The Building Blocks of Life

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Researchers have found that the faster an animal is growing, the more energy from food it uses. As animals age, their energy use levels out. Credit: Zina Deretsky, National Science Foundation

(PhysOrg.com) -- Ever wonder where all that food your teenager devoured was going? Not only does the food go into the teen's daily activities--running, doing homework, breathing and playing video games, but food converted to energy also fuels growth of new tissues--bones, vessels, cartilage, muscle.

In poorer areas of the world, part of the energy yielded by food might be deflected for the body's defense system in fighting disease. Children and teens in such conditions will not grow as tall or big as their healthy counterparts who were able to allocate more of their energy stores directly to growth.

In the October 31 issue of *Science*, researchers funded by the National Science Foundation report on a model that shows that the food baby mammals and birds use to grow always stay proportional to how fast they are growing. This relationship stays remarkably stable for all sizes and types of animals.

Chen Hou of the Santa Fe Institute compares the building of an animal to the building of a house: "When you build a house the materials alone are just part of the story. You might pay $1,000 for the bricks, but you will spend much more for the workers and the rest of the overhead. Same with building a body--new muscle and bone are just part of the energy expenditure; laying that new tissue down costs much more."

Previous energy budget models have typically been based on either rates of food consumption or metabolic energy expenditure. Hou and his colleagues are the first to reconcile the two approaches and to highlight the fundamental principles that determine rates of food assimilation and the rate of energy allocation to maintenance of a body and to its growth, activity and storage. They confirmed their model with data from 14 different mammals and birds from the chicken to the fox.

In the future they will be interested to see how the rates of food intake and growth compare in reptiles and insects.

The current modeling work is not only important in agriculture and husbandry, but will lend key insight into child obesity and the relationship of diet control to exercise and weight loss. This research can also shed light on how food restriction can retard aging.

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