



Lt is an online learning platform that engages students with real data, inside and outside the lab.

Our Human Physiology Collection includes customizable lessons, grouped into modules. Each module contains a combination of tutorial(s), pre-lab prep, and a lab. Combine lessons with our hardware teaching systems and kits to provide a true-to-life, practical learning experience for your students in the lab, or use Lt's pre-recorded example data for remote learning situations.

### Professionally-developed lessons

Lessons in our Human Physiology Collection reinforce introductory and advanced concepts across a wide range of topics including cardiovascular and circulatory, respiratory, nervous, gastrointestinal, muscular, kidney and urinary physiology, and more.

Each media-rich lesson is designed to maximize engagement with a strong focus on student outcomes. Use our lessons off-the-shelf or tailor any lesson to suit your curriculum and your teaching preferences. Lessons can be grouped, and ordered per your course needs.

*"I have 1000 students each semester, but my labs run smoother with Lt."*

**Aura Grandidge,**  
Manager Biology Labs, Anatomy and Physiology,  
University of Rhode Island



Improved efficiency



Increased student engagement

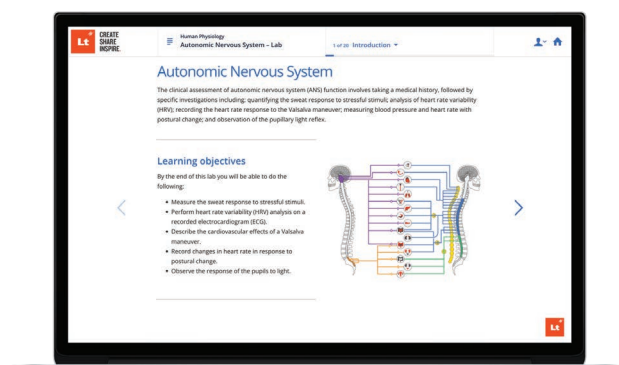


Improved results in theory and clinical practice



Increased student pass rates\*

*\*Results of using Lt at the Otago Polytechnic School of Nursing, 2017*





## Human Physiology Collection

## 33 MODULE COLLECTION

### Airflow

Record spirometry signals to examine FEV1 in normal and simulated airway restriction. Perform peak flow tests.

### Autonomic Nervous System

Examine skin potential changes, heart rate variability, the Valsalva maneuver, rapid postural change, and pupillary exercises.

### Blood Clotting

Assess bleeding and coagulation time, and use a hemocytometer to perform a platelet count and calculate the number of platelets per  $\mu\text{L}$  of blood.

### Blood Counting

Prepare a blood smear and identify different blood cells under a microscope. Determine the hemoglobin concentration using a spectrophotometer and perform a hematocrit test. Determine blood type using Eldon cards.

### Blood Pressure

Measure blood pressure in the arm and assess the effect of cuff location, cuff size, and arm position. Examine how leg position affects leg blood pressure.

### Body Temperature

Measure body temperature and explore the differences between conductive and convective heat loss.

### Brain Structure and Reflexes

Revise major human brain structures and view MRI and CT scans. Test the knee and ankle jerk reflex responses with and without the Jendrassik maneuver. Assess pupillary and plantar reflexes.

### Breathing

Use a respiratory belt to investigate the ability to hold the breath and the relationship between breathing and heart rate.

### Cardiorespiratory Effects of Exercise

Record and compare ECG, blood pressure, and respiratory movements at rest, during exercise, and immediately after exercise.

### Cardiovascular Effects of Exercise

Record and compare ECG and the finger pulse at rest and immediately after exercise.

### Cold Pressor Test - Mini Lab

Measure blood pressure by auscultation and carry out the cold pressor test. Use a blood pressure sensor and a finger pulse sensor to measure blood pressure, heart rate, and pulse amplitude continuously whilst observing a bodily extremity's reaction to extreme cold.

### Diving Response

Investigate the effects of simulated dives and breath holding on heart rate and peripheral circulation.

### Electroencephalography (EEG)

Record EEGs to examine interfering signals, changes with eyes open and shut, and the effects of mental and auditory activity.

### Electrooculography (EOG)

Record EOGs to examine angular displacement, saccades, smooth tracking, gaze-holding, gaze-shifting, and nystagmus.

