Lab 1 - Hemorrhage

Cardiac Outputs, PRA, Sodium Excretion, EPO, Brain Blood Flow and Sympathetic Nerve Activity differ between QCP and HumMod

Plasma volume falls again in HumMod for some unknown reason

Lab 2 – AV Fistula

Cardiac Output, Muscle Blood Flow, Blood Volume, Red Cell Volume, Plasma Volume, Hematocrit and PRA have noticeable different values or trends.

HumMod involves faster patient exhaustion during exercise.

Lab 3 – Fick’s Principle

No trends to notice, values between HumMod and QCP differ but the actual and calculated Cardiac Outputs are both reasonably accurate.

Lab 4 – Pulmonary Shunt

Blood Pressure, Cardiac Output, Sympathetic Nerves, PRA, Na+ excretion, EPO , blood volume data, and Hematocrit are all significantly different.

The Exercise could not be completed in HumMod seeing as the program crashed before a full month could be completed.

Lab 5 – Respiratory Acidosis

Lab Missing.

Lab 6 – Water Load

The oral water load does not actually cause the addition of any water to the total body volume of the patient in HumMod. Hence, data points in this lab are irrelevant.

Lab 7 – Starvation

The data in Glucagon concentration, Brain KA and Brain Glucose use differ between HumMod and QCP

Lab 8 – Baroreceptor Reflex

TPR, Stroke Volume, and Arterial Pressure values all deserve looking at due to differences. Stroke volume has a different trend the other two have slight value differences.

Lab 9 – Insulin Overdose

Lab does not work in HumMod no reaction to insulin injection.

Lab 10 – Renal Artery Stenosis

There are significant differences in fluid volumes and sodium excretion.

Lab 11 – Heart Failure

The patient does not respond to myocardial infarction in HumMod.

Lab 12 – High Altitude

There are a couple of minor discrepancies in data, but the only major difference is EPO levels.

Lab 13 – Changes in Salt Intake

Arterial pressure, left and right atrial pressure, and Sodium excretion in the control run are different. For the run without angiotensin, right and left atrial pressure, ANP, and sodium excretion appear to differ significantly.

Lab 14 – Aldosterone and Sodium Escape

In QCP the patient died before day 17 but in HumMod the patient makes it through the full time.

Arterial pressure, left and right atrial pressure, Plasma ANP, [Na+], proximal Na+ inflow and reabsorbtion, Plasma Volume, ECFV and Ascites are all different.

Ascites are significantly different, in HumMod I had to calculate it by taking the H2O in the middle torso and subtracting the normal value for H2O in the middle torso from it. However in QCP they are given.

Lab 15 – A Normal Meal

Plasma [Glu], Tissue Glucose use, Brain Glucose use, Fat Glucose use, Muscle glucose use, plasma [FFA], tissue and muscle FFA use, Plasma Triglycerides, Fat Triglyceride uptake, Liver Glycogen, Plasma Insulin, and plasma glucagon are all different.

Lab 16 – Diabetes Mellitus

Glucose Mass, Plasma [Glu], Tissue, Brain, Fat, and muscle glucose use, Tissue and muscle FFA use, Plasma [Triglycerides], and Fat triglyceride uptake are all different.

Lab 17 – Pericardial Hemorrhage

In QCP the patient couldn’t finish the full hour, but the patient in HumMod could. Arterial Pressure, Cardiac Output, Stroke Volume LV EDV and EDP are all different.

Lab 18 – Carbon Monoxide Inhalation

No major differences except for the fact that the patient is killed much earlier by the same level of inhalation.

Lab 19 – Anemia

This lab cannot be completed because red cell secretion cannot be changed.

Lab 20 – Diabetes Insipidus

This lab cannot be completed because there is no method to eliminate ADH from the system.

Lab 21 – Pneumothorax

The lab properly completed as it did in QCP, but many values are different. Cardiac output, heart rate, stroke volume, total ventilation, ventilation rate, and tidal volume are different.

Lab 22 – Cardiac Arrest

A divide by zero error occurs less than 30 seconds after cardiac arrest and the lab cannot be completed.

Lab 23 – Asphyxia

No method for asphyxia is readily available in HumMod as it is in QCP. Hence, this lab could not be completed.

Lab 24 – CPR

This lab could not be completed in HumMod due to an error that occurs when CPR starts.

Lab 25 – Acid/Base

This lab cannot be completed in HumMod, as it is an initial conditions lab.

Lab 26 – Sodium Bicarbonate

The protocols by which sodium bicarbonate IVs are handled in QCP and HumMod are different, which appears to have an effect on the speed at which the bicarbonate has an influence. As a result, all variables in this lab appear to be significantly different between HumMod and QCP.

Lab 27 – Ketoacidosis

Firstly, the patient is killed much quicker in HumMod than in QCP. Also, odd occurrences such as a negative concentration of bicarbonate in the HumMod patient’s blood can be found in the data.

Strong ion difference, the anion gap, ketoacid concentration, brain ketoacid use, and ventilation appear to differ. However, as the two programs do not run to completion in a similar manner, this may be irrelevant.

Lab 28 – Mitral Stenosis

Mathematical errors in HumMod mean that mitral stenosis has no effect on the physiology. A DES file was changed locally in order for the lab to be carried out to specification (allowing a greater range of values to be assigned to the mitral stenosis’s area).

Lab 29 – Aortic Regurgitation

Mathematical errors in HumMod mean that aortic regurgitation has no effect on the physiology. A DES file was changed locally in order for the lab to be carried out to specification (allowing a greater range of values to be assigned to the aortic regurgitation’s area).

Lab 30 – Osmolarity

This is an initial conditions lab and cannot be completed in HumMod.

Lab 31 – Nephrotic Syndrome

When protein permeability is changed:

Plasma protein mass, interstitial protein mass, plasma volume, capillary filtration, and lymph flow are different. The rate of a “severe” protein permeability in HumMod is numerically different from that in QCP, which may account for several of the discrepancies.

When GFR is lowered:

Plasma volume, interstitial volume, capillary filtrate, lymph flow, extracellular sodium mass, plasma rennin activity, and aldosterone concentration differ.

When protein permeability is severe and GFR is lowered:

Plasma protein mass, interstitial protein mass, interstitial colloid pressure, plasma volume, capillary filtrate, lymph flow, arterial pressure, plasma renin activity, ANP, Aldosterone, and renal nerve activity are all different.