ne Society for Industrial and Applied Mathematics

m news

Volume 43/ Number 7
September 2010

Heavy Math Sheds Light on Weighty Issue

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For mathematical obesity expert Carson Chow, the human body looks a lot like a leaky integrator. We can gain a lot, he says, by using such a bare-bones mathematical model to look at the problem of weight control. Much of the mystery and many of the myths surrounding Americans' expanding waistlines can be accounted for with a few simple differential equations. Unfortunately, the calculus of weight gain suggests that *solving* the problem may not be so simple.

Chow, a researcher in the laboratory of biological modeling at the National Institute of Diabetes and Digestive and Kidney Diseases, part of the National Institutes of Health, gave a joint invited presentation on the dynamics of obesity at this year's side-by-side SIAM Annual Meeting and Conference on the Life Sciences, held in Pittsburgh in July. Chow led the audience through the equations of macronutrient flux, body composition, and basal metabolism, to the implications of "life on the Forbes curve" for the relation between weight and weight gain.

The basic equations start in three dimensions: Weightwise, we worry about our intake of fat, carbs, and protein. (A good way to gain weight quickly is to drink a couple large glasses of water, but that's not the kind of weight gain anyone worries much about.) These nutrients are stored in the form of body fat F, glycogen G, and protein

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2010 SIAM Annual Meeting, Pittsburgh, July 12–16. *Just about everyone who attends the SIAM Annual Meeting turns out for the prize luncheon, a festive celebration of outstanding work at a variety of levels and in many different areas. Among those honored at this year's luncheon were Bernd Sturmfels (left) of the University of California, Berkeley, who gave this year's John von Neumann Lecture. Sturmfels, who titled his lecture "Algebra: From Linear to Non-Linear," was cited by the prize committee "for his key role in developing and applying algebraic and algebraic–geometric ideas to problems arising in biology, statistics, optimization, and the numerical computation of polynomial systems."*
Recognized for contributions of a completely different nature was Martin Grötschel (pictured at right), the 2010 recipient of the SIAM Prize for Distinguished Service to the Profession. Grötschel, vice president of ZIB (the Konrad-Zuse-Zentrum für Informationstechnik Berlin) and a professor at the Technische Universität Berlin, received the prize "in recognition of his visionary, indefatigable, global leadership in application-driven mathematics research. The most concrete realization of his vision of mathematics as an indispensable ingredient in technological progress is the Berlin institute MATHEON, which he founded in 2002, and which, as director for its first seven years, he guided to a new, internationally recognized model of a mathematics research center." Grötschel's contributions include invited addresses at many meetings, as well as articles for SIAM News *(on MATHEON and on applications of combinatorial optimization, which is among his research interests). He is the current secretary of the International Mathematical Union.*