

From the "Student's Manual", HUMAN-80, "Microcomputer Version of A Mathematical Model of the Human Body in Health, Disease and During Treatment". Thomas G. Coleman and James E. Randal, April, 1981. Modified for use with web-HUMAN. Manual material is the property of Drs. Coleman & Randal and may be reproduced for educational purposes only.

EXPERIMENT #13. EXPOSURE TO COLD AND HEAT STROKE

The effectiveness of the regulation of body temperature depends in part upon the environmental, or ambient, temperature and on the relative humidity in the air. The importance of these factors can be simulated by changing ambient temperature (TEMAB) away from its normal value of 27.° C. and by changing relative humidity (RELHUM) from its normal value of 0.3. Consider that the model is lightly clothed.

Fill in the first two columns in the table below and describe the mechanisms that contribute to the homeostatic response to a decrease in ambient temperature.

| Ambient Temperature | TEMAB | 27° C | 15° C | 37° C |
|------------------------|--------|-------|-------|-------|
| Body Temperature | TEMP | _____ | _____ | _____ |
| Calories Produced | CALP | _____ | _____ | _____ |
| Sweat Volume/min | SWETV | _____ | _____ | _____ |
| Skin Blood Flow | SKNFLO | _____ | _____ | _____ |
| Shivering | SHIV | _____ | _____ | _____ |
| Muscle Flow | MUSFLO | _____ | _____ | _____ |
| Sympathetic Nerve Act. | SYMPNA | _____ | _____ | _____ |

What is the minimum temperature that can be tolerated?

Fill in the last column and describe the mechanisms that contribute to the body's response to an increase in temperature.

What is the influence of relative humidity on temperature control on a warm day?

What is the level of exercise that can be safely tolerated when TEMAB is 38. and RELHUM is .8?

Notes on the Use of HUMAN-80 Student Manual Experiments in *web*-HUMAN

Essentially all HUMAN-80 experiments run *perfectly* in *web*-HUMAN. Nevertheless, those using the HUMAN-80 experiments with the current *web*-HUMAN model should be aware of certain minor compatibility issues and limitations.

What is HUMAN-80?: There have been multiple past versions of the HUMAN model of which *web*-HUMAN and HUMAN-80 are but two. Human-80 was a version of the HUMAN model designed to run on desktop PC's. Although both versions of the model behave virtually identically *physiologically*, they obviously differ vastly in how the user interacts with them. This means that those parts of a HUMAN-80 experiment instruction sheet that are user-interface specific are not necessarily fully compatible with *web*-HUMAN.

Adapting HUMAN-80 Manual experiments to *web*-HUMAN:

Essentially all HUMAN-80 experiments run *perfectly* in *web*-HUMAN. Just follow Dr. Randall's instructions step by step.

- wherever possible the text of these exercises has been edited or annotated to increase compatibility of the instructions with *web*-HUMAN. Thus references to commands that differ between the two versions have been updated either by editing or by indication with a commented superscripted symbol (* or #) .

- experiment numbers in HUMAN-80 *DO NOT MATCH* those in those in *web*-HUMAN. To create your own tabular output format simply load *web*-HUMAN experiment #1 and follow Dr. Randall's instructions using **View output**: to create your own data tables.

- users should note that HUMAN-80 had no graphic output, only tables. In *web*-HUMAN you can choose to graph by simply selecting **<graph>** instead of just **<text>** below each variable in the **View output**: table.

- HUMAN-80 instructions sometimes ask for users to look at more than six variables. To do so simply rerun the experiment with the additional variables displayed or use the **<View Variable>** option to obtain a value for a variable that is not in the tables.