### Endocrine Physiology

Investigate hormone feedback loops with real-life scenarios. Use critical thinking skills to identify a hormone administered to a "virtual" rat by analyzing changes in the animal's organ weights.

### Energy Expenditure and Exercise

Measure the  $\text{FEO}_2$ ,  $\text{FECO}_2$ , and RER during steady-state exercise, as well as ventilatory changes and changes in mechanical efficiency.

## Glucose Absorption



Measure blood glucose using a glucolet and glucometer and compare results from five protocols. Take urine samples to measure glucose levels.

## Heart and ECG



Measure the ECG and pulse, compare variations between the different leads of a 12-lead ECG, and perform an Einthoven triangle analysis.

## Heart and Peripheral Circulation



Practice palpation techniques on arm and leg arterial pulses, record the radial pulse, and examine arterial anastomoses in the hand.

## Heart Sounds



Listen to heart sounds via a stethoscope and phonocardiogram (PCG), and record an ECG and pulse to investigate the relationship between ECG events and heart sounds.

## Hoffmanns Reflex



Stimulate the tibial nerve to measure the Hoffmann's reflex. Determine how the latency and amplitude of the M-wave and H-reflex change under different conditions.

## Kidney and Urine



Estimate bladder capacity, view an abdominal CT scan, and perform urine testing and observation on "patient" urine samples.

## Lung Volumes



Record and analyze spirometry signals to perform basic tests of pulmonary function and simulate breathing with hyperinflated lungs.

## Mechanical and Chemical Digestion



Explore the effects of mechanical and chemical digestion on the breakdown of three different food substances that represent the macronutrient classes: carbohydrate, protein, and lipid.

## Mechanics of Ventilation



Measure pressures generated passively and by contraction of expiratory and inspiratory muscles. Use spirometry to determine lung volume.

## Muscle and EMG



Record EMG during voluntary muscle contractions to investigate coactivation, muscle fatigue, and how visual and verbal feedback impact the ability to sustain muscle contractions.

## Myotatic Reflex - Mini Lab



Trigger the myotatic reflex on a volunteer by stimulating the patellar tendon. Observe the effects of the Jendrassik maneuver on the myotatic reflex.

## Peripheral Nerve Function



Record an evoked EMG, then calculate latency and nerve conduction velocity.



## Reflexes and Reaction Times



Examine simple reflexes, and then explore reaction times to stimuli under different conditions.

## Reproductive Physiology



Learn how reproductive anatomy develops at birth and how it matures and responds to puberty. Investigate how the hormones of the hypothalamic-pituitary-gonad axis interact with reproductive organs in both the testicular and ovo-uterine systems. Explore hormonal control of the menstrual cycle in the ovo-uterine reproductive physiology lab and perform sperm count and motility measurements in the testicular reproductive physiology lab.

## Sensory Illusions



Investigate mechanisms of sensory perception and discover techniques that send conflicting information to the central nervous system.

## Sensory Physiology



Observe a range of sensory illusions.

## Skeletal Muscle Function



Record and measure muscle twitch responses, observe recruitment as stimulus strength increases, and explore muscle twitch summation and tetanus.

## Stroop Test



Investigate the interference of conflicting messages, and examine the effects of the Stroop test as an experimental stressor.

