

LabTutor® for Medical Education

Connecting physiology with patient care



Use real patients to engage students in physiology

Build your students' physiology knowledge around real patients and hands-on learning experiences with LabTutor. LabTutor for Medical Education is an innovative software that teaches core physiology concepts by interweaving patient case studies with practical exercises.

Every LabTutor for Medical Education exercise features real patients, presented through high-quality video and clinical test results. Each patient helps students learn to observe and apply core physiology theory to clinical contexts, allowing students to benefit from case-based learning.

The complementary exercises transform students into active, independent and engaged learners. Students work in groups as they measure physiological parameters from each other, simultaneously integrating lecture concepts and reflecting patient care scenarios.

Address a range of medical core competency requirements

By completing LabTutor for Medical Education exercises your students will:

- Build their medical careers on a strong and relevant physiology knowledge base
- Experience and explore real clinical scenarios
- Learn to work as part of a cohesive team
- Understand the respect and empathy required when working with people

Add an innovative and flexible learning approach to your curriculum

ADInstruments has been providing physiology teaching solutions for over 20 years, and we have worked closely with health care educators and clinical professionals to develop a specialized tool for medical education. LabTutor for Medical Education offers a range of exercises to address different courses, and all exercise content can be edited to suit your students and course. With LabTutor Online, you can also give students remote access to LabTutor exercises for analysis, revision and report submission.

Benefits for students

- Enhance understanding of physiology and how it relates to patient care
- Use patient videos and clinical tests to introduce a variety of illnesses, treatments and procedures
- Easily customize content to suit specific courses
- Help students balance study with personal commitments with LabTutor Online's remote access

“The integrated Powerlab teaching materials continue the tradition of dependable hardware and intuitive software. [ADInstruments employees] introduce me to innovations that allow me to improve the education of my students. What's most impressive is how the PowerLab people work with me to help me create the educational experiences that I want my students to have. Everyone is just so helpful - I can call whenever I have a question and will immediately get an informed and relevant response. It's rare to find a company so focused on helping me do what I want to do.”

Tom Pisarri, Ph.D.
Assistant Professor, School of Medicine, Creighton University

What is LabTutor for Medical Education?

LabTutor for Medical Education integrates real patient case studies with physiology theory and complementary hands-on exercises. The exercise collection explores physiological functions and anatomical structures integral to any medical curriculum.

Hands-on exercises clarify theory

LabTutor software leads students step-by-step through each exercise. Students experience the roles of both medical practitioners and patients by working in teams to record physiological signals from each other. By linking their own recordings and experiences to scientific concepts, students gain an evidence-based understanding of the science theory normally confined to lectures and textbooks.

Real patients reinforce the relevance of science to medical practice

Students meet real patients with a disease related to the physiology or anatomy under investigation. Through high-quality video, students are able to explore how altered physiology affects a patient's health, quality of life and relationships, and learn how patients are treated and cared for in clinical environments.

LabTutor for Medical Education exercise list:

- Autonomic nervous system
- Blood pressure
- Body temperature
- Brain structure and reflexes
- Glucose metabolism
- Heart and circulation
- Heart and electrocardiography
- Heart sounds
- Kidney and urine
- Lung function
- Muscle and fatigue
- Muscle function
- Peripheral nerve function

More exercises (including pregnancy and childbirth) are currently being developed. For an up-to-date list: www.adinstruments.com/medical



Above: LabTutor patient case studies introduce students to a wide variety of patients (including pediatric patients and their parents, left). Students can watch patients undergo clinical testing and care procedures (center) and are able to view and analyze their clinical results (right).

What the literature says...

Interactive teaching methods enhance students' learning

"...The setting up of interactive modules, i.e., both computer-based teaching as well as case studies, enhanced the students' appreciation of the relevant course units..."¹

Interactive curriculum takes students beyond traditional lectures

"...Case-oriented problem-solving tutorials have successfully been combined with traditional didactic lecture modules and computer-based teaching modules could improve problem-solving abilities..."¹

¹ Enhanced student experience: an analysis of subjective evaluation and objective learning success after the transformation of a pharmaceutical physiology course. Zimmermann, M., and Eckert, G., Advan in Physiol Edu 34:1-10, 2010

Explore a LabTutor exercise step-by-step

Lung Function exercise stage 1: Hands-on practical exercises

Introduction

The exercises begins by introducing the students to Mrs. M, a patient with extreme shortness of breath. The Introduction also clearly defines the exercise's learning objectives relating to both scientific knowledge and clinical practice.

