Computer software for physiology education

The computer programs listed below are presented to help physiologists locate appropriate software for use in their curricula. These programs have not been reviewed by Advances in Physiology Education, and inclusion in the listing does not constitute endorsement of the software. If you use or are aware of software that may be useful in teaching physiology, please share this information with us, so that it can be included in future listings. Send pertinent information to Harold Modell, Editor, Advances in Physiology Education, National Resource for Computers in Life Science Education, PO Box 51187, Seattle, WA 98115-1187.

AneSoft Corporation
13051 SE 4th Place
Bellevue, WA 98006
(206) 644-7488

Artwave: the Radial Artery Pressure Waveform. Simulation dealing with factors influencing the shape of the radial arterial pressure waveform. Available for IBM-PC-compatible equipment.


Axon Instruments, Inc.
1101 Chess Drive
Foster City, CA 94404
(415) 571-9400

Axon: A simulation program that investigates the mechanisms underlying the action potential by graphically fitting the Hodgkin-Huxley equations for single or multiple channels. Available for IBM-PC-compatible equipment.

Barry, Dr. Peter H.
School of Physiology and Pharmacology
University of New South Wales
P.O. Box 1, Kensington
NSW 2033
Australia
61-2-697

Memspot: A graphical interactive program that simulates the measurement of membrane potentials in a number of excitable cells and allows the fitting of permeability parameters to the data. Available for IBM-PC-compatible equipment.

BIOSOFT
22 Hills Road
Cambridge CB2 1JF, UK; or
P.O. Box 10938
Fergusson, MO 65135


Ileum. Simulates laboratory experiments investigating effects of drugs on the in vitro guinea pig ileum. Program available for Apple II and IBM-PC-compatible equipment.

Neurosim. Package of four simulations dealing with passive conduction in a long length of axon, the Hodgkin-Huxley equation, postsynaptic potentials, and rhythmic properties of a simple neural network. Available for Apple II and IBM-PC-compatible equipment.

Biosource Software
2105 S. Franklin, Suite B
Kirkville, MO 65501
(816) 665-3678

Concepts in Thermography. Tutorial covering basic DC concepts, peripheral vascular physiology, detecting skin temperature, amplifiers, and processing DC signals. Program for Apple II equipment.


Skeletal Muscle Anatomy/Physiology. Tutorial covering three muscle categories, skeletal muscle microstructure, sliding filament theory, motor units, and lever systems. Program for Apple II equipment.

Skills in Electromyography. Tutorial covering skin preparation, reducing EMG artifact, testing a myograph's operation, electrode location, and preventing shock hazards. Program for Apple II equipment.

Branck, Dr. Charles
Department of Physiology and Biophysics
Auburn University
Auburn, AL 36849
(205) 844-5414

Interactive Videodisc Basic Science Laboratories for Health Sciences Education. In teractive videodisc simulation of cardiovascular laboratories. Available for MS-DOS computers with either IBM Infowindows, Sony View II, or the Matrox VGO overlay system.

Decker Electronic Publishing, Inc.
P.O. Box 785
Lewiston, NY 14092-0789
(416) 639-6215

Arterial Blood Gas Analysis. A series of exercises designed to sharpen clinical skills in assessing blood gas levels. Available for IBM-PC-compatible and Macintosh equipment.

Dietz, Dr. John R.
Department of Physiology and Biophysics
University of South Florida
College of Medicine, Box 8
Tampa, FL 33612
(813) 974-9723

Endolab. An endocrine physiology computer laboratory designed to provide some experience with the effects of a number of hormones as well as practice in problem-solving in endocrinology. Available for IBM-PC-compatible equipment.

Glimmer Filtration, Concentration-DilutionTm. A package of three renal physiology teaching programs. Available for IBM-PC-compatible equipment.

Educational Materials and Equipment Co.
P.O. Box 2805
Danbury, CT 06813-2805
(203) 798-2050

Human Circulatory System. High-resolution pictorial simulation. Available for Apple // (enhanced) and IBM-PC-compatible equipment.

