Starvation

This exercise investigates the metabolic response to complete cessation of caloric intake. If the metabolic substrate is not coming from food intake, where is it coming from? We need to keep an eye on these sources of fuel:

 Metabolism / Liver Glycogen

 Body Composition / Adipose Tissue Lipids

 Cell Composition / Cell Protein

We can arbitrarily divide the body’s response into acute (a few hours), intermediate (a few days), and long-term (a few weeks) responses.

###### The Starvation Protocol

Begin by clicking Restart to reset the model’s variables to their initial values. Record control values. Click  and set carbos, fat and protein intake to 0. Advance the solution and record the data.

|  |  |
| --- | --- |
|  | Liver Glycogen Mass (G) |
|  |  |
|  | Adipose Lipid Mass (G) |
|  |  |
|  | Cell Protein Mass (G) |
|  |  |
|  | Plasma [Ketoacids] (mG/dL)  Plasma [Glucose] (mG/dL) |
|  |  |
|  | Brain Ketoacid Use (mG/Min)  Brain Glucose Use (mG/Min) |
|  |  |
|  | Skeletal Muscle Glucose Use (mG/Min)  Skeletal Muscle FFA Use (mG/Min) |
|  |  |
|  | Plasma [Insulin] (uU/mL)  Plasma [Glucagon] (pG/mL) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time | 0 | 6  Hrs | 1  Day | 2  Days | 1  Wk | 2  Wks | 3  Wks |
| Liver Glycogen | 100 | 72 | 22 | 12 | 11 | 10 | 6 |
| Adipose Lipid | 10000 | 9983 | 9887 | 9726 | 8857 | 7619 | 6480 |
| Cell Protein | 6000 | 5978 | 5889 | 5763 | 5245 | 4599 | 3947 |
| Plasma [KA] | 0.49 | 0.36 | 1.58 | 4.39 | 6.74 | 9.53 | 5.60 |
| Plasma [Glu] | 109 | 86 | 58 | 52 | 48 | 50 | 49 |
| Brain KA Use | 1.9 | 1.5 | 6.5 | 17.7 | 21.6 | 24.0 | 16.8 |
| Brain Glu Use | 55.1 | 55.8 | 47.0 | 27.3 | 20.4 | 16.5 | 30.3 |
| Musc. Glu Use | 7.6 | 5.0 | 2.9 | 2.1 | 2.0 | 1.7 | 1.3 |
| Musc. FFA Use | 13.3 | 13.4 | 14.3 | 14.7 | 15.0 | 15.2 | 14.6 |
| [Insulin] | 19.8 | 12.2 | 6 | 5.3 | 5.6 | 5.3 | 1.9 |
| [Glucagon] | 69 | 80 | 128 | 173 | 175 | 187 | 174 |