Background

The Background details the relevant physiology, anatomy and pathophysiology. Every page in a LabTutor exercise links to the Background page, and students can view it at any point to help them understand their findings.

Hands-on exercises

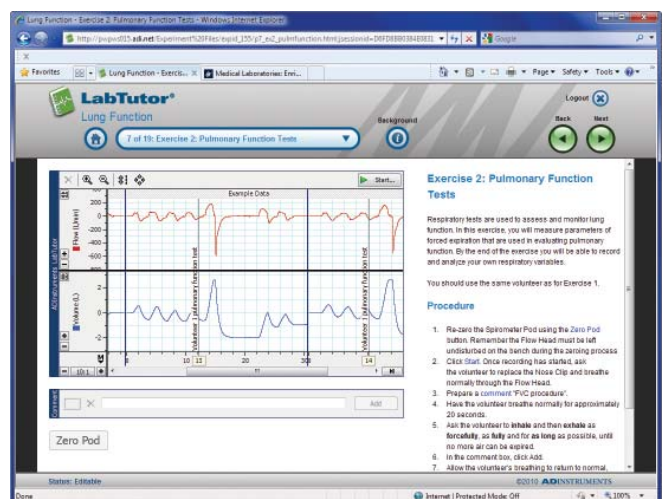
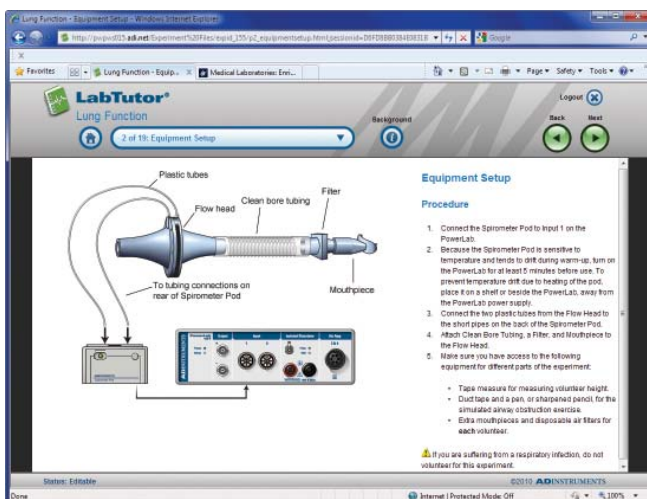
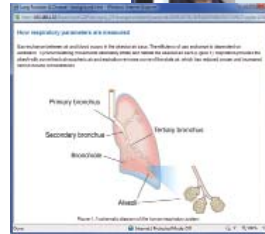
Students use different equipment and techniques to take relevant measurements from each other. In the Lung Function exercise these include:

- using a PowerLab system to measure breathing rate, respiratory flow and volume
- replicating pulmonary function tests by coaching a group member through a Forced Vital Capacity procedure
- practicing the correct procedure using a Peak Flow Meter
- simulating an asthma patient's experience of airway obstruction by taping over the equipment's tubing filter.

Pop-up pages

LabTutor exercise pages also incorporate links to pop-up pages with further information including:

- troubleshooting tips
- example measurements
- effects of pharmacological interventions on the signal being measured



Left: LabTutor uses diagrams and step-by-step instructions to guide student through any equipment setup. Right: Exercise procedures appear next to student respiratory flow and volume recordings so students remain focused on-screen and aren't distracted by consulting paper manuals or handouts.

Explore a LabTutor exercise step-by-step

Lung Function exercise Stage 2: Real patient case studies

LabTutor for Medical Education's patient case studies enable students to explore a wide range of patients, diseases and procedures at their own pace. ADInstruments holds written informed consents from all patients, relatives, and health professionals for the use of the videos, the investigation results and other materials used in these cases, and all promotional materials related to them.