Educe Education Technologies
P.O. Box 199
Whitewood, SD 57793
(605) 269-2612

From the Heart Software
211 S. Stadium Drive
Monmouth, OR 97361
(503) 838 1960

Cardiovascular Function Laboratory/Physiology Laboratory Tutor. Programs developed to provide problem-based learning in cardiovascular physiology. Available for IBM-PC-compatible and Macintosh equipment.

Gaar, Dr. Kermit A.
Department of Physiology and Biophysics
School of Medicine in Shreveport
Louisiana State University Medical Center
Shreveport, LA 71130-3982
(318) 674-6010

O2/CO2 Transport Model. Simulation for studying oxygen transport from the lungs to the tissues. Available for Apple II and IBM-PC compatible equipment.

Goerke, Dr. Jon
CVRI
University of California, San Francisco
San Francisco, CA 94145-0130

The Cardiac Cycle. HyperCard stack providing students with three animations for viewing the cardiac cycle: a four-chamber echocardiographic sequence, a Wiggers' plot of physiological variables, and a pressure-volume diagram of the left ventricle. Available for Macintosh equipment.

The Cardiac Vector. HyperCard stack examining how myocardial electrical events generate the frontal vectorcardiogram and the standard limb leads of the electrocardiogram. Available for Macintosh equipment.

The Einthoven Triangle. HyperCard stack that allows students to explore how changes in the direction and magnitude of the cardiac net dipole vector affect voltages in the standard electrocardiographic leads. Available for Macintosh equipment.

Hempling, Dr. Harold G.
Department of Physiology
Medical University of South Carolina
171 Ashley Avenue
Charleston, SC 29425-2288
(803) 792-2005

Acid-Base Physiology Simulation. Simulation of acid-base disturbances based on Davenport diagram. Program available for IBM PC compatible equipment.

Cardiovascular Interactions. Cardiovascular physiology simulation. Program available for IBM-PC compatible equipment.

Gas Diffusion in the Lung. Simulation of oxygen and CO2 transfer between alveolar air and blood. Program available for IBM-PC compatible equipment.

Renal Glomerular Dynamics. Simulation of human glomerulus and factors that affect glomerular filtration rate. Program available for IBM-PC compatible equipment.

Intellitool Incorporated
P.O. Box 459
Batavia, IL 60510-0459
(708) 406-1041; (800) 227-3805

Cardiocomp. ECG/RRG data acquisition and analysis system. Available for IBM-PC compatible equipment.

Flexicom. Data acquisition and analysis system for studying the reflex arc. Available for Apple II and IBM-PC compatible equipment.

Physiogrip. Data acquisition and analysis system for the muscle physiology lab. Available for Apple II and IBM-PC compatible equipment.

Spirocomp. Data acquisition and analysis system for measuring lung volumes and capacities. Available for Apple II and IBM-PC compatible equipment.

Intellimation Library for the Macintosh
Department YAS
P.O. Box 1922
Santa Barbara, CA 93116-1922
(800) 346-8355

Cella. Simulates experiments in tracking the movement of cells through the four-state mitotic cell cycle. Available for Macintosh equipment.

Cockroach Nerve Cord. HyperCard lab stack gives an extensive description of the classic cockroach nerve preparation and covers principles of extracellular recording, recording from giant axons in the nerve cord, and stimulation of single cerebral hairs. Available for Macintosh equipment (requires HyperCard 1.2.2).

Crab Ion Balance. HyperCard stack describing the effects of blood sodium levels in crabs bathed in water with different salinities. Available for Macintosh equipment (requires HyperCard 1.2.2).

Effect of Size on Mouse Metabolism. HyperCard stack describing the effects of mouse size on the metabolic rate. With the use of simple metabolic chambers, experiments are performed on mice of different sizes. Available for Macintosh equipment (requires HyperCard 1.2.2).

