University of New Hampshire
University of New Hampshire Scholars' Repository

Inquiry Journal 2005 | Inquiry Journal

Spring 2005

A Synthetic Activation of Human Fat Cell Energy Release

Catherine Hooke
University of New Hampshire

Follow this and additional works at: http://scholars.unh.edu/inquiry_2005

 Part of the Animal Sciences Commons

Recommended Citation
Hooke, Catherine, "A Synthetic Activation of Human Fat Cell Energy Release" (2005). *Inquiry Journal*. 5.
http://scholars.unh.edu/inquiry_2005/5

This Article is brought to you for free and open access by the Inquiry Journal at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Inquiry Journal 2005 by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact nicole.hentz@unh.edu.

A Synthetic Activation of Human Fat Cell Energy Release

Rights
Copyright 2005 Catherine Hooke

This article is available at University of New Hampshire Scholars' Repository: http://scholars.unh.edu/inquiry_2005/5

INQUIRY journal
UNH UNDERGRADUATE RESEARCH JOURNAL SPRING 2005

research brief

A Synthetic Activation of Human Fat Cell Energy Release

—Catherine Hooke

All living cells require energy. Adipose tissue, or fat, is an efficient storehouse of energy, which can be used as fuel for cells when other energy sources run low. This energy is released from the adipose tissue through lipolysis, a process in which fat cells release their stored fat.

When the body needs energy, such as during exercise, adipose tissue lipolysis is stimulated. Likewise, when individual cells of the body need energy, an enzyme known as AMPK (AMP- activated protein kinase) is activated. Researchers seeking to better understand how cells get their energy during times of need use a synthetic stimulator of AMPK, called AICAR (5'-Aminoimidazole-4-carboxamide ribonucleoside), a chemical not normally found in the body. If a reliable synthetic stimulator of AMPK, and thereby lipolysis, could be found, this could help in the treatment of diabetes, especially type 2 (adult diabetes). Such a drug could have the same effects as exercise does in stimulating lipolysis. Previous studies using fat cells in rats showed conflicting results regarding the effects of AMPK activation on lipolysis. This study was the first to examine synthetic stimulation of AMPK and its effects on lipolysis in human fat cells.

Adipose tissue was obtained from three liposuction patients, two of normal weight and one overweight. Fat cells, isolated from this tissue, were incubated with isoproterenol (a synthetic hormone that mimics the effects of exercise and stimulates lipolysis) in the presence and absence of AICAR. Results showed that overall there was no statistically significant effect of AICAR on lipolysis. However, results differed between subjects: inner and outer thigh fat cells from the two normal weight subjects showed no change in lipolysis with the addition of AICAR compared to no addition, while bilateral hip fat cells from the overweight subject showed a decrease in lipolysis with the addition of AICAR compared to no addition.

The findings suggest that AMPK's role in lipolysis may be a function of the adipose tissue region, the weight of the subject, and/or of individual variations in metabolism. Because this is the first study to examine the effects of AMPK activation on lipolysis in freshly isolated human fat cells, further study is warranted.

The author would like to thank Dr. Gale Carey for all of her help with this project.

Copyright 2005 Catherine Hooke

Author Bio

Catherine "Katy" Hooke is a 2004 graduate of the University of New Hampshire with a B.S. in animal science. Her research on adipose tissue metabolism was her honors thesis, completed with mentor and advisor, Professor Gale Carey, professor in the Animal and Nutritional Sciences Department.

Katy says while conducting her research she learned a lot about adipose tissue metabolism, as well as designing and completing a research project and troubleshooting in the lab. She decided that writing about her project for Inquiry would be a good opportunity to learn about the process of submitting to a journal and to share her research with a larger audience. Currently, Katy is working at the National Institute of Health in Washington, D.C., where she has a post-baccalaureate fellowship with the National Cancer Institute.

Mentor Bio

Katy says Professor Carey is responsible for sparking her research interest. Carey is a 16-year veteran of UNH, specializing in metabolic biochemistry and nutrition. Over the years she has mentored between 30 and 35 undergraduates in their work.

"What a joy it is to be a mentor, and see students discover how wonderfully capable they are!" Carey commented, adding that obtaining specimens for Katy's project was a challenge, and she was impressed with Katy's diligence, flexibility, and willingness to work, even on her Inquiry article, well after graduation. "I just provided feedback and suggestions" for Katy's writing, she said. "I know the process well... write, revise, rewrite, revise, rewrite... It can seem never-ending!"

Nonetheless, Carey says she is pleased that students now have the opportunity to finalize the research process just as a professional scientist would-by archiving their work with the scientific community, in writing.