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PED 116, Section 103-A

3 June 2013

Brown Fat, White Fat, Good Fat, Bad Fat

The distinction between different fat cells came up during the class discussion last week. I found it very intriguing because earlier this year, in the biology class we studied how fat is stored and we observed that bloated fat cells had very little room and various organelles were pressed against the cell membrane. Studying the NIH article by Dr. Francis Collins reveals that this classification of fat cells is based on the “different roles” that they each play.

Consistent with what one observes in the biology lab, the article goes on to describe the large white fat cells as specialized in storage while the smaller brown ones are responsible for fat consumption and production of energy. Majority of brown fat cells that one is born with is stored in the upper spine and shoulders; this ready source of heat energy is valuable in infancy. Since the brown fat cells contain small fat droplets is more room within the cell membrane for energy producing organelle mitochondria. In fact the iron in mitochondria is what gives brown fat cells their distinguishing color.

Dr. Collins refutes the notion that one loses all of the brown fat cells that one is born with. Although not as plentiful as an infant’s body “about 5% of total body mass” (Collins), an adult’s body retains some brown fat cells in the neck and shoulder areas. Attempting to harness the brown fat cells, a team at University of Pennsylvania compared the white and brown fat cells and discovered that brown fat cells contain more of a protein called Ebf2. Additional experimentation on mice proved that white fat cells in presence of high levels of Ebf2 changed into brown fat cells and by the virtue of higher oxygen consumption proved that they were producing heat.

Harvard’s Joslin Diabetes center further refined the study and segmented the brown fat cells into two groups, the ones from birth (constitutive) and others that are dispersed among white fat cells and muscle cells (recruitable). The Harvard team also tested their findings on mice and learned that lack of brown fat cells does not condemn the individual because the body is able to correct the imbalance. They proved this by eliminating a protein called BMPR1A from a sample group. This protein is responsible for proper development of brown fat cells. The resulting individuals with just a trace of constitutive brown fat cells at birth survived because their body was able to generate adequate brown fat by commanding recruitable brown fat into action.

The medicinal prospects of this research for controlling diabetes and obesity can be tantalizing but it also provides an example for how complex a system our body is. Lawrence Zendle pointed this out as a comment on the NIH website and warned that a healthy diet and proper exercise are still the best tools to balance our fat cells regardless of their color. The website moderator highlighted this comment and thanked Lawrence Zendle for it.

Works Cited

Collins, Francis. “Brown Fat, White Fat, Good Fat, Bad Fat.” *National Institutes of Health*.

Web. 26 March 2013. < <http://directorsblog.nih.gov/brown-fat-white-fat-good-fat-bad->fat/>