Frog Gastrocnemius Muscle. HyperCard stack describing the classic frog gastrocnemius muscle preparation. Covers the muscle twitch, stimulus-response relationships, work done, summation, and tetanus. Available for Macintosh equipment (requires HyperCard 1.2.2).

Acid-Base Physiology Simulation. Simulation of acid-base disturbances based on Davenport diagram. Program available for IBM PC compatible equipment.

Cardiovascular Interactions. Cardiovascular physiology simulation. Program available for IBM-PC compatible equipment.

Gas Diffusion in the Lung. Simulation of oxygen and CO2 transfer between alveolar air and blood. Program available for IBM-PC compatible equipment.

Renal Glomerular Dynamics. Simulation of human glomerulus and factors that affect glomerular filtration rate. Program available for IBM-PC compatible equipment.
**Frog Heart.** HyperCard stack describing the classic frog heart preparation. Covers heart contraction, temperature effects, adrenaline, and acetylcholine effects, and the refractory period of the ventricle. Available for Macintosh equipment (requires HyperCard 1.2.2).

**Frog Sciatic Nerve.** HyperCard stack describes the classic frog sciatic nerve preparation. Covers nerve conduction, undulation velocity, bidirectionality, effects of temperature, and refractory periods. Available for Macintosh equipment (requires HyperCard 1.2.2).

**Human Electrocardiogram.** HyperCard stack describes the classic human ECG (response, artifacts, heart sounds, exercise effects) and finger pulse (dichrotic notch, exercise effects, temperature effects). Available for Macintosh equipment (requires HyperCard 1.2.2).

**Human Lung.** HyperCard stack allowing students to record breathing movements and the corresponding electrocardiogram. The experiments include the effect of gravity on lung capacity and of breathing on breathing. Available for Macintosh equipment (requires HyperCard 1.2.2).

**Model Neuron.** Simulated experiments demonstrating the dynamic aspects of excitable cell behavior. Available for Macintosh equipment.

**Mouse Thyroid Gland.** HyperCard stack describes the effects of reversal thyroid destruction on growth rate and cold temperature on the metabolic rate. Available for Macintosh equipment (requires HyperCard 1.2.2).

**Think Tank.** Allows experimental differentiation between chemical synapses, electrical synapses, and no synapses. Available for Macintosh equipment (requires HyperCard 1.2.2).

**Water and Ion Movement Across Frog Skin.** HyperCard stack describes the effects of ouabain and antidiuretic hormone on the movement of sodium and water across frog skin. Available for Macintosh equipment (requires HyperCard 1.2.2).

**I.R.L. Press**

- **Box P.0.15** Eynsham
  - Oxford OX8 1J1, UK

  **Macman.** Simulation of circulatory system. Available for IBM-PC-compatible equipment.

  **Macpec.** Simulation of interactions of renal physiology. Available for IBM-PC-compatible equipment.

  **Macput.** Simulation of cardiopulmonary physiology. Available for IBM-PC-compatible equipment.

**J & S Software**

- **14 Vanderbilt Avenue**
  - Port Washington, NY 11050

  (516) 944-8304

  **Digestion.** Tutorial covering digestion in simple organisms and humans. Program available for Apple II and TRS-80 model III equipment.

  **Endocrine System.** Tutorial covering hormones, effects, and problems. Program available for Apple II and TRS-80 model III equipment.

  **Excretion.** Tutorial reviewing metabolic wastes, waste removal, and kidney function. Program available for Apple II and TRS-80 model III equipment.

**Mad Scientist Software**

- **13422 North Bayberry Circle**
  - Alpine, UT 84004

  (801) 756-0027


**Mines, Dr. Allan H.**

- **Department of Physiology**
  - University of California, San Francisco
  - 513 Parnassus Avenue
  - San Francisco, CA 94143

  (415) 476-2889

  **Psimple.** Twenty-five problem sets, each containing between 4 and 15 problems. Areas covered include cardiovascular, respiratory, and renal physiology. Available for Macintosh equipment.

