

## THE LASER

720 BROADWAY • SEATTLE, WA 98122 • 206.726.1200 • www.pnri.org

## PERSPECTIVES

by R. Paul Robertson, M.D.



## Independent Research and Society: An Interdependent Relationship

Scientists love independence. The freedom to pursue novel solutions to knotty problems through creative thought and hard work is heady, satisfying. Day's work and night's musings merge into a never-ending, irresistible journey into the unknown. It's like plodding through deep snow with the pleasurable realization that one's marks are freshly made. On occasion, insight converts a horizontal trek into an exhilarating downhill rush into discovery. Then, it's the uphill again until the next rise is crested where hindsight gasps at errors made and, if fortune holds, foresight glimpses new unimagined solutions. It's the stuff of pure romance.

And who makes this romance possible? How is it that scientists, like musicians and artists, get to play each day instead of work like the rest of

*continued on page 4*

## Working with Parents for Public Health: DEW-IT

Can the risk of juvenile diabetes in Washington's children be accurately predicted? Researchers at PNRI think the answer is yes. If so, the potential public health benefits will be immense. Early detection will enable doctors and families to better recognize and manage the disease. A simple and reliable diabetes test can be routine for all newborns in the state. And one day soon, many experts believe, prevention of diabetes mellitus is within reach.

On their way toward this goal, Dr. Bill Hagopian and a team of PNRI research associates are inviting parents to work with them in one of the largest type 1 diabetes screenings ever conducted.

### The Promise of Important Benefits

Hagopian's team has sent letters to almost half a million Washington households, asking permission to test the blood of all children born here since August of 1995. The test will be free and will require no new blood samples. It will be conducted on a small portion of the blood already collected at birth in the Newborn Screening Program of the state Department of Health.

Analysis will allow the PNRI researchers to identify those children who have a greater than average risk of developing type 1 diabetes. This knowledge will permit them to offer the at-risk children and their parents free follow-up tests, educational resources for recognizing and treating diabetes, and access to new medications developed during the term of the study.

Hagopian and his colleagues are optimistic. They are confident this study will confirm not only the accuracy of the screening procedure but also its efficacy as a new public health tool. Adding diabetes to the Newborn Screening Program will enable the state to provide all

parents with important information about their child's risk. Individual families will be better able to manage the complications of type 1 diabetes. In addition, the general public will have greater awareness and understanding of the disease and its risks. But the social benefits of this research will only be gained because a number of partners have worked together. The most important partners at the moment are the parents.



*Dr. Hagopian's Research Team*

### The Challenge of Encouraging Collaboration

Essential to this PNRI study—called the Diabetes Evaluation in Washington (DEW-IT) and funded by the Centers for Disease Control—is parent permission, which is required by ethics and law. Parents must take the time to understand the study and actively give permission. Hagopian's team is working hard to earn parents' trust and cooperation.

The study team is encouraging parents to permit this use of their child's blood sample in

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# THE LASER

FEBRUARY 2002

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Special thanks to the following for their help in preparing this issue: Carolyn Anderson, Michael Brantley, Ruth Burstiner, Debi Cooper, Matt Donelan, Bill Hagopian, Paul Robertson, Jeff Stevens, Mike Toney, and Emily Wion.



FROM THE EDITOR:

## The Poetry of Promise

by Rich Murphy

I came across the following quotation from the 19th century English poet Christina Rossetti during my first week at PNRI. Bill Hutchinson had included it in a booklet he printed in 1961 and distributed to the friends of what was then called the Pacific Northwest Research Foundation:

*Does the road wind  
uphill all the way?*

*Yes, to the very end.*

*Will the journey take  
the whole long day?*

*From morn to night,  
my friend.*

It made me feel right at home.

The background I bring to my new position as Director of Community Relations at PNRI is not science but literature. English poetry, writing, and a career as a humanities teacher. My subject—in its broadest terms—was poetry. I studied, taught, and helped both students and colleagues think about the art of narrative. I was listening for the pleasures of rhythm, attending to the dynamic power of story.

Now at PNRI, I have a new subject and new audiences. Cells, genes, and their intricate operations in disease and health—these are my new texts. And my new audiences? You. Lay and professional readers of *The Laser*. Visitors to the PNRI website. Friends of the Institute in this distinguished, almost 50-year history. Members

of the larger civic and biomedical community of which PNRI is a part. What a privilege it is to be invited to help frame and tell its story for you.

Long-time readers of *The Laser* know that this newsletter is one essential vehicle of PNRI's story. Thanks to the good work of Dave Anderson and Rick Oldenburg, its earlier editors, you've read profiles of our scientists and news of their recent research accomplishments. Donald Malins' study of DNA mutation, for example. Or Ingegerd and Karl Hellstrom's collaboration with University of Washington scientists on a promising new tumor vaccine. *The Laser* also has celebrated Institute successes, like Malins' and Sen-itiroh Hakomori's election to the National Academy of Sciences or Paul Robertson's appointment as program director of the Seattle Human Islet Transplantation Project.

But there are still other stories to tell—of the many unheralded individuals who collaborate to make discovery possible; of the incremental processes by which knowledge is advanced; of wrong guesses and inconclusive results; of partial successes in reducing human suffering and increasing human health. The grandeur of such stories is fundamental, and I must admit to some trepidation here on the verge of telling them.

Still, the welcome I've already received makes me realize that PNRI's story will be a cooperative effort. And Bill Hutchinson's quotation from Rossetti is further reassurance. Scientific discipline is deep, durable, and patient. It winds uphill to the very end. It takes the whole long day.

And there's no better expression of its promise than poetry.

*join us in discovery...*

WORKING FOR A WORLD WITHOUT  
DIABETES AND CANCER

# Transplanting Islets: A Medical Odyssey

by R. Paul Robertson, M.D.

In past issues of *The Laser* we often wrote of transplanting pancreatic islets in patients with type 1 diabetes so that their blood glucose levels would be normal and so they would no longer be at risk for the serious complications of the disease. These complications can result in blindness, amputations, and kidney failure—hardly trivial problems.

In 2000, physicians at the University of Alberta in Edmonton, Canada, figured out a new twist in immunosuppression therapy that allowed consistent success in islet transplantation. Everyone in the field became quite excited, as did we. Plans were laid to duplicate Edmonton's results and to add more special twists to improve on them. PNRI played a major role in organizing a consortium of research institutions in the Seattle area that work under the acronym HITS (Human Islet Transplantation in Seattle). Our collaborators in this effort include the Fred Hutchinson Cancer Research Center, Puget Sound Blood Center, Swedish Medical Center, University of Washington, and Virginia Mason Hospital. After three years of preparations, you would think this powerhouse group would be transplanting islets on a daily basis. Would that it were so.

One of the painful facts in medical research is that nothing happens on time. Every time one thinks the green light is on, the signals seem to change without warning. In the case of islet transplants, we thought we were ready to roll over a year ago when abruptly the Federal Drug Administration (FDA) decided it would regulate this procedure, thereby halting all ongoing efforts in the US.

On the one hand, it is ironic that the FDA seemingly didn't care when this procedure was being tried and experiencing failure between the years 1972 and 2000. On the other hand, now that it is successful, it is probably a good thing that the procedure has the watchful oversight of the FDA so that it is not conducted without appropriate care and caution by qualified transplant centers.

In any event, the HITS program now has FDA approval to carry out this novel approach to managing diabetes, so we expect the New Year will bring new excitement to our consortium of researchers and their patients. If we are successful, diabetic patients needing kidney transplants will also receive islet transplants and thereby achieve normal glucose levels without daily insulin injections. Stay tuned for further updates.

## PNRI Principal Investigators and their Major Areas of Research

- William A. Hagopian, M.D., Ph.D.  
*(Type 1 diabetes mellitus)*
- Sen-itiroh Hakomori, M.D., Ph.D.  
*(Aberrant cell recognition and signaling in cancer, based on changes in glycosylation)*
- Ingegerd Hellström, M.D., Ph.D.  
*(Tumor immunology)*
- Karl Erik Hellström, M.D., Ph.D.  
*(Tumor immunology)*
- Michael Kahn, Ph.D.  
*(Chemical biology & functional genomics)*
- Jeffrey A. Ledbetter, Ph.D.  
*(Cancer immunotherapy and T cell tolerance in autoimmune disease)*
- Donald Malins, Ph.D., D.Sc.  
*(Breast, ovarian, prostate cancer)*
- Vincent Poitout, D.V.M., Ph.D.  
*(Pancreatic beta-cell dysfunction in Type 2 diabetes)*
- Christopher Rhodes, Ph.D.  
*(Biochemistry of pancreatic beta cells)*
- R. Paul Robertson, M.D.  
*(Pancreas and islet transplantation, glucose toxicity of pancreatic beta cells)*



PNRI

## HISTORY

*The following paragraphs first appeared in William B. Hutchinson's An Invitation to Invest in Longer, Healthier Living... through Medical Research, PNRF 1961.*

### How Pacific Northwest Research Foundation Was Started

The idea for the Pacific Northwest Research Foundation was conceived in the spring of 1956 by Dr. William B. Hutchinson and a group of citizens prominent in civic, social, business and professional affairs. These founders, in addition to Dr. Hutchinson, were: Mrs. Lawrence M. Arnold, Henry C. Isaacson, Gus E. Ledbetter, D.K. MacDonald, and Mrs. Lowell P. Mickelwait. Later that year the Foundation was incorporated as a tax exempt organization under the laws of the state of Washington for the express purpose of providing space and facilities for medical research by the physician or surgeon with an enquiring mind.



*"This landmark on First hill, originally the home of Captain W.R. Ballard, early Seattle settler, served as headquarters for The Foundation from the time of its formation in 1956 until 1961."*

The Swedish Hospital generously provided a three-story wood-framed building located near the hospital and which was once the home of an early Seattle resident. Alterations to the building were financed by a small group of interested persons, and several research projects were promptly started.

## Perspectives

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humanity? Society places its hopes of disease prevention and medical cures in the hands of scientists by supporting their research through federal programs, private foundations, and personal gifts. Our society has adopted the notion that the research of creative people who dream of new ways to promote greater health and who bring these dreams to fruition should be supported. Otherwise, the only medical research in existence would be commercial in nature, financed purely by the profit motive. A balance is clearly healthy and needed. But at the same time, society-supported researchers have a serious responsibility to produce results and to convey their findings to the society that makes their work possible.

Because we highly value this symbiosis, we

publish *The Laser*. In it we try to convey what PNRI scientists are doing and why we do it. With this issue, we introduce our new editor, Rich Murphy. All you have to do is read the rest of this issue to discover what a find he is. Rich is a retired Professor of English Literature from Radford University in Virginia who specializes in communication. His prose is impeccable as his persona is irresistible. As our first Director of Community Relations, we know he will be extraordinarily effective in conveying to you, our supporters, what we do and why we do it. In the end, we hope he will lay our dreams and accomplishments before you so that you understand the amazing value of independent research institutes like PNRI.

## DEW-IT Program

*continued from page 1*

order to get important health information. Since the sample is already collected, the child does not have to go through the pain or fear of another sampling. Hagopian's study is the first research project to seek permission to use this bank of blood samples.

Hagopian and his team also know that some parents may find the study's request troubling. The news that their child "may" develop diabetes will be potentially more painful because it will have the force of science behind it, and yet type 1 diabetes still can't be prevented or cured. But the research team is explaining to parents that early detection of type 1 diabetes is a great help in managing the complications of the disease once it has begun. And Hagopian is very hopeful that drugs now approved for use for other autoimmune diseases or for transplantation may eventually be proven to prevent type 1 diabetes in the highest risk children.

### Early Partnership Success

The partnership with parents has already begun. Hagopian and his colleagues have created a special website with additional information about the study and its ramifications. They've established an advisory committee made up of citizens from across the state to help them define and address public concerns. They've invited television and newspaper scrutiny to publicize what they are doing and why. And they've detailed both the personal and public benefits of parent participation.

Parent response has already been encouraging. Ten thousand Washington parents have so far enrolled their children in the study. The screenings have not yet begun, but the team

expects its first results as early as spring of this year. It is a major undertaking, with tangible advantages for public health. It promises significant progress in the fight against diabetes. And it is happening thanks to the willing cooperation of Washington's parents.



*One of the DEW-IT study's graphic logos, this image represents the 17% of screened children who might have an increased risk of developing type 1 diabetes.*

PROFILE OF CARE:

# Matt Donelan

Matt Donelan didn't take the shortest route to PNRI. He came via art, economics, gardening, plant and soil sciences, and research at the Joslin Diabetes Research Center in Boston and the University of Texas Southwestern Medical Center in Dallas. But along the way, he's held true to one overriding idea about biochemical research: "It must be responsible to the environment and to the community."

As Health and Safety Director at PNRI, he's hard at work making the Institute's research as responsible as it can be. His is a demanding job. He must ensure that experimental processes protect both the environment and the people who work here.

Every biomedical research facility operates in a universe of risk. Chemical solvents like poisons and tetragens; flammables like ethanol, chloroform, and formaldehyde; toxic inhibitors; blood-borne pathogens; radiation—all, and more, infuse the work with hazard.

Matt doesn't want this list of dangers sensationalized. But everyone who works in, or even walks in, a PNRI lab should be aware. "There is a certain amount of risk associated with every job task," he explains. "It's a question of safely managing those risks."

So his health and safety job has several related dimensions.

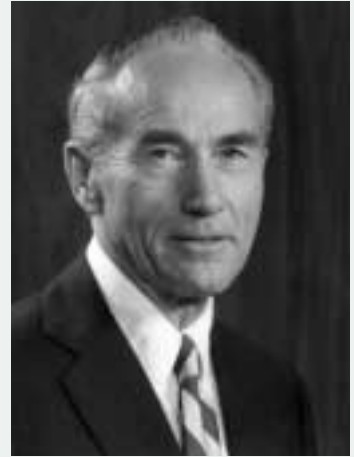
First, he must educate the staff. He conducts both new employee training and annual refresher classes to make and keep people aware of such issues as radiation safety, chemical hygiene, and accident prevention. To supplement this training, he has created an intranet

web site that gives everyone at PNRI immediate access to important information, like the updated Health and Safety manual as well as the Material Safety Data Sheets necessary for proper handling of hazardous chemicals. He also chairs regular Health and Safety Committee meetings and serves as a permanent resource for researchers so they can design and conduct safe experiments.

Matt also manages toxic materials and maintains scrupulous records of their use. From their arrival at PNRI to their disposal, Matt tracks every dangerous substance every inch of the way. He monitors chemical inventories, measures radiation exposure, conducts wipe tests, investigates accidents, and supervises the proper disposal of all biochemical waste. But Matt's responsibility is more than waste management in a rarified atmosphere. It is to help all PNRI employees understand the risks, so that they will treat materials with respect and use them safely and wisely.

The law requires it. Matt's job is to ensure PNRI's compliance with a whole raft of government safety regulations. He has to keep the Institute's licenses—and his own training—current. He has to answer to both federal and state occupational and safety health agencies, to the state departments of both Ecology and Labor and Industry, and to the Seattle Fire Department. On a moment's notice, or no notice at all, he has to be ready to welcome inspectors to scrutinize his and the Institute's work.

Matt is glad for these requirements. In a facility where the life of cells is under constant microscopic examination, safety should be given microscopic care as well. The people who work here, the public community, and the environment deserve no less. It is one of his abiding passions—and not surprising in a man who combines art and science—that the race for sophisticated biochemical insight be guided by expansive awareness, strict stewardship, and care.



## REMEMBERING DR. HUTCHINSON

Bill Hutchinson was a pioneer in medical research. He founded PNRI in 1956 as the Northwest's first non-profit institute and began the Fred Hutchinson Cancer Research Center in 1972 in memory of his brother.

A whole host of companies including Immunex, Seattle Biomedical, and ICOS have arisen because Bill Hutchinson had a vision that private research could enrich and improve human life.

PNRI continues that vision today.

The Dr. William B. Hutchinson Research Fund offers an opportunity for his many admirers to further his work. Contributions may be made by sending them to the Hutchinson Research Fund at PNRI, 720 Broadway, Seattle 98122. Or by calling (206) 726-1200.

PNRI



## PNRI Welcomes New Employees and Visiting Scientists!

Ben Armentrout, Kahn Lab  
Rena Baek, Hakomori Lab  
Taleetha Buckingham, Animal Facility  
Debi Cooper, Administration  
Sarah Fitzgerald, Kahn Lab  
Sanjay Jadhao, Poitout Lab  
Tokio Kaizu, Hakomori Lab  
Junko Kawata, Hakomori Lab  
Ruben Kertesz, Hagopian Lab  
Dae Hoon Kim, Kahn Lab  
Jee Ho Lee, Kahn Lab  
Eric Leroy, Robertson Lab  
Akihisa Matsuda, Kahn Lab  
Patrick Moore, Poitout Lab  
Chang-Hyun Oh, Kahn Lab  
Peter Ong Lim, Kahn Lab  
Hui Peng, Hagopian Lab  
Scott Sommers, Rhodes Lab  
Wim Steelant, Hakomori Lab  
Hiroki Takahashi, Robertson Lab  
Michael Toney, Administration  
Kyu Chang Won, Robertson Lab  
Mei-Chun Yang, Hakomori Lab  
Martha Horike-Pyne, Hagopian Lab  
Janice Ginsberg, Hagopian Lab  
Kyung Soon Lee, Kahn Lab



Some new staff gathered in the lobby for a quick photo. Among those new employees and visitors not shown is the photographer.

## ANNIVERSARY:

# Ruth Burstiner



No one at PNRI has been here longer than Ruth Burstiner. September 1, 2001 marked her 20th anniversary.

“I wash and sterilize glassware,” Ruth says plainly, standing in front of the Primus Sterilizer autoclave. “I sterilize media they use for experiments.”

In her quiet, unassuming way, she also keeps the history.

After a year doing glassware at the Fred Hutchinson Cancer Research Center, Ruth moved to the Institute in 1981, where she has watched both the staff and the facilities evolve.

“The summer of 1988,” she says, “we moved into this building. I’m the only one left.”

The automatic washer she uses now in her workroom on the fourth floor of PNRI is a large stainless steel Lancer. It hums through our talk, rinsing beakers in hot demineralized water.

“We used to be in a rented building. Eklind Hall. It belonged to Swedish. It was the dormitory for the doctors. I worked in what had

been a shower room, with tile walls and cloudy windows.”

Not only does Ruth wash and sterilize reusable materials. She also decontaminates bio-hazardous waste. The autoclave heats the waste to more than 120 degrees centigrade, disinfecting it completely, so that it can be packaged and disposed of safely. The heat of the autoclave is so effective that it is used to clean equipment as well. A roll of cash register tape hangs off the control panel, recording every load of material with date and time, the number of cycles and the temperature of the sterilizing treatment. Often, Ruth buries a test vial in the center of a load to verify that the autoclave is doing a thorough job.

What does she have to be most careful with? She doesn’t hesitate: “We have to be careful with all of it.”

Ruth works alone, always has. For more than twenty years. Quietly, matter of factly, expertly making the science of PNRI possible.

## STAFF KUDOS

### William Hagopian, M.D., Ph.D.

- Elected to Leadership Council, Immunology of Diabetes Society
- Ad Hoc Reviewer, Diabetes SBIR Grants, National Institute of Diabetes Digestive and Kidney Diseases

### Donald Malins, Ph.D., D.Sc.

- Publication: “Age-related radical-induced DNA damage is linked to prostate cancer.” *Cancer Res.* 2001, 61: 6025-6028
- Invited presentation at the Superfund Basic Research Program Annual Meeting, Gainesville, FL: “Subtle changes in DNA structure are sensitive biomarkers for increased risk of disease in fish exposed to environmental contaminants”
- Presentation at Tenth Meeting of the Cancer Cube: A Focus Group on Estrogen Carcinogenesis, Washington D.C.: “Antioxidants substantially reduce diversity in DNA structure”

- Invited to serve as member of the Advisory Committee for the Center of Excellence in Redox Biology at the University of Nebraska, NIH COBRE (Centers of Biomedical Research Excellence) program
- Invited to serve as member of the Editorial Board for the new journal *Technology in Cancer Research & Treatment*

### Vincent Poitout, D.V.M., Ph.D.

- Appointed member of the American Diabetes Association Grant Review Panel

### Christopher Rhodes, Ph.D.

- Invited to serve as member of the Endocrinology Study Section, Center for Scientific Review, National Institutes of Health

### R. Paul Robertson, M.D.

- Invited speaker, NIH Symposium on the Pancreatic Beta Cell: “Chronic oxidative stress as a mechanism for beta cell glucose toxicity in type 2 diabetes”
- Chair and speaker, Annenberg Pancreatic Islet Transplantation Symposium

# 2 Minute Survey Helps Us Serve You Better

Please fill out the following survey.  
Your response will help us provide you with better information.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

*(Mark all that apply to you)*

**I am interested in PNRI's research in the following:**

- All areas of research at PNRI
- Type 1 Diabetes       Type 2 Diabetes
- Breast Cancer       Ovarian Cancer       Prostate Cancer

**I am interested in PNRI's research because:**

- I have     Family member has     Friend has diabetes
  - Type 1     Type 2
- I have / had cancer     breast     ovarian     prostate
- