Nutrient sensing and response in the unicellular yeast are cell autonomous. More complex organisms, however, must coordinate the metabolism of individual cells with the energy status of the organism as a whole. Insulin is one such global coordinating factor. It accumulates when circulating nutrient levels are adequate, and stimulates various sites in the body to behave accordingly. Each recipient cell must then integrate the global insulin signal with signals from its own local nutrient-sensing systems. PAS kinase might constitute just such a cell-autonomous sensory system that controls, as does insulin, protein synthesis and glycogen storage.

The two systems I have studied as a graduate student have an interesting commonality. Both appear to be regulated by cellular metabolism, and more specifically, by a specific intracellular metabolite or nutrient. Regulatory small molecules are typically considered to be restricted to the respective families of dedicated signaling molecules, including lipid and nucleotide second messengers and hormones. I believe that as more signaling networks are studied in biochemical, mechanistic detail, regulatory function will be found in a much larger and more diverse set of cellular metabolites.

References and Notes

2002 Grand Prize Winner

Jared Rutter was born in a small Utah town in 1973, where he stayed until graduating from high school in 1991. After spending 2 years in Scotland, he attended Brigham Young University in Provo, Utah, and graduated in 1996 with a bachelor's degree in molecular biology. He went to Dallas, Texas, to pursue graduate studies at the University of Texas Southwestern Medical Center in the molecular biophysics graduate program. Under the guidance of Steve McKnight, Dr. Rutter studied the regulation and function of two proteins involved in sensing metabolic status and controlling cellular biology. After receiving his Ph.D., Dr. Rutter was appointed as the Sara and Frank McKnight Independent Fellow of Biochemistry at the University of Texas Southwestern. Dr. Rutter and his wife Deena, who is a successful artist, have three energetic young boys.

Regional Winners

Europe: Attila Toth, for his essay, “Cohesin and Monopolin: Two Major Determinants of Chromosome Segregation,” based on his research in the laboratory of Kim Nasmyth at the Institute of Molecular Pathology, Vienna, Austria. Dr. Toth was born in 1973 in Nagykanizsa, Hungary. He studied biology and genetics at ELTE (Eötvös Loránd University) in Budapest, Hungary, from 1991 to 1996. He joined Dr. Nasmyth’s group and received his Ph.D. from the University of Vienna in 2001. He continued his studies on chromosome segregation as part of a collaboration between the Nasmyth laboratory and the laboratory of John Kilmartin at the MRC Laboratory of Molecular Biology in Cambridge, UK. In 2002 he joined the laboratory of Aziz Surani at Wellcome Trust and Cancer Research UK in Cambridge to study meiosis in mice.

The second European regional winner is Olivier Voinnet, for his essay, “Molecular Analysis of Post-Transcriptional Gene Silencing,” reporting research carried out with David Baulcombe’s group at the Sainsbury Laboratory, John Innes Centre, Norwich, UK. Dr. Voinnet was born in Paris, France. He has a master’s degree in molecular and cellular biology from the University of Paris VI (Pierre et Marie Curie) and an engineering degree in Agronomy from the “grande école” Institut National Agronomique Paris. In 1996 he joined Dr. Baulcombe’s group, where he continued as a postdoctoral fellow after obtaining his Ph.D. in 2001. He will continue to address aspects of RNA silencing in his own laboratory at the Institut de Biologie moléculaire des Plantes du CNRS.

North America: Wenying Shou, for her essay, “Want to Play the Finale of Mitosis? RENT Instruments from the Nucleolus First!” based on her doctoral research in the laboratory of Dr. Deshaies at Caltech. For another perspective, see the diary kept by the yeast cells. Dr. Shou was born in Hangzhou, China. She received her BA degree from Pomona College in Claremont, California, in 1993 and a Ph.D. from the California Institute of Technology in 2001. She is currently a Damon Runyon postdoctoral fellow at the Rockefeller University in New York City.

Japan: Mitsutoshi Setou, for his essay, “Cargo Binding Mechanisms of Molecular Motors,” based on his Ph.D. research carried out in the laboratory of Dr. Nobutaka Hirokawa at Tokyo University. Dr. Setou was born in Kagawa, Japan. After graduating as a valedictorian from the University of Tokyo School of Medicine, he joined Dr. Hirokawa’s laboratory in 1996 and received his Ph.D. from the University of Tokyo Graduate School of Medicine in 2001. He is now a research associate in Dr. Hirokawa’s laboratory and a PRESTO (Precursory Research for Embryonic Science and Technology) researcher of the Japan Science and Technology Corporation (JST) at the Mitsubishi Kagaku Institute of Life Science.

The second Japanese regional winner is Hiroshi Takayanagi, for his essay, “How Does the Immune System Break and Protect Bone? Molecular Cross-Talk in Osteoimmunology,” based on her research at the University of Tokyo. Dr. Takayanagi was born in 1969 in Tucuman, Argentina, and received his M.D. degree in 1993 from the Faculty of Medicine, University of Tokyo, in 1990. After 7 years as an orthopaedic surgeon in the University Hospital, she undertook doctoral research on the mechanism and regulation of bone destruction in arthritis in the Department of Orthopaedic Surgery and later the Department of Immunology, University of Tokyo, under the guidance of Dr. Taniguchi. Dr. Takayanagi obtained his Ph.D. from the University of Tokyo in 2001. He is currently an Associate in the Department of Immunology, Graduate School of Medicine, University of Tokyo, and a researcher in the PRESTO program of the JST.

All Other Countries: Raul Mostoslavsky, for his essay, “The Role of Chromatin Structure in the Establishment of k-Chain Allelic Exclusion.” Dr. Mostoslavsky was born in 1969 in Tucuman, Argentina, and received his M.D. degree in 1993 from the Faculty of Medicine at the National University of Tucuman. He pursued Ph.D. studies at the Hadassah Medical School, The Hebrew University, Jerusalem, under the supervision of Yehudit Bergman and Howard Cedar. Dr. Mostoslavsky received his Ph.D. degree in 2001. He currently holds a postdoctoral position in Professor Alt’s laboratory at The Children’s Hospital–Harvard Medical School, Boston.

For the full text of essays by the regional winners and for information about applying for next year’s awards, see Science Online at www.sciencemag.org/feature/data/pharmacia/prize/winning.shl
2002 Grand Prize Winner

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