

2011/12



MEDICAL & SCIENCE MEDIA

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[Cat #: MU-14](#)**Kidney Epithelial Transport, Proximal Tubule - Wins**

This interactive tutorial focuses on how the transport of solutes occurs in the proximal tubule of the kidney and how these systems are regulated by hormones and nerves. The tutorial complements lectures and practical classes for medical, health sciences, physiology and physiotherapy students. It aims to improve understanding of:

- functional and structural relations between parts of the nephron
- filtrate composition and solute movements across the proximal tubule epithelium
- cellular mechanisms at work in a proximal tubule epithelial cell
- how transport of solutes may be limited
- how hormones can regulate solute transport.

The tutorial begins with the anatomy of the kidney and nephron. You can explore photographs and diagrams of the kidney and nephron and view enhanced electronmicrographs of the proximal tubule.

Analysis of proximal tubule transport is introduced with explanations of the use of inulin and creatinine as markers for water reabsorption and how their clearance can be used to estimate glomerular filtration rate (GFR). You take samples to determine concentrations in tubular fluid and compare TF/P ratios along the proximal tubule of sodium, potassium, chloride, bicarbonate, glucose, amino acids, inulin, and osmotic concentration to decide whether each is reabsorbed or secreted or not reabsorbed or secreted.

You are then asked to construct a functioning proximal tubule epithelial cell capable of reabsorbing sodium, chloride, bicarbonate, glucose, amino acids and water by placing membrane transporters and channels on a cell template. Click "start cell" at any stage to begin the animation and see the ions and solutes move according to your design. Context-sensitive hints and feedback guide you toward the correct positioning of the Na<sup>+</sup>K<sup>+</sup>ATPase, Na<sup>+</sup>H<sup>+</sup> exchanger, K<sup>+</sup> channel, Na<sup>+</sup>HCO<sub>3</sub><sup>-</sup> cotransporter, solute (X) transporter and Na<sup>+</sup>X cotransporter. Putting transporters in incorrect positions and watching the animated outcome is quite entertaining, and setting up an unworkable arrangement and watching it unfold to its logical conclusion helps to build stronger understanding and problem-solving skills.

You investigate the saturation of transporters in the proximal tubule through an interactive animation of the renal threshold for glucose. Various rates of glucose filtration are applied to illustrate the concept of maximum transport. The tasks include questions on diabetes.

To view an example of a control mechanism for sodium reabsorption, you apply angiotensin II to your model of a proximal tubule cell with an AT1 receptor in place. You investigate the effect of applying an AT1 blocker.

Part A of the tutorial ends with a look at the relation between filtration and reabsorption in a superficial proximal tubule.

In Part B, you investigate the control by various hormones and neurotransmitters of reabsorption of water and solutes in the proximal tubule using the cell model you constructed. The model now has basolateral receptors for ANF (atrial natriuretic factor), endothelin, insulin, angiotensin II and noradrenaline. You can apply these hormones, and also AT1 antagonist (AT1-receptor blocker) and amiloride, to the cell to investigate the effects on sodium reabsorption, specifically its suppression.

**Authors:** Debbi Weaver, Robert Kemm, Lea Delbridge, Tom Petrovic, Peter Harris

[Cat #: MU-15](#)**Kidney, Glomerular Filtration - Wins**

The 'Kidney: glomerular filtration' CD-ROM is a tutorial program designed to complement medical and health sciences courses that focus on human and animal kidney functions. The tutorial program offers interactive simulations that actively engage students and accelerate understanding of the factors influencing glomerular filtration.

Students can investigate the effects of six factors that commonly alter the rate of glomerular filtration, namely: blood pressure; sympathetic nervous activity; hormones, especially angiotensin II; the effectiveness of the filtration barrier; plasma protein content; pressure in the proximal tubule and Bowman's capsule.

**Authors:** Tom Petrovic, Cobern Ott and Peter J. Harris

[Cat #: MU-12](#)**Blood Pressure Reflex Control - Wins**

This interactive tutorial focuses on the baroreceptor reflex, which maintains blood supply to the brain, particularly during postural changes. It covers concepts of feedback control and the regulation of blood pressure. The tutorial complements lectures and practical classes for medical, health sciences, physiology and physiotherapy students. It aims to improve understanding of:

- the mechanisms used by the body to monitor blood pressure and relay this information to the brain,
- how the brain processes this information, and
- how an appropriate response is produced in the heart and blood vessels.

