

# Teach Yourself How To Use *web*-HUMAN

## An Introduction To

### The *web*-HUMAN Systems Physiology Teaching Model

(Version 19c August, 2011)

Welcome to HUMAN! The tutorial below allows you, step-by step and screen by screen, to teach yourself how to use *web*-HUMAN. It does so by via accessing the built-in *web*-Human help system.

In our example below you will learn how to run an exercise simulation. By the end of the example you should be equipped to learn how to run any other HUMAN procedure on your own.

We suggest strongly that you follow along in HUMAN itself, step by step.

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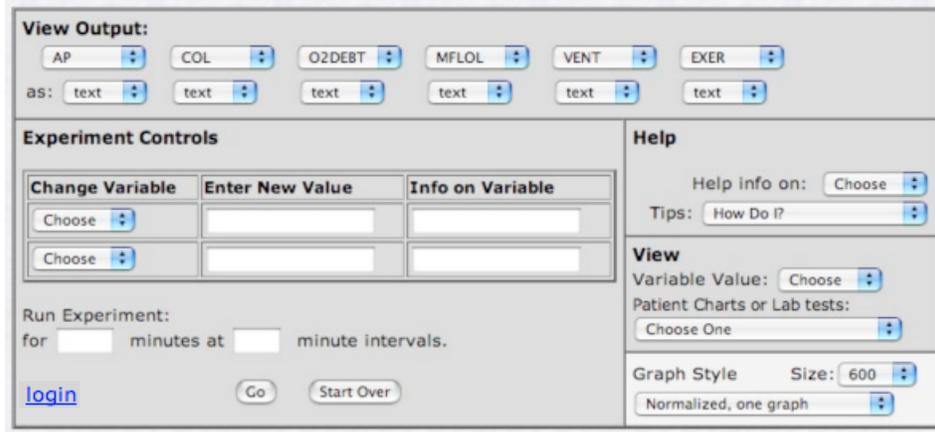
## Step 0 – Startup

To reach the main model screen, on seeing the opening HUMAN screen, simply click the [<Start a Physiology Experiment>](#) link (see below, middle).



The screenshot shows the login page for the *web*-Human Physiology Teaching Simulation. The title is "web-Human Physiology Teaching Simulation (Physiology in Health, Disease and During Treatment)". The page is divided into three columns. The central column contains a "Login for Personalized Features" section with input fields for "Your login name:" and "Your password:", a "Login" button, and a link to "Register for a free personal account." Below this is a large purple link "Start a Physiology Experiment" and a blue link "Run a HUMAN Patient." The bottom of the central column says "Welcome to web-Human Version 9." The right column contains a vertical list of links: "About H...", "How To -", "web-HUM", "Contact f", and "Credits." The left column contains some partially visible text: "the" and "s."

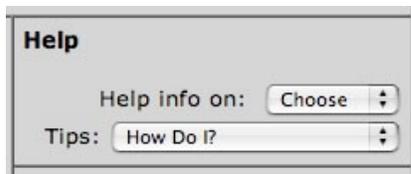
This brings you to the main screen where you see the experimental navigator (below). The navigator contains all of the controls that we will be using in this tutorial.



Above: The Experiment Navigator Screen

## Step 1 – Using Help to Learn How To Run a Procedure (i.e. exercise)

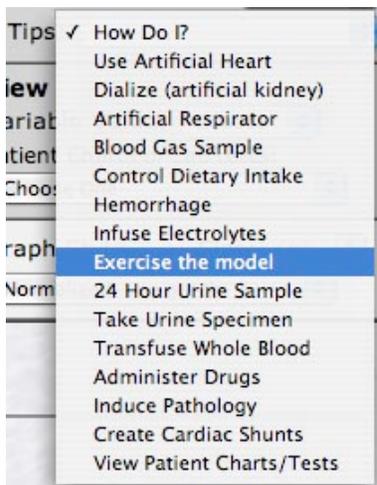
Find the **Help** section (shown below) in the navigator