Video

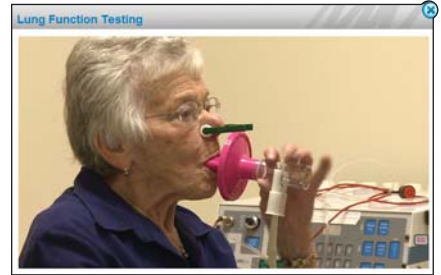
Students find out more about Mrs. M through a series of high-quality videos.



Mrs. M describes her symptoms, their effect on her lifestyle, and her clinical care experiences.



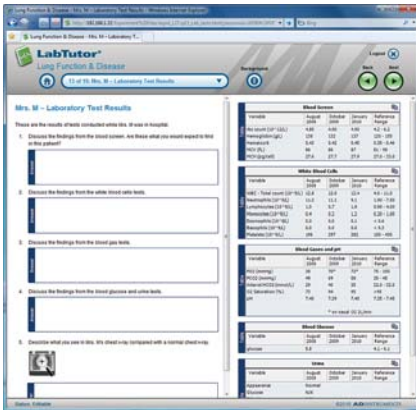
Mrs. M's husband relates his concerns. Students observe how walking affects Mrs. M's breathing.



Students also watch Mrs. M undergo a lung function test in a hospital respiratory laboratory.

Clinical Data and Test Results

Students gain further insight into Mrs. M's condition through her clinical test results.



Students are provided with Mrs. M's blood (screens, white cells, gases, pH and glucose) and urine test results over a three year period.



Students view and compare animated CT scans of Mrs. M's diseased lungs with similar images of healthy lungs.



Students see Mrs. M's lung capacities and pulmonary function tests in the same format as their own measurements (made in stage 1).

Report and Medical Summary

Students are asked to compare their own in-class measurements to Mrs. M's clinical data, and explain how the altered physiology affects the patient's abilities, relationships and quality-of-life. Students must also link patient treatment and care to the underlying physiological concepts. After students have submitted their Report (either as a group or individually) a healthcare professional provides a video summary of medical issues relevant to Mrs. M and her care.

What educators say...

"We use LabTutor with over 1200 students across five different courses, including science, medicine, pharmacy, dentistry and nursing. LabTutor has made it possible for more students to attend each lab session, we need fewer technicians and supervisors than previously, and the same equipment can be used for a range of different LabTutor experiments. Additionally, the totally professional ADInstruments staff provide excellent support service."

Stephen Dineen, University College Cork, Ireland

Economical and easy-to-use teaching system

Our Health Science Teaching System contains the equipment students need to measure physiological signals when completing LabTutor for Medical Education exercises.

The system is safe and easy-to-use, so students are able to get started quickly and complete exercises independently.

LabTutor Teaching Suite

The LabTutor Teaching Suite software package includes:

- Permission to install LabTutor's student interface on all networked departmental computers as required, with no limit on student numbers
- All current LabTutor exercises, and access to future exercises at no extra charge

PowerLab 26T

At the core of the system is the PowerLab 26T acquisition unit. The PowerLab records the extensive range of physiological signals included in the exercises. The units connect easily to classroom computers via a USB port.



Feel secure in your students' safety - the PowerLab 26T has been approved to the IEC 60601-1 patient safety standard, and is safe for human connection

Transducers & Accessories

Each transducer and accessory supplied in the Teaching System connects seamlessly to the PowerLab unit.

All transducers are "plug and play". Students simply start LabTutor software, follow the on-screen instructions to plug in the correct transducer or accessory and start their measurements.