The tutorial begins with a short case study of prolonged bed rest, which forms the basis for more discussion later in the tutorial.

In the first section, you familiarise yourself with the cardiovascular control centre in the brain, zooming in on a functional view of the vasomotor areas of the medulla - the cardiovascular pressor centre, cardiovascular depressor centre, and input region. More anatomical detail and a structural view of the caudal ventrolateral medulla (CVLM), nucleus of tractus solitarius (NTS), rostral ventrolateral medulla (RVLM) and nucleus ambiguus (NA<sub>m</sub>) are also provided. Feedback mechanisms in the regulation of blood pressure by the autonomic nervous system are revised, and then you look at signal inputs and outputs. Click on the "stimulate me" buttons for animations of afferent neurones, efferent neurones and neuronal circuits, and compare bursts of action potentials using the "listen to me" buttons.

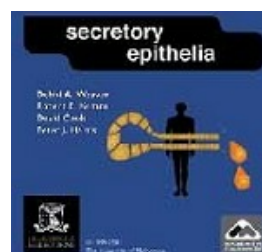
Your next task is to build a simple neuronal circuit. From a palette you create receptors and neurones (afferent neurones, sympathetic efferent neurones, parasympathetic efferent neurones, excitatory interneurones, inhibitory interneurones), and position them on a simplified template to build a functioning negative-feedback neuronal circuit. Click "raise BP" at any stage to begin the animation and see the action potentials moving around the system you have designed. Context-sensitive hints and feedback guide you in your choices. Watching the animated outcome is quite entertaining, and setting up an unworkable arrangement and watching it unfold to its logical conclusion helps to build stronger understanding and problem-solving skills.

Your main practical task is to build a model of the arterial baroreceptor reflex control of blood pressure. You select receptors and neurones as before and place them on a functional template that includes: the cardiovascular pressor centre, cardiovascular depressor centre and input region of the medulla; peripheral blood vessels; carotid sinus; carotid artery; aortic arch; vena cava; heart; parasympathetic ganglion; cervical sympathetic ganglion; thoracic sympathetic ganglion; and the cervical/thoracic, lumbar and sacral sections of the spinal cord. When you complete the model you can observe its operation and use it to answer questions from the Tasks sheet supplied. You can also get the human to stand up and see how the system maintains blood supply to the brain when posture changes, which brings us back to the initial case study.

Authors: Debbi A. Weaver, Lea Delbridge, Peter J. Harris, Tom Petrovic, Robert E. Kemm

[Cat #: MU-16](#)**Secretory Epithelia - Wins**

This interactive tutorial focuses on the cellular transport processes involved in the production of secretions by different organs of the body. It is designed to complement a medical or health science course. The five independent sections may be completed separately or worked through in sequence.



The first section is an introduction to secretion and covers the basic process of 2-stage secretion and the effect of flow rate on secretory fluid composition.

The section on sweat includes an interactive exercise building a cell model and control mechanisms, and covers the generation of a transepithelial current loop.

The section on saliva includes an interactive exercise on flow rates and fluid composition, and animated demonstrations of cell transport processes and control mechanisms.

Pancreatic secretions are covered in a section which includes introductory functional anatomy and animated demonstrations of cell transport processes and control mechanisms.

The final section describes cystic fibrosis as an example of a genetic mutation which produces different changes in secretions at different sites in the body. It includes introductory information on cystic fibrosis mutations, and animated demonstrations of cell transport processes in airway epithelia, both with and without cystic fibrosis. (Cystic fibrosis is used as a recurrent example of impaired secretion throughout all modules.)

All chapters include questions designed to revise and extend the material covered in the tutorial.

**Authors:** Debbi A. Weaver, Robert E. Kemm, David Cook, Peter J. Harris, Tom Petrovic

[Cat #: MU-27](#)

### The Liver - Wins & Mac

The Liver is a program comprised of three modules that focus on the functional and structural relationship between the liver cells, the mechanisms by which bile salts and bilirubin are transported as well as understanding the metabolism of bilirubin. The program also contains interactive, self-testing questions for students to assess their understanding of the main principles discussed.