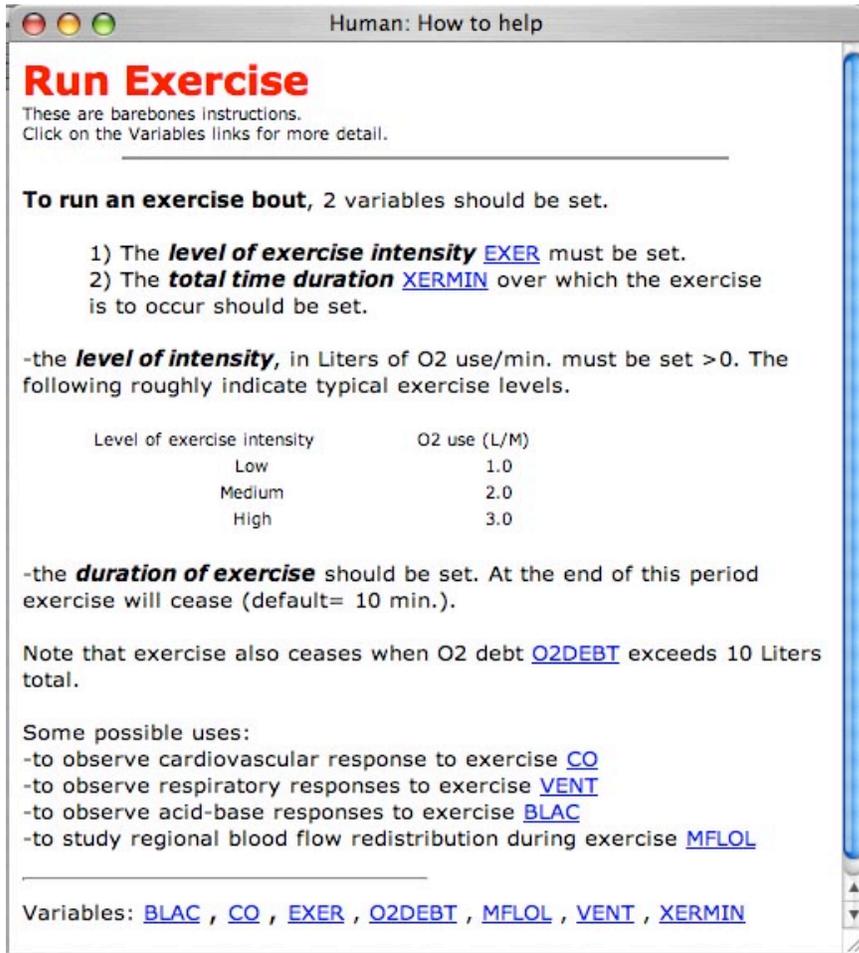
In **Help**, locate Tips: <How Do I? > and mouse click (i.e. select) it.

You see various procedures (Use Artificial Heart, Dialyze ...) .

Roll your mouse down to Exercise the model (see below) and select it.



The Help **Run Exercise** screen appears. (if it doesn't you need to turn your *pop-up blocker* off)



Above: The Help Run Exercise Screen

We notice (top) that to exercise we need to set two variables

- 1) [EXER](#) - the level of exercise intensity and
- 2) [XERMIN](#) - the duration of the exercise bout.

We also notice that to achieve a medium level of intensity of exercise we must set EXER to 2.0.

There are numerous other useful pieces of information and exercise-related links on this screen that we will not follow for now.

## Step 2 – Setting Up the Model to Exercise

Now that we *know* from Help what to set (EXER & XERMIN), we proceed to actually change their settings in the model itself.

Find the **Experiment Controls** section (see below)

Change Variable	Enter New Value	Info on Variable
Choose		
Choose		

### To enter a value for EXER of 2.0

Under **Change Variable** click on <Choose>

You see a list of variables (A2INF, ADHB, etc.); scroll down to EXER & select it.

Change Variable
✓ Choose
A2INF
ADHB
ALDOB
ALDOP

EXER now appears in the box (see below) along with its units (L O<sub>2</sub>/Min.) and possible range of values (0-10 L O<sub>2</sub>/ Min.).

We desire a moderate level of exercise of 2.0. Type this value into the box (don't edit the units [Info] box).

You now have the screen below.

Change Variable	Enter New Value	Info on Variable
EXER	2.0	0-10 L-O2/Min
Choose		

We wish the exercise duration (XERMIN) to be a large value so as to not terminate the exercise bout. Here is how to set it to 60 minutes.

- Mouse the lower **Change Variable** <Choose> choice.
- Type XE and your browser should skip down the list to XERMIN.
- Select it. XERMIN is now in the lower box.
- Type in the desired value of 60 (below).

Change Variable	Enter New Value	Info on Variable
EXER	2.0	0-10 L-O2/Min
XERMIN	60	10 Minutes

You have completed setting up the input variables for this exercise experiment.

### Step 3 – Setting up the output variables – picking variables to view

With exercise now set up to run at an intensity of 2.0 L O<sub>2</sub>/min. for 60 minutes we now turn to the question what variables we wish to see the effect of exercise upon.

HUMAN shows which variables it is set up to monitor in its **View Output:** section as below.

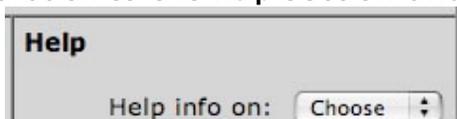


Across the top line we see the six variables the model will now give us data on as they respond to exercise. These are, from left to right, AP (arterial pressure), COL (cardiac output, Liters/min.), O<sub>2</sub>DEBT (oxygen debt), MFLOL (muscle flow, Liters/min.), VENT (lung ventilation) and EXER (level of exercise).

This fortuitously forms a very reasonable sub-set of HUMAN's variables for an exercise experiment.

Nevertheless, let us assume we wish to change one of them (or perhaps find out information on *any* variable). Let us do so for the variable COL.

We go back to the **Help** section and click on Help info on: <Choose> .

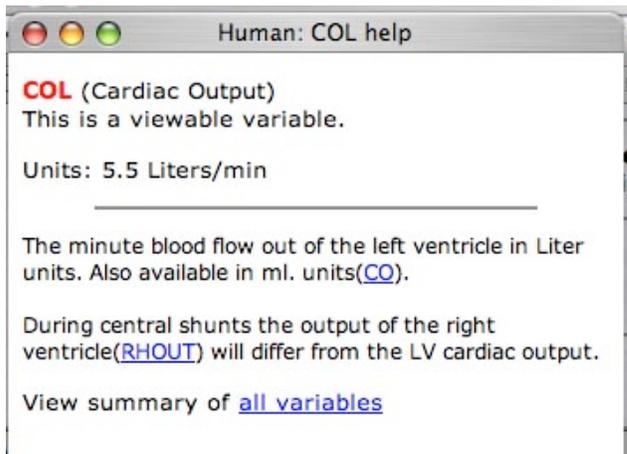


This brings up a scrolling list of variables whose output can be followed in HUMAN.



We then scroll down to COL, our variable of interest, and select it.

This brings up the Help screen for COL as below.



At the top we see the definition of the variable (Cardiac Output) and its resting value and its units (5.5 Liters/min). The remainder of the screen gives us variable-related information including that (if we so wished) HUMAN could *display the cardiac output in ml/min units if we substitute CO for COL*.

We now have the information we need to substitute one variable (CO) for another (COL) in the output.

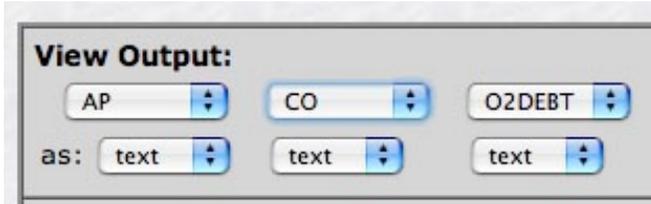
We make the substitution by going back to **View Output:** , clicking on COL and scrolling up to CO and selecting it (below).



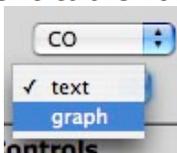
\*Note that while this is a relatively trivial substitution, it illustrates how to ask for the readout of *any* variable (e.g. coronary flow, CORFLO- see above) in *any* Table location.

## Step 4 – Setting up the output variables – picking a variable to graph.

By default, HUMAN's output is a six-column text table. This can be seen by reexamining the **View Output:** screen now in front of you. We notice in the second line that all variables are now output as: <text>.



We wish to change the output of CO so that it is also graphed. To do so, we pick it and select graph (below). Now the output will be in *both* graphic and text table formats.



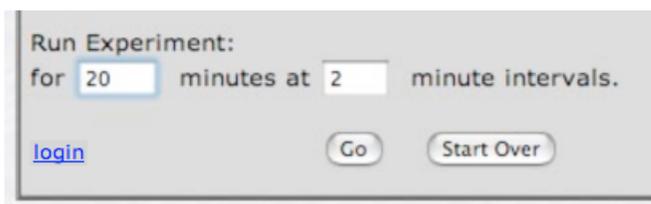
We now also do this for the other five variables thus yielding the final **View Output:** section below.