**National Biomedical Simulation Resource**

- **Duke University Medical Center**
  - Box 3709
  - Durham, NC 27710

  (919) 681-3048

  **SCoP—Simulation Control Program.** General purpose simulation package. Available for IBM-PC-compatible and DEC VAX equipment and most computers running the UNIX operating system.

**NRCLSE**

- **National Resource for Computers in Life Science Education**
  - P.O. Box 51187
  - Seattle, WA 98115

  (206) 522-0045

  **Common Themes in Physiology—Conservation of Mass.** Simulations/problems applying conservation of mass principles to physiological situations. Included are indicator dilution experiments and mass balance experiments. Available for IBM-PC-compatible equipment.

  **Common Themes in Physiology—Osmotic Pressure Relationships.** Tutorial format using simulated experiments covering determining of osmotic pressure, cell reactions to osmotic environments, and fluid movement at the capillary. Available for IBM-PC-compatible equipment.

  **Simulations in Physiology—the Respiratory System.** Series of 12 simulations dealing with respiratory mechanics, gas exchange, chemoregulation, and acid-base balance. Program available for Apple II, IBM-PC-compatible, and Macintosh equipment.

**New Jersey Medical School**

- **Joseph Boyle, MD**
  - 100 Bergen Street
  - Newark, NJ 07113

  (201) 456-4464

  **Abgame.** Tutorial and game providing practice in acid-base principles. Program available for IBM PC compatible equipment.

  **CAPEXCH.** Simulation dealing with exchange at the capillary level. Available for IBM PC compatible equipment.

  **Circsyst.** Simulation dealing with pulmonary mechanics. Available for IBM-PC-compatible equipment.

  **Circsyst, Gasexch.** Simulations dealing with pulmonary gas exchange. Available for IBM-PC-compatible equipment.

**Oakleaf Systems**

- **Box P.0.47**
  - Decorah, IA 52101

  (319) 382-4320

  **Physiological Data Simulation.** Twenty-five simulations covering aspects of physiology. Program available for Apple II and IBM-PC-compatible equipment.

**Omega Ware**

- **P.O. Box 8024**
  - Ft. Collins, CO 80526

  (303) 491-7808

  **Basic Biology Series.** A series of 50 tutorial programs covering topics typically covered in freshman biology. Physiology topics include blood glucose, cells, countercurrent exchange, digestive enzymes, hormonal regulation, kidney function, neural transmission, and osmoregulation. Available for Macintosh equipment.

**P11 Enterprises**

- **P.O. Box 5185**
  - Bridgeport, CT 06610

  (203) 366-0258

  **The Engine of Life.** An animated tutorial about the human heart. Available for IBM-PC-compatible equipment.

**Queue, Inc.**

- **562 Boston Avenue**
  - Bridgeport, CT 06610

  (800) 229-2224

  **Cardiac Muscle Mechanics.** Simulation of heart muscle behavior in response to changes in length, load, and contractility. Available for IBM-PC-compatible equipment.

  **Mechanical Properties of Active Muscle.** Set of six programs concerned with skeletal muscle contraction. Available for IBM-PC-compatible equipment.
Randall, Dr. James
609 S. Jordau
Bloomington, IN 47401
(812) 335-1574


Rush Medical College
Drs. Joel Michael and Allen Rovick
Department of Physiology
1750 West Harrison Street
Chicago, IL 60612
(312) 942-6426; (312) 942-6567

Cardiovascular Physiology Part I: Pressure/Flow Relations. Tutorial dealing with a variety of calculations in the area of hemostatics/hemodynamics. Program available for IBM-PC-compatible equipment.

Cardiovascular Physiology Part II: Reflex. Tutorial dealing with carotid sinus regulation of blood pressure, and reflex responses in hemorrhage and exercise. Program available for IBM PC compatible equipment.

Ciresim: a Teaching Exercise on Blood Pressure Regulation. Simulated experiments based on a model of the baroreceptor reflex loop. Program available for IBM PC compatible equipment.