Students who complete this program should be able to:

- Integrate and apply knowledge learnt from basic and clinical sciences.
- Interpret clinical findings and laboratory results in the area of Hepatology.
- Build models of the liver and enterohepatic circulation.
- Enhance their problem solving skills including hypotheses generation, mechanism building and information seeking.

**Author:** Dr Samy A Azer.

**System Requirements: Windows:** Minimum Requirements: 200mhz Pentium-based PC or compatible, 64 MB of RAM, Windows 95/98/NT/ME/2000/XP, Sound Blaster compatible card, 16 Bit Colour Display, 800x600 Screen Resolution. DirectX version 3.0 or later. Recommended Requirements: 300MHZ Pentium II/Celeron compatible or greater, 128MB of RAM, Windows 98/NT/ME/2000/XP. **Macintosh:** Minimum Requirements: 200mhz PowerPC processor-based Mac, 64MB of RAM, Mac OS 7.5.5, 16 Bit Colour Display, 800x600 Screen Resolution. Recommended Requirements: G3 or greater, 128MB of RAM, Mac OS 8.1 or later.

[Cat #: MU-24](#)

### Kinemyo - Wins & Mac

Kinemyo aims to provide year 1 Physiotherapy students with an understanding of mechanical principles (module 1) and the structure and function of skeletal muscle (modules 2 and 3) as a basis for developing skills in analysis of human movement.

Use of everyday examples facilitates understanding of important concepts that are then applied to examples relevant to physiotherapy theory and practice.

Each concept is accompanied by questions and feedback.

**Author:** Dr Elizabeth Tully

**System Requirements: Windows:** Windows NT or higher. **Macintosh:** Mac 9.1 or higher, both require Quicktime 6 and javascript enabled on the browser.

[Cat #: MU-17](#)**Sleep Health – Wins & Mac**

This program aims to assist medical students in learning the skills required to understand and manage an important community health issue, sleep health. The program allows students to undertake wide-ranging investigations before making decisions about appropriate treatment of sleep problems. It begins with an interactive role-play session where students get the opportunity to chair a public health forum on sleep health.



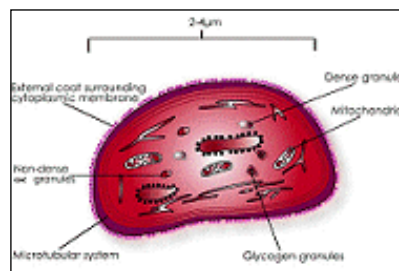
To further investigate topics raised in the forum, students access the resource sections on Polysomnography, Pathophysiology, Risk factors, Epidemiology, and Management. Students are then required to apply their knowledge of sleep health to four different patient cases, and to develop appropriate treatment regimes for each patient. The program encourages students to develop their own decision-making processes to resolve issues, in a manner that takes them beyond material covered in lectures, Problem Based Learning sessions and practical classes.

**Authors:** Robert Pierce, Robert Kemm, Terry Judd, Peter Harris, Chris Worsnop, Kristine Elliott, Gregor Kennedy, Paul Williams, Carolyn Casey and Kate Vanderstat.

**System Requirements: Macintosh:** OS system 8.6 or greater, Powermac, G3 or better, Total Ram 64 or greater, Millions of colours, 800 x 600 minimum display, Quicktime 4. **Windows:** Windows 95/98/ME/2000/NT/XP, 24 bit colour and 32Mb of RAM, 800 x 600 minimum display, Quicktime 4.

[Cat #: SB-1W](#)**Blood Coagulation - Wins & Mac**

The program is divided into several sections: Tutorials: uses text, colour graphics and animated graphics to teach the morphology and physiological function of platelets, the haemo-static mechanisms: platelet plug formation and coagulation (intrinsic, extrinsic and common pathways) and anti-clotting mechanisms especially fibrinolysis. Methods: uses text and animated graphics to describe the principles and a step-by-step method of each of the major laboratory tests used in producing a haemostatic profile (Bleeding time, Prothrombin Time, Activated Partial Thromboplastin Time (APTT), Thrombin Time). It also includes details of an automated technique using a coagulometer.