## Step 5 – Running the experiment.

In the Run Experiment: section (see below) we pick the *total time* we wish to run for (20 minutes) and the *interval* at which we wish our data to be displayed (at 2 minute intervals).

If we now click the <Go> button the exercise experiment we set up (moderate exercise) will take place.



## Summary

Below is the final setup in the experiment navigator screen of all the choices made above in setting up this exercise experiment .

**View Output:**

AP CO O2DEBT MFLOL VENT EXER

as: graph graph graph graph graph graph

**Experiment Controls**

Change Variable	Enter New Value	Info on Variable
EXER	2.0	0-10 L-02/Min
XERMIN	60	10 Minutes

Run Experiment:  
for 20 minutes at 2 minute intervals.

[login](#)

**Help**

Help info on: CO

Tips: Exercise the model

**View**

Variable Value: Choose

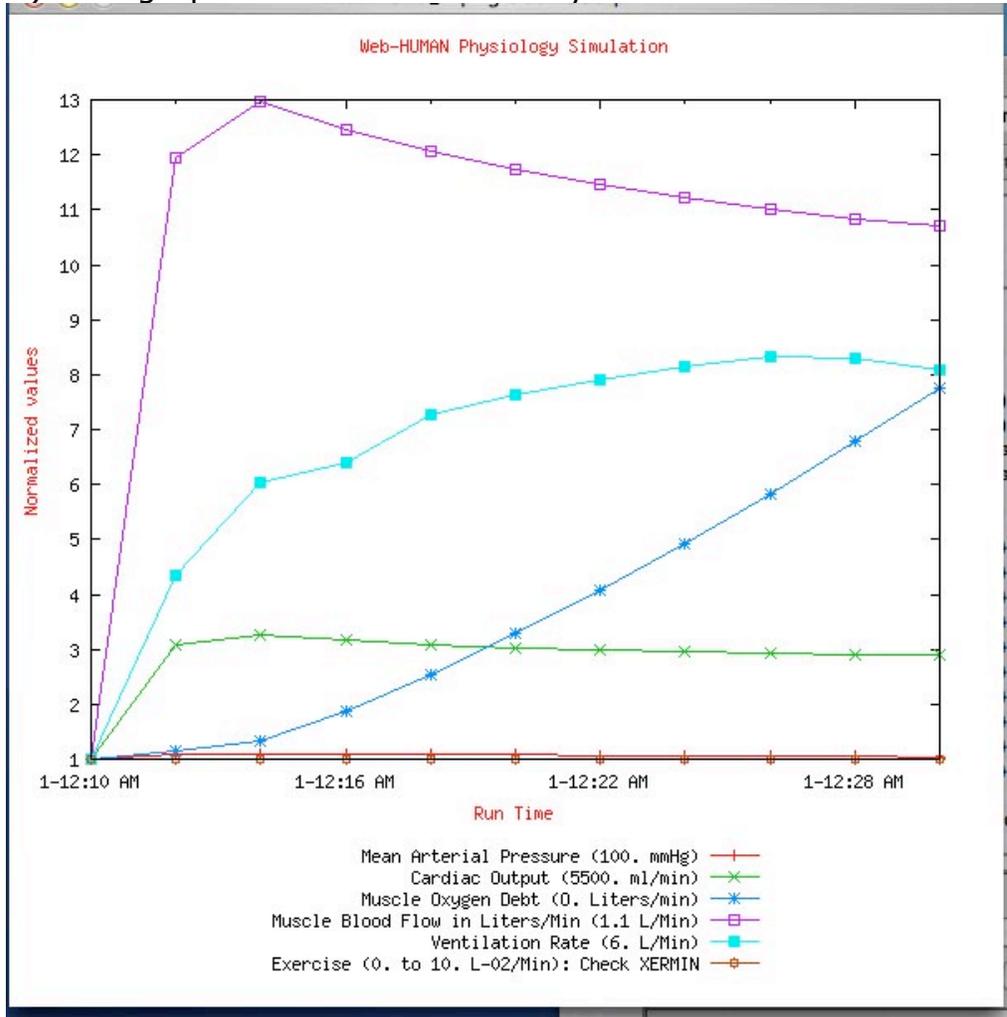
Patient Charts or Lab tests: Choose One

Graph Style      Size: 600

Normalized, one graph

## Step 6 – Viewing the results

Our exercise results appear as a graph and as a table (the default output form for HUMAN). The graph is shown immediately below.



We notice that the plot is *normalized* thus showing change since the onset of exercise. The variables plotted are keyed below the plot.

In particular we notice that

- Ventilation (blue squares) rises much more than cardiac output (green x) suggesting that the cardiovascular system and not the respiratory system is more limiting in endurance exercise.
- That the exercise is not quite aerobic (notice the steady climb of O<sub>2</sub> DEBT (blue x)).
- That mean arterial pressure (AP, red) hardly rises at all at this level of endurance exercise.

- That muscle flow (purple squares) increases much more than cardiac output (green) suggesting that vascular conductance in the skeletal muscle beds has opened up greatly (vasodilation).

Human also generates a tabular output providing time series data on the six variables (see below) that equally supports the physiological conclusions above.

Skidmore College		Output from Web-HUMAN Physiology Simulation				Manual	Ver. 7
DAY/HR	AP	COL	O2DEBT	MFLOL	VENT	EXER	
1-12:00 AM	99.78	5.438	0.000	1.100	5.675	0.000	
1-12:10 AM	99.69	5.425	0.000	1.089	5.673	0.000	
Exercise (0. to 10. L-O2/Min) ** Check XERMIN **					=	0.0000	
Exercise (0. to 10. L-O2/Min) ** Check XERMIN **					=	2.0000	
Duration of Exercise (Minutes)					=	10.000	
Duration of Exercise (Minutes)					=	60.000	
DAY/HR	AP	CO	O2DEBT	MFLOL	VENT	EXER	
1-12:10 AM	99.69	5425.	0.000	1.089	5.673	2.000	
1-12:12 AM	107.7	0.1663E+05	0.1476	13.02	24.59	2.000	
1-12:14 AM	107.7	0.1765E+05	0.3352	14.12	34.20	2.000	
1-12:16 AM	109.1	0.1719E+05	0.8786	13.58	36.22	2.000	
1-12:18 AM	108.9	0.1676E+05	1.549	13.14	41.17	2.000	
1-12:20 AM	108.1	0.1643E+05	2.285	12.79	43.25	2.000	
1-12:22 AM	107.1	0.1618E+05	3.080	12.49	44.78	2.000	
1-12:24 AM	106.1	0.1601E+05	3.929	12.23	46.22	2.000	
1-12:26 AM	105.1	0.1588E+05	4.831	12.00	47.17	2.000	
1-12:28 AM	104.4	0.1580E+05	5.778	11.80	47.12	2.000	
1-12:30 AM	103.9	0.1574E+05	6.759	11.65	45.87	2.000	

## Step 7 – What to do next

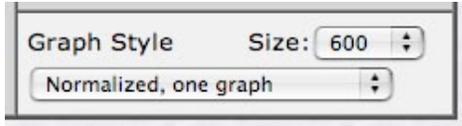
- One could continue the experiment by typing into the Run experiment: section new additional values for minutes and display intervals and click <Go>.

Run Experiment:  
for  minutes at  minute intervals.

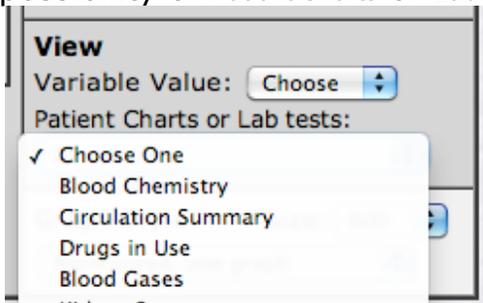
[login](#)

- One could save the exercise experiment you just executed for future use by selecting [login](#) (see above, left). This presents you with the login screens and then returns you to this point in the experiment to allow you to save it. Accounts (and all of web-HUMAN uses) are free!
- One could click on the *web-HUMAN* Manual link (top right of all pages) to see ideas for many more experiments of multiple types (renal, water balance, acid-base balance, respiration mechanics, cardiovascular, clinical patients and much more).

- One could examine the **View:** section of the interface where you will find other possibilities not covered in this tutorial including
  - a wealth of other Graph Style options (see below, we simply accepted the default settings) and



- the possibility of Patient Charts or Lab test results (see below).



- to extend the depth of your self-tutoring experience you might wish, in the Manual, under [II. Learning Basic web-HUMAN](#), to try similar step-by-step tutorials on simulating high altitude and emphysema.

Enjoy!

Your feedback is always appreciated.

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