## Water Balance

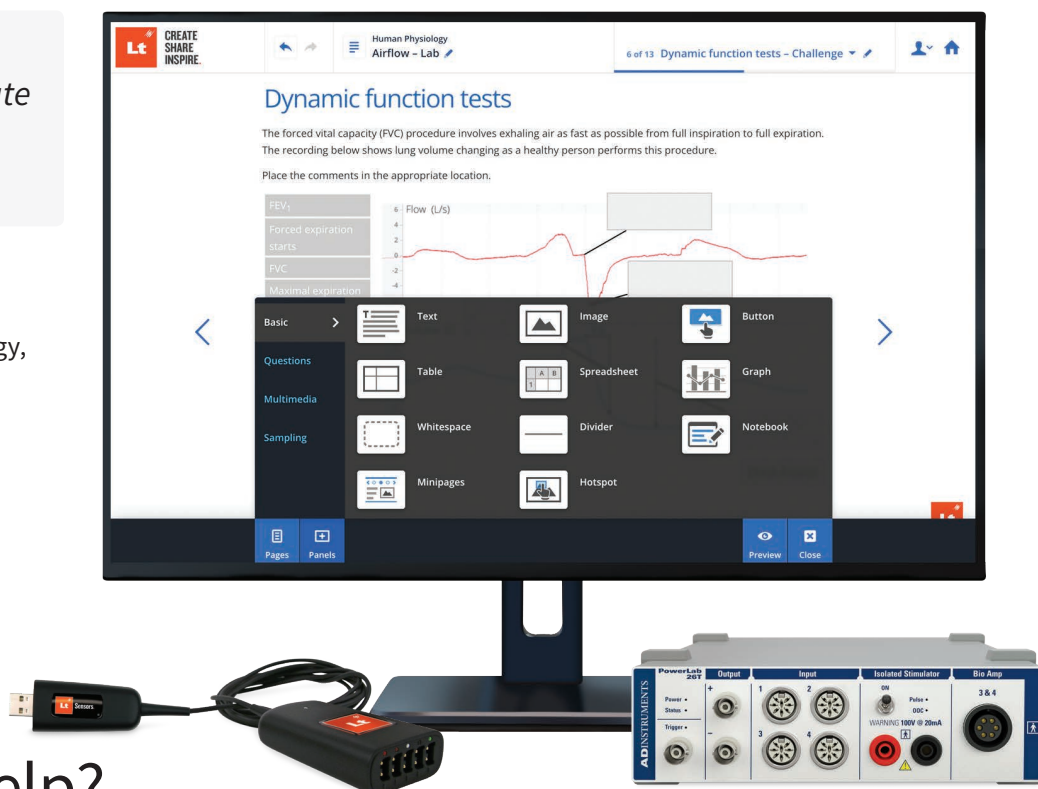


Drink a variety of solutions, then collect and measure the volume and specific gravity of the resulting urine over two hours.

*A module may include tutorial(s), pre-lab prep, lab.*

*"It allows me and my colleagues to collaborate on lesson plans in real-time."*

**Dr James Clark,**  
Senior Lecturer,  
Human and Applied Physiology,  
King's College, London



## How can Lt help?

### Educators

#### Authoring and customization

Easily edit, share, and update our content or create your own in real-time, wherever and whenever you need. Drag-and-drop a range of content types including video, audio, images, quizzes, and text directly into your lessons.

#### Collaborative

Share content and workload with your fellow educators and teaching assistants. Set varying levels of access to allow others to review content, add content, or publish revisions online.

#### Flexible grading

Automatically grade quizzes while keeping the flexibility to add feedback and positive reinforcement, and manually grade written assessments.

#### Supporting your Lt journey

When you sign up to Lt, you become part of our global community of Lt collaborators. We provide you with ongoing support, including a dedicated Customer Success Manager during onboarding and beyond to ensure you're meeting your teaching objectives.

### Administration

#### Simple setup

Lt needs only an internet browser to allow course administration, authoring, and publishing. Our data acquisition app, used for sampling, installs in 30 seconds.

#### Analytics

Our analytics allow you to view class progress in each lesson and section in your course, and provide valuable insights about where and how students are interacting with course material.

#### Secure and scalable

Totally secure, Lt is hosted on Amazon Web Service's encrypted servers with guaranteed 99% uptime and the ability to maintain speed as more students login to Lt.

#### Future-proof

Lt is automatically updated with new features by our team of engineers, developers, and education specialists.

### Students

#### Learn anywhere, anytime

Lt's cloud-based platform means students can learn on almost any device that connects to the internet. Whether they use iOS or Android, tablet, mobile, or laptop, lessons will be resized to suit.

#### PowerLab and Lt Sensor integration

In the lab, students can record and view their own physiological signals live on screen with PowerLab or Lt Sensors. Sampling panels in Lt can record Pulse, ECG, Respiratory Rate, Blood Pressure, and more.

#### Remote learning

The Human Physiology Collection comes with pre-recorded example data that students can use to achieve the desired learning outcomes, even when they can't make it to the lab.



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