In Clinical Cases: the use of the test results in diagnosis is taught using a highly interactive problem-solving approach which requires students to use data from selected clinical case histories to make a diagnosis. For each of five different cases (haemophilia, Disseminated Intravascular Coagulation, von Willebrand Disease, alcohol-induced liver disease, pro-myelocytic leukaemia) a brief patient history and a haemostatic profile is provided. Students must answer on-screen questions and may access relevant further test results. They must then use this information to make a correct diagnosis from a list of possible conditions. Feedback and help are available throughout and there is also a glossary, which explains the medical terms used.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003. **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X. **Recommended Browser Software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-2W](#)**Blood Physiology - Wins & Mac**

The program is divided into three sections:

1. Red Blood Cell Indices - this program simulates the determination of standard red blood cell indices, which may be performed in the laboratory using fresh blood samples, and used to produce a haematological profile.

Red blood cell count - simulated haemocytometry, Haematocrit (PCV) - simulation of the use of an haematocrit reader Haemoglobin (Hb) concentration - simulated spectrophotometry including the construction of a standard haemoglobin curve.

In the Methods Section the principles of each method are explained using a combination of text and imaginative graphics. Students can then simulate performing the tests on either a normal male or a normal female subject. This allows them to interactively obtain results for red cell count, PCV and [Hb] which may then be entered into a simple calculation program to give MCV, MCH and MCHC. The complete haematological profile may then be printed.

2. Blood Groups - text and graphics are used to introduce and explain the basis of the determination of ABO and Rhesus blood groups. There is then an exercise in which students can observe the interaction of a blood sample, from a subject of unknown blood group, and known antisera (anti-A, anti-B and anti-D). They are then asked to select the correct blood group from a list of possible answers. Different blood groups are generated randomly and students can try as many examples as they wish. A record of their score is kept and displayed on-screen.

3. Anaemia's - Nine patient case histories are used to teach the principles of how the medical history, peripheral blood films and the results of haematological tests can contribute to diagnosis of anaemias. Each case has a brief medical history, a haematological profile (RBC count, Hb concentration, PCV, MCV, MCH, MCHC), a peripheral blood film which indicates how this differs from normal blood and the results of other blood indices. Students are required to select an appropriate diagnosis initially from one of the four main types (iron deficiency, megaloblastic, haemolytic and aplastic) and then with the aid of additional test results to further define this by selecting one from nine possible diagnoses (enzyme deficiency, thalassaemia, haemorrhage, sickle cell, bone marrow aplasia, folate deficiency, hereditary spherocytosis, vitamin B12 deficiency, autoimmune (drug induced), iron deficiency).

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003. **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X. **Recommended Browser Software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher

[Cat #: SB-10W](#)**Frog Heart - Wins & Mac**

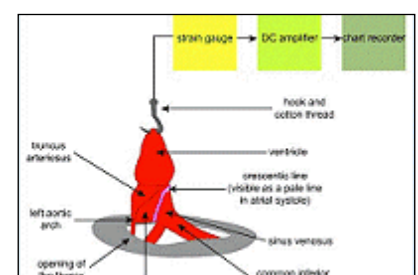
An interactive, menu-driven and easy to use program which simulates a number of experiments which can be performed on the 'in situ' heart of a pithed frog. High-resolution simulations of contractions of the frog heart, derived from real data, are presented on a scrolling display to simulate a chart recorder. The trace may be paused to facilitate measurement of heart rate or to assess changes in the amplitude of atrial or ventricular contraction.

**Experiments include:**

- Interpretation of a typical trace;
- the effects of adrenaline;
- the effects of acetylcholine (with physostigmine or atropine);
- the effects of temperature;
- refractory period;
- electrical conduction through the heart (Stannius ligatures).

Each experiment is prefaced by introductory text and includes an experiment guide and assignments.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.



[Cat #: SB-11W](#)**Physiology of the Heart - Wins & Mac**

The highly interactive program is designed to teach the basic physiology of the heart and is designed to complement and accompany a similar program (The Circulation.) covering the physiology of the circulatory vessels. It is divided into several sections accessed from a menu:

**Introduction:** structure and function of the cardiovascular system;

**The Heart:**

- gross structure - chambers and major blood vessels, the wall of the heart and the pericardium;
- heart valves - structure and function of atrioventricular and semi-lunar valves;
- histology - cardiac muscle and pacemaker cells;
- excitation - spread of depolarization and the ECG;
- heart sounds
- the cardiac cycle - pressure and volume changes;
- cardiac output - control by autonomic nerves, hormones and autoregulation.

High quality colour graphics are used extensively throughout the program and features such as animation and a Hypertext facility are used to enhance student learning. The program is highly interactive and uses several features to promote this. For example students are required to:

a) label diagrams by "dragging" labels from a list and "dropping" them into the box corresponding to the correct position on the diagram; b) interpret recordings of pacemaker cell action potentials to better understand the effect of autonomic nerves on heart rate.

In addition they must answer a variety of questions included in each section. These may be multiple choice, selecting correct phrases from a list to complete a statement, and true/false questions with feedback.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-3W](#)**Physiology of the Circulatory Vessels - Wins & Mac**

The highly interactive program is designed to teach the basic physiology of the circulation. It is divided into several sections accessed from a menu:

**Introduction:** - structure and function of the circulatory system;

**The Circulatory vessels:**

1. Structure and function - blood vessel wall, arteries, arterioles, capillaries, venous vessels;
2. Blood flow - flow, pressure and resistance.
3. Peripheral resistance - peripheral resistance vessels and their control;
4. Blood pressure - measurement, regulation of BP (autonomic reflexes, hormones, intrinsic regulation, long-term control by kidneys).

High quality colour graphics are used extensively throughout the program and features such as animation and a Hypertext facility are used to enhance student learning. The program is highly interactive and uses several similar features to those described opposite.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-25W](#)**Respiratory Physiology - Wins & Mac**

This highly interactive program is designed to be used as a student-centred, self-paced learning resource and would occupy students for 3-4 hours. The content is divided into several sections accessible from a menu:

- Introduction - the basic principles of respiration put into a health context by introducing some of the more common respiratory disorders.
- Structure of the respiratory tract - structure and function of the upper respiratory tract (nose, mouth, pharynx and larynx), trachea, lungs, bronchial tree and alveoli.
- Transport of gases
- transport of oxygen by haemoglobin (normal dissociation curve and physiological factors affecting it),
- carbon dioxide (dissolved in plasma, in combination with haemoglobin, as bicarbonate).
- Mechanics of breathing - introduces respiratory volumes and capacities and covers how the contractions of the respiratory muscles and diaphragm give rise to inspiration and expiration. Muscles involved in forced respiratory movements .
- Control of Respiration
- Nervous control - central respiratory centres, autonomic reflexes and conscious control of breathing.
- Chemical control - central and peripheral chemoreceptors, influence of hydrogen ions, carbon dioxide and oxygen in regulation of breathing.

High quality interactive graphics and animations are used extensively to explain principles such as how the respiratory muscles and diaphragm interact to cause inspiration and expiration. Throughout the emphasis is on problem-based tasks - interpretation of graphical data (e.g. haemoglobin dissociation curves), interpretation of experimental data, calculations (e.g. ventilatory volumes and dead space, volume of oxygen in arterial and venous blood), and exercises to stimulate understanding. There are also self-assessment questions (multiple choice, multiple true/false) in each section.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-30W](#)**Chest Clinic - Wins & Mac**

This program is designed to cover the principles of respiratory function testing and adopts a patient orientated, case-centred approach to teach, by investigation, the use of these tests in the diagnosis of common respiratory disorders. It is aimed at undergraduate medical/science students studying physiology on a range of biomedical courses. The program is divided into several sections:

**TUTORIAL** is subdivided into: Introduction; Limitation to Airflow; Lung Size; Gas Transfer; Bronchodilation; Constriction; Normal Values; Test your knowledge. Each section typically combines text, high-quality graphics, animations to explain the underlying physiology, anatomy and pathophysiology. Self-assessment questions are used for students to assess how much they have understood.

**METHODS** is subdivided into: Introduction; Peak Expiratory Flow; Spirometry; Reversibility; Challenge Tests (Metacholine, exercise); Lung Volumes; Transfer Factor; Each section typically combines text, high-quality graphics, animations and video-clips to explain, in detail, the principles of the investigative methods used to assess respiratory function. Self-assessment questions are used for students to assess how much they have understood.

**CASES** contains details of seven patients including a normal subject and patients suffering a range of respiratory disorders. For each the user is presented with the results of relevant respiratory function tests which may be compared to predicted normal values for that patient. Users are required to draw conclusions (in the form of true/false questions) about the patients' conditions.

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[Cat #: SB-23W](#)**Experiments on Renal Function in Humans - Wins & Mac**

This highly interactive computer program is designed to allow students to collect urine and plasma data from groups of healthy male students who took part in the following investigations:

1. control experiment (no water loading)
2. water loading experiment
3. experiments to investigate the action of four diuretics (acetazolamide, amiloride, hydrochlorothiazide, bumetanide) in water loaded subjects

For each experiment, data are presented (mean values: n=10) graphically for:

- plasma electrolyte concentrations ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$ )
- plasma creatinine concentration and plasma osmolality
- urine electrolyte ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ,  $\text{HCO}_3^-$ )
- urine creatinine output and total solute output
- urine osmolality
- urine flow

Students observing data from water-loaded subjects may superimpose control data to give a visual comparison. Similarly, water-loading data can be superimposed for each of the diuretic experiments.

The program also describes the protocol for each experiment and, in brief, the methods used to analyse urine and plasma. Accompanying each experiment are several interactive questions and tasks to emphasise the important physiological principles. These may be questions (e.g. multiple choice or true false with feedback), data interpretation exercises, or calculations. For example, for each experiment and in addition to other questions, students are asked to calculate using data they have collected from the program: glomerular filtration rate; total and fractional (%) water re-absorption; total and fractional (%)  $\text{Na}^+$  re-absorption. The calculations require them to take measurements from the graphical screen displays, enter it into well-established formulae and type in their answers. Assistance with the calculations is available via an on-screen "Help" and, if they get the answer incorrect, there is also a "Tell" facility which demonstrates how the correct answer is arrived at. These questions are designed to consolidate knowledge and to allow students to self-assess their understanding of the section they have completed. A summary of all other data, which may be calculated, is also incorporated.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-15W](#)**Intestinal Absorption - Wins & Mac**

The program simulates experiments designed to demonstrate by investigation the important characteristics of the transport of two important nutrients - hexoses and amino acids, in the small intestine.

INTRODUCTION and METHODS use a combination of text and high-resolution graphics to explain the process of carrier-mediated transport of these nutrients, the everted sac preparation and the methods used to measure nutrient transport: using radio labelled galactose, glycine and methionine and a scintillation counting technique; measuring the transmural potential difference particularly for kinetic analysis of the transport system.

EXPERIMENTS allows the user to collect sample data from a range of experiments designed to:

1. Measure the transport of each of these nutrients - Control experiments;
2. Demonstrate the  $\text{Na}^+$  dependence of the transport process by measuring transport of each nutrient when the mucosal fluid contains reduced concentrations of sodium ions ( $\text{NaCl}$  partly replaced with  $\text{KCl}$ /tris chloride/choline chloride); investigate the mutual interaction of the hexose and amino acid transport systems by performing a series of experiments (including a kinetic analysis and calculation of apparent  $K_m$  and  $V_{max}$  for the transport process) to assess whether the interaction is due to competition for energy or competition at the carrier level.

Students are presented with raw data: weights: wet empty sac; weight of sac containing 0.5ml Krebs bicarbonate saline; wet weight after incubation in mucosal fluid containing a nutrient; wet weight of final empty sac; radioactive counts) cpm, ESR, dpm, blank- corrected dpm): blank; control sample; serosal sample, gut sample. The data is based on predictive models of carrier-mediated transport, which have been verified by experiment. Students collect the data and use them to calculate transport parameters e.g. mucosal fluid transfer, total amount of nutrient transferred, final gut concentration and T/M ratio, in much the same way as they would if they performed the experiment for real.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

### [Cat #: SB-14W](#)

#### Insulin and Glucagon - Wins & Mac

The highly interactive program is designed to teach the basic physiology of the pancreatic hormones and the regulation of blood glucose. It covers:

- location and structure of the Islets of Langerhans
- factors affecting release of insulin and glucagon and their effects on target cells
- principal clinical disorders - Type I and Type II diabetes mellitus (causes, symptoms and treatment)
- hypoglycaemia and hyperglycaemia

High quality colour graphics are used extensively throughout the program and features such as a Hypertext facility are used to enhance student learning. The program uses several features to promote interactivity e.g. students are required to:

1. Identify correct actions of hormones or characteristics of certain clinical conditions by "dragging" phrases/words from a list and "dropping" them into the appropriate box on the diagram, 2. Answer a variety of self-assessment questions on the glucose tolerance test.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

### [Cat #: SB-26W](#)

#### Thyroid Hormones - Wins & Mac

The highly interactive program is designed to teach the basic physiology of the thyroid hormones and covers:

- location and structure of the thyroid glands,
- synthesis, release, transport and mechanism of action of the thyroid hormones,
- function of the thyroid hormones T3 and T4,
- principal abnormalities of thyroid function - hypothyroidism and hyperthyroidism.