With the Health Science Teaching System your students can measure:

- Body temperature
- Blood pressure
- ECG
- EMG
- Grip force
- Heart rate
- Heart sounds
- Lung volume
- Lung flow
- Pulse
- Reflexes
- Respiratory rate
- Skin potentials
- Twitch response

PTB4268 Health Science Teaching System

- ML4856 PowerLab 26T
- MLS400 LabTutor Teaching Suite Software
- MLT1010/D Pulse Transducer
- MLT1132/D Respiratory Belt Transducer
- MLT1102/D Sphygmomanometer with 3 Cuffs
- MLA2540 5 Lead Shielded Bio Amp Cable
- MLA2505 Shielded Lead Wires
- MLADDF30 Stimulating Bar Electrode
- MLA1250 Headphones
- MLT201 Cardio Microphone
- MLA1010 Disposable ECG Electrodes
- MLAYDG Dry Earth Strap
- MLT004/ST Grip Force Transducer
- MLA93/D Tendon Hammer
- SP0148 One-Way Mouth Pieces (x 100)
- MLT422/A Skin Temperature Probe
- ML309 Thermistor Pod
- MLAC22 BNC to DIN Smart Adapter (2)
- MLA1093 Abrasive Gel
- MLA1094 Alcohol Swabs
- PTK10 Human Respiratory Kit

Flexible teaching solutions with LabTutor software

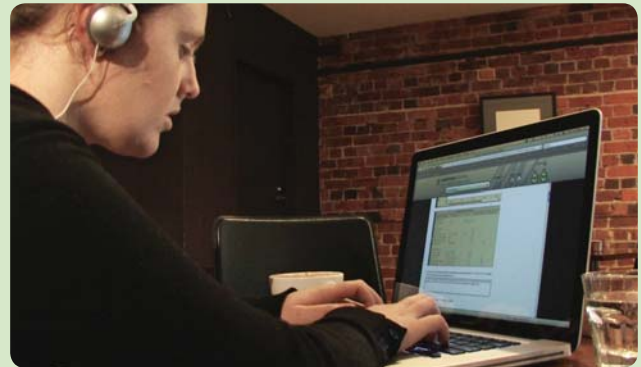
Give Students Off-Campus Access to LabTutor with LabTutor Online

LabTutor Online gives students remote access to their LabTutor course and exercises. Students can access LabTutor Online from any computer with an internet connection, and use it to analyze their own measurements, review patient case studies (including watching the videos) and submit their report.

With LabTutor Online you can:

- Shorten in-class laboratory sessions by asking students to complete analysis and reporting tasks as homework
- Encourage students to use exercises for exam revision
- Provide distance learning and off-campus students with access to example measurements, as well as the patient case studies so they don't miss out on the opportunity to enhance their science understanding

LabTutor Online integrates seamlessly with the LabTutor Teaching Suite - contact your representative for details.



LabTutor setup, implementation & management FAQ

We don't have laboratory space. Where can our students complete LabTutor exercises?

LabTutor for Medical Education exercises do not require wet lab facilities, and students can complete the exercises in any classroom with Windows computers. Signals are measured using portable and durable PowerLab systems - smaller and lighter than an average Anatomy and Physiology textbook.

Our department has hundreds of students enrolled in multiple courses - can they all access LabTutor?

LabTutor is supplied as part of **LabTutor Teaching Suite**. The Suite's flexible licensing agreement allows you to install the student interface on every computer across your department's network, and create as many courses and individual student logins as you require. Student measurements and analyses are saved to their unique login, rather than any specific computer.

Our timetables are already full. Where do we fit LabTutor in?

LabTutor's flexibility lets you choose how and when students will complete exercises and submit reports. For example, a student can complete the hands-on exercises as part of a group in a clinical skills classroom, then explore the related patient case study after class and at their own pace in the computer lab. Using LabTutor Online, students can even submit the final report from home computers.

Some aspects of a LabTutor exercise doesn't suit my students or syllabus. Can I make changes?

Yes. LabTutor Teaching Suite also includes **LabAuthor** software, which you can use to edit any LabTutor exercise to suit your exact needs. LabAuthor's drag-and-drop interface is extremely easy-to-use, and allows you to:

- Edit background text, exercises and report questions to complement your syllabus
- Delete or modify exercises to suit your classroom's equipment or timetable
- Convert your existing teaching materials into LabTutor exercises, or even create completely new exercises

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PowerLab systems and signal conditioners meet the European EMC directive. ADInstruments signal conditioners for human use are approved to the IEC60601-1 patient safety standard and meet the CSA C22.2 No. 601.1-M90 and UL Std No. 2601-1 safety of medical electrical equipment standards.



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