

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 #7. DECREASED PULMONARY MEMBRANE SURFACE AREA

The actual or functional surface area can decrease with pulmonary disease in general and especially with emphysema. This can be simulated by decreasing the parameter for membrane surface area (MSA) from its normal value of 100 (percent). Try moderate (75 and 50) and severe (25) reductions and record the respiratory and hemodynamic compensations that occur over a period of 24 hours.

		MEMBRANE SURFACE AREA			
		100%	75%	50%	25%
Arterial Oxygen	PO2A	_____	_____	_____	_____
Venous Oxygen	PO2V	_____	_____	_____	_____
Arterial CO ₂	PCO2A	_____	_____	_____	_____
Venous CO ₂	PCO2V	_____	_____	_____	_____
Ventilation	VENT	_____	_____	_____	_____
Respiratory Rate	RESPRT	_____	_____	_____	_____
Tidal Volume	TIDVOL	_____	_____	_____	_____
pH	PH	_____	_____	_____	_____

Explain what causes the changes in blood gases:

Explain how acid/base balance is affected:

Extra: What is the effect of decreased membrane surface area on the model's ability to perform exercise? Is there any benefit from breathing 100% oxygen?

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.