About web-HUMAN 9
An overview & welcome to first time users!
(version 9b, 24 Aug, 2011)

What is web-HUMAN?
Web-HUMAN is a systems physiology teaching simulation that presents educators and students with full web access to Tom Coleman’s classic physiology simulation program HUMAN. While developed originally for “in-house” use as a physiological teaching tool at Skidmore, it has become increasingly used for simulation labs, as a lecture demonstration tool and as a vehicle for independent study by a variety of other colleges, universities and medically-interested students.

How do I run an experiment in web-HUMAN?
To run a simulated experiment the user changes one or more of the some 67 available variables thus forcing the model’s physiology to respond to the changed conditions. The values of variables are changed by simply “mousing” the desired variable(s), eyeballing their displayed current value and then typing in your new desired value.

What type of simulated experiments can I run in web-HUMAN?
Simulated experiments can be done in a wide variety of subcategories including but not at all limited to the following.

- **Challenges to standard physiology** - e.g. exercising the model at different levels of intensity (O2 consumption) and monitoring the resulting cardiac, respiratory, salt and water balance responses.

- **Comparative and environmental challenges** – e.g. one might move the model to high altitude (decreased barometric pressure) or thermally challenge the model by moving it into a high or low temperature environment and observe the related integrated responses to the hypoxia or thermal challenge.

- **Clinical challenges** – one might simulate emphysema by decreasing available lung surface area for exchange or renal failure by removing a selected proportion of the renal mass from functioning.

- Testing one’s understanding of the normal physiology by attempting to run an artificial organ so as to maintain normal levels of systems function. Web-HUMAN contains an artificial heart, the ability to artificially ventilate, a kidney dialysis module, the ability to infuse electrolytes, transfuse blood and more.
Testing one’s understanding of basic pharmacologic intervention – the web-HUMAN Pharmacy contains a standard arsenal of vasoactive, cardio active, renal and certain other select drugs and the ability to adjust their levels and frequency of administration.

How is the physiological response monitored in web-HUMAN?
Web-HUMAN outputs can be both tabular and graphic in format.

The default web-HUMAN output is a tabular readout of the response of the physiological variables vs. time. Users can select six from among over 137 physiological variables to monitor in the main output tables.

Can I graph the results of a web-Human simulated experiment?
We also provide the ability to graph the response pattern of up to all six of the variables selected vs. time. The user can chose between normalized (change from baseline value) or absolute value plot formats and between multiple and single variable plotting. The web-HUMAN Manual also contains a section with instructions on how to pass data from web-HUMAN to Excel for a fuller graphic analysis.

How many physiological systems does web-Human contain?
Web-HUMAN is a fairly comprehensive model that incorporates the major (systemic) responses of the cardiovascular, respiratory, renal, acid-base balance, thermoregulatory and fluid and electrolyte balance physiological systems and, in addition, contains aspects of responses of the nervous system, the hormone system and muscle/metabolic system.

Significantly these individual system responses are integrated. Thus a high altitude challenge (reduced barometric pressure) shows not only the expected hypoxia (low PO2) but also the accompanying hyperventilation, its resultant hypocapnia (low PCO2), the effect of this hypocapnia on blood acid-base status (a respiratory alkalosis) and the compensation over time via the kidneys (compensatory metabolic acidosis). The effects of this challenge and the response to it by other systems (e.g. the cardiovascular system) are also apparent.

How can I get started using web-HUMAN?
Try out the newly revised How to- Introductory tutorial available from both the opening human page and the User's Manual. This exercise takes beginners step-by-step and screen-by-screen through each of the skills needed to navigate your way through web-HUMAN.
In addition the *User's Manual* contains numerous extended “How to do it” examples that take one step by step (& screen by screen) through each procedure.

**How can I find out more about using web-HUMAN?**

Perhaps the simplest way is to dive in and use the model with the aid of the **on-line Help system**. This Help system gives users easy access to many of the major *procedures* (e.g. how to run exercise, infuse, run the artificial organs, etc.) and puts them one mouse click away from access to full information on the near 140 *user-accessible physiological variables*.

All model pages also contain a link to the **User's Manual**. Here users will find the “How to do it” tutorials (see above) and an extensive analysis of the capabilities of *web-HUMAN* in the "Annotated List of *web-HUMAN* variables and parameters". In addition, **sample teaching labs** are provided, including many of the original ones, plus ones employed at Skidmore and other institutions. Links are available to material used in past *web-HUMAN workshops* and more information can be found about the underlying model itself, its author (Dr. Coleman), the co-author of the microcomputer version (Dr. Randall) and more. Anytime you have a question or need more detailed knowledge on some aspect of using the model *click the on-line Help* or **User's Manual** links.

**Newer features of web-HUMAN**

We are continually working to improve *web-HUMAN*. The current version, 9.0, allows registered users to **save & retrieve their simulations** in their own institution’s folder space within HUMAN. Similarly we make available a growing fund of pre-stored **one-step, click and run experiments** that allow instructors and their students to utilize HUMAN without any prior knowledge of how to set the model up. Finally, substantially **improved access to Patients** including new information useful in diagnosing/understanding them is available via a now totally separate Patients section.

**A word of caution in using HUMAN – HUMAN is a teaching tool**

Models cannot contain more than is built into them! We essentially present, via a web interface, Dr. Tom Coleman's HUMAN physiological model. This was written by Dr. Coleman at a time when the shape of the major behaviors of these physiological systems was known experimentally and the interactions between these physiological systems had been characterized. Since this is almost **exactly the**
fundamental physiology that most of us engage in teaching our students, this makes HUMAN a potentially powerful teaching tool. On the other hand, one cannot expect it to contain newer concepts of a more subtle regulatory nature or, for that matter, newer pharmaceuticals developed to address mechanisms discovered after HUMAN itself was written. Those using the web-site to teach fundamental physiology, at the pre-professional, college or graduate level, will likely find these limitations of model to be of little or no trouble to them (but should nevertheless keep them in mind as necessary).

**Contact us if we can be of help!**

Use of web-HUMAN by the physiology education community has been growing steadily with approximately 25,000 plus non-Skidmore simulation sessions run within the past year. If you have any questions* we can help you with or have suggestions for features you would like to see, write to me (rmeyers@skidmore.edu) or Leo Geoffrion (ldg@skidmore.edu) and we will try to get back to you as soon as is feasible within the framework of our work schedules.

**Enjoy!**

*Note that we simply do not have time to address questions outside the framework of the use of web-HUMAN as a teaching tool.