Gasp-PC: a Teaching Exercise on the Chemical Control of Ventilation. This is a simulated experiment based on a model of the chemical control of ventilation (MAC-PUF). Available for IBM-PC-compatible equipment.

Muscle Mechanics: a Computer Simulated Experiment. Simulated experiment that permits the user to determine either the length-tension or the force-velocity relationship of a skeletal muscle. Program available for IBM-PC-compatible equipment.

Problems in Fluid Compartment Re-Distribution. Tutorial covering solution of simple problems of fluid compartment changes in the face of perturbations. Program available for IBM-PC-compatible equipment.

Scott, Foresman and Company
1990 East Lake Ave.
Glencie, IL 60025
(312) 729-3000

Human Body-Structure and Function. Simulation covering joint movement, movement of food through digestive system, and enzyme activity. Program available for Apple II equipment.

Sheffield BioScience Programs
Dr. David Dewhurst
Department of Applied Science
Leeds Polytechnic
Culverley Street
Leeds LS1 3HE, U.K.

Exercise Physiology. Simulation of some of the important physiological measurements that can be made to assess cardio-respiratory performance or "fitness" in the laboratory. Available for IBM-PC-compatible equipment.

Frog Heart. Simulation of experiments that can be performed on the in situ frog heart. Available for IBM-PC-compatible and Acorn (BBC) equipment.

Frog Skin—Membrane Transport. Simulation of experiments that can be performed on the frog skin preparation to teach the principles of the epithelial transport of ions. Available for IBM-PC-compatible equipment.

Guinea Pig Ileum. Simulation of the isolated, transmurally stimulated guinea pig ileum preparation to investigate the effects of drugs on neurotransmitter release in the enteric nervous system. Available for IBM-PC-compatible equipment.

The Langendorff Heart. Simulates experiments that can be performed on the isolated perfused mammalian heart (Langendorff preparation). Available for IBM-PC-compatible equipment.

Muscle Physiology. Simulation of experiments that can be performed on the isolated frog sciatic nerve-gastrocnemius muscle to illustrate some of the physiological properties of skeletal muscle. Available for IBM-PC-compatible and Acorn (BBC) equipment.

Nerve Physiology. Simulation of experiments that can be performed on the isolated frog sciatic nerve to illustrate some of the physiological properties of mixed nerves. Available for IBM-PC-compatible, Macintosh, and Acorn (BBC) equipment.

The Electrocardiogram. Interactive, menu-driven program to teach the fundamentals of the electrocardiogram. Available for IBM-PC-compatible and BRC B/Master equipment.

Siegman, Dr. Marion J.
Department of Physiology
Jefferson Medical College
1020 Locus Street
Philadelphia, PA 19107


Trinity Software
P.O. Box 960
Campton, NH 03223
(603) 726-4641


Membrane Potential Problem Solver. Simulation to help students grasp the complexities of cell membrane potentials. Available for IBM-PC-compatible equipment.

Walker, Dr. J. R.
University of Texas Medical Branch
Galveston, TX 77550
(409) 761-2966


Wise-Ware
Madison Academic Computing Center
University of Wisconsin-Madison
1210 West Dayton Street
Madison, WI 53706
(608) 543-3201

Acid-Base Simulation Program. Simulation of acid-base disturbances. Values are displayed numerically and in up to five common graphical formats. Designed for use as a lecture aid and for independent study. Available for IBM-PC or PS/2 equipment (requires Windows).

AHB: Abnormal Human Biology Clinical Tutorial. Tutorial on abnormal human biology based on clinical case presentations. The program is organized into 12 separate lessons. Available for IBM-PC or PS/2 equipment.

Physiological Simulation Program. The basic purpose of this program is to provide interactive software that can be used in a variety of physiological simulations applicable for biomedical teaching and research. Available for IBM-PC or PS/2 equipment (requires Windows 2.03).