High quality colour graphics are used extensively throughout the program and features such as animation and a Hypertext facility are used to enhance student learning. The program is highly interactive and uses several features to promote this. For example students are required to:

1. Label diagrams by "dragging" labels from a list and "dropping" them into the box corresponding to the correct position on the diagram, 2. Answer a variety of questions included in each section. These may be multiple choice, selecting correct phrases from a list to complete a statement, and true/false questions with feedback.

**System Requirements: Windows:** 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-6W](#)**Introduction to Endocrinology - Wins & Mac****An interactive computer-based tutorial to introduce the endocrine system**

This highly interactive program is divided into several sections, each of which may be accessed from a menu:

**Introduction:** an overview of the function of the endocrine system, location of some of the important endocrine glands;

**Chemical properties:** covers the three main chemical groups of hormones: peptides and glycoproteins, steroids and amines, giving examples of each. For each group the program describes the synthesis, transport and physiological implications of the chemical properties.

**Cellular Mechanisms of Action:** covers the main features of how (i) peptide and catecholamine hormones act at the cellular level (second messengers) and (ii) steroids and thyroid hormones act at the cellular level;

**Hypothalamus - Pituitary:** describes the anatomy of the structures and the relationship and connections between the hypothalamus and the pituitary gland; the hormones of the anterior and posterior lobes, regulation of their release and main physiological functions.

High quality colour graphics are used extensively throughout the program and features such as animation and a **hotword** facility are used to enhance student learning. The program is highly interactive and uses several features to promote this. For example the main sections all have associated student tasks e.g. true/false questions with feedback, drag-and-drop exercises. These are designed to allow students to assess their understanding of the section they have completed and also to present additional information and explanations through the feedback. The learning package is intended to be used either: to support existing teaching methods, or for independent study where it could be used as an alternative to staff-led tutorials or lectures. It is estimated that it would occupy students for two to three hours of fairly intensive study and is suitable for primary learning or revision. The question-answer sections may also be useful for self-assessment.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player, v8 or higher.

[Cat #: SB-35W](#)**Parathyroid Hormone, Calcitonin and Vitamin D - Wins & Mac**

The highly interactive program is designed to teach the basic physiology of the hormones involved in the regulation of plasma calcium. It covers:

- location and structure of the parathyroid glands,
- synthesis, release, transport and action of parathyroid hormone, calcitonin and vitamin D on bone, kidney and gastrointestinal tract,
- physiological role of calcium,
- structure of bone and bone remodelling,
- principal abnormalities of calcium metabolism - hyperparathyroidism, hypoparathyroidism, vitamin D deficiency and osteoporosis.

High quality colour graphics are used extensively throughout the program and features such as animation and a Hypertext facility are used to enhance student learning. The program uses several features to promote interactivity e.g. students are required to:

- (i) label diagrams by "dragging" labels from a list and "dropping" them into the appropriate box on the diagram,
- (ii) answer a variety of self-assessment questions (multiple choice, selecting correct phrases from a list to complete a statement, and true/false questions with feedback).

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-5W](#)**Introduction to the Clinical Aspects of Pain - Wins & Mac**

This highly interactive program is divided into several sections each of which may be accessed from a menu:

- **Introduction,**
- **Terminology:** definitions and explanations of important terms e.g. pain, analgesia, allodynia, hyperalgesia, nociceptors,
- **Types of Pain:** e.g., acute, chronic, nociceptive, neuropathic,
- **Functions of Pain:** under normal physiological conditions,
- **Pain and Injury:** examples of the variable link between pain and injury,
- **Dimensions of Pain:** sensory, affective, cognitive,
- **Pain Assessment:** pain assessment tools including rating scales and pain location charts,
- **Pain Management:** introduction to pharmacological and non-pharmacological methods of pain relief,
- **Summary,**
- **Revision:** 20 self-assessment MCQ questions.

High quality colour graphics, animation and Hypertext are used extensively throughout the program to enhance student learning. The program is highly interactive and uses several features to promote this - e.g. students are required to:

1. Label diagrams by "dragging" labels from a list and "dropping" them into the box corresponding to the correct position on the diagram;
2. Interpret different pain charts,
3. Answer a variety of questions which may be multiple choice, selecting correct phrases from a list to complete a statement, true/false questions with feedback, hangman game, matching definitions with statements etc.

The learning package is intended to be used either to support existing teaching methods or for independent study where it could be used as an alternative to staff-led tutorials or lectures (the material covers approximately two to three one-hour lectures to first year students). It is estimated that it would occupy students for two to four hours of fairly intensive study and is suitable for primary learning or revision. The question-answer sections may also be useful for self-assessment.

**System Requirements:** IBM PC's running Windows, CD-ROM drive.

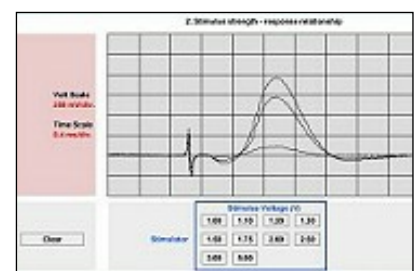
[Cat #: SB-19W](#)**Nerve Physiology - Wins & Mac**

An interactive, menu-driven and easy to use program, which simulates a number of experiments performed on the frog sciatic nerve preparation to illustrate some of the important properties of mixed nerves. High-resolution graphic simulations of compound nerve action potentials, derived from real experimental data, are displayed on a simulated oscilloscope screen. Experiments include;

- stimulus voltage/response relationships,
- investigation of refractory period,
- measurement of conduction velocity,
- effects of temperature and action of a local anaesthetic.

Each experiment is prefaced by introductory text, and each experiment has associated assignments. The package includes a **manual, tutor's guide and student workbook**.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x.  
**Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.



[Cat #: SB-18W](#)**Muscle Physiology - Wins & Mac**

An interactive, menu-driven and easy to use program, which simulates experiments on the frog sciatic nerve - gastrocnemius muscle preparation to illustrate physiological properties of skeletal muscle.

**Experiments include:**

- stimulus voltage/response relationships,
- summation,
- tetanus,
- length-tension relationship,
- action of curare.

Real experimental data is used to generate simulated muscle contractions, which are displayed in a form comparable to that of an oscilloscope. Each experiment is prefaced by introductory text, and experiment guide and includes assignments (MCQ, true-false, data interpretation) for students to complete which are designed to reinforce underlying physiological principles, and test accuracy of data collection and data interpretation.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003 **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.

[Cat #: SB-8W](#)**Exercise Physiology - Wins & Mac**

An interactive, menu driven program, suitable for students of biology at high school and undergraduate level. This program simulates some of the important physiological measurements which can be made to assess cardio-respiratory performance or "fitness" in the laboratory. The program presents results, in a form comparable to a chart recorder (in high resolution graphics), from healthy individuals performing a fixed schedule of graded exercise on a bicycle ergometer, and includes:-

**Heart Rate,  
Minute (Pulmonary Ventilation),  
Oxygen Consumption,  
Blood Lactate Concentration**

Measurements can be taken from the trace by pausing it and using the cross-hair cursor facility provided. The program simulates the response of a subject working continuously under a work load which is increased by increments of 20 watts each minute until the subject is exhausted. The screen display also shows a digital clock and work load meter. Heart rate is monitored continuously and respiratory performance is assessed by breath-by-breath analysis of expiratory air samples. Blood samples may be taken during the exercise regime and the [lactate] determined using a simulated spectrophotometer.

The program allows subject parameters (age, weight, height, sex, trained or untrained) to be determined by the user and may thus be used to compare, for example, male with female performance, or the effects of training or age.

**System Requirements: Windows:** Intel Pentium II 450MHz or faster processor (or equivalent), 128MB of RAM; Microsoft Windows 98, Windows Me, Windows 2000, Windows XP or Windows Server 2003. **Macintosh:** PowerPC G3 500MHz or faster processor, 128MB of RAM; Mac OS X v.10.1.x, 10.2.x, 10.3.x, or 10.4.x. **Recommended browser software: Windows:** Internet Explorer; **Macintosh:** Safari or Firefox; Both: Adobe Flash Player plug-in, version 8 or higher.





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