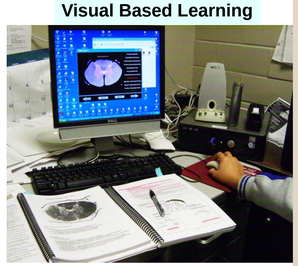
<u>Progress</u>:

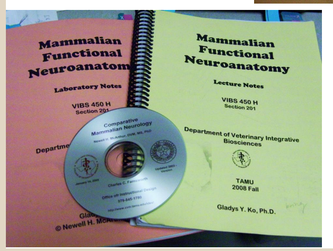
We have finished the entry of the main text, quizzes, clinical case studies, and anatomical images. We have also finished shooting the video clips on animal brain dissections and basic and clinical diagnostic examinations that have been transformed into web-based format. The next step is to integrate all the texts, quizzes, anatomical images and video clips into one web-based program. The following stage will be the most difficult task, which is to design 3-D animations for the illustrations of neuroanatomical pathways. At the same time, we will start to proceed the recording for audio narrations to integrate into the web-based program. The last stage will be the final integration of all the components and editing.

## From Traditional Teaching and Learning

Traditional Classroom Teaching

Visual Based Learning






All of the above +
video clips + interactive programs + illustrations + 3-D animations + audio narrations

⇓

**Interactive web-based neuroanatomy program**

## To Web-based Teaching and Learning

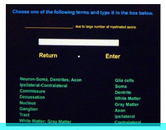
Interactive natures of this learning program

Click and Learn

Computer software used to generate this learning program

Immediate learning assessment through interactive quizzes

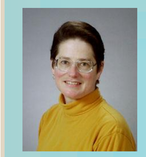

Question → Wrong answer (2 chances to make it right) → Correct answer given




Different styles of quizzes

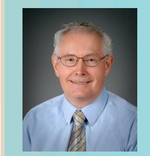
Integrated video clips


## Acknowledgment

**Louise Abbott, DVM, Ph.D.**
*Associate Professor*
Veterinary Integrative Biosciences
**Montague Scholar 1997-1998**

Dr. Abbott helped in creating video clips in animal brain dissections and neurological examinations on healthy animals.



**Newell McArthur, DVM, Ph.D.**
*Professor Emeritus*
Veterinary integrative Biosciences

Dr. McArthur produced the original Neurology learning CD with interactive features.

**Mr. Bryan Murdock**
*Student Worker*

Mr. Murdock assisted in creating this web-based learning program, text, images and data entry, and shooting video clips.

**Jonathan Levine, DVM**
*Assistant Professor, Neurologist*
Small Animal Clinical Sciences

Dr. Levine created video clips in clinical neurological examinations of small animal patients.

**Charles Farnsworth, Ph.D.**
*Clinical Assistant Professor*
Educational Administration & Human Resource Department

Dr. Farnsworth helped in the development of this web-based learning program. He also serves as a consultant for this project to bridge the use of technology and traditional teaching, especially on the design of student learning outcome assessment.

**Mary Herron, DVM**
*former CVM faculty member*
Dr. Herron designed some clinical diagnostic questions that are integrated into the program for learning assessment.

**This project is graciously supported by the Montague Center for Teaching Excellence Scholar Award and the Inquiry/Research-based Education of Undergraduates Quality Enhancement Plan from College of Veterinary Medicine and Biomedical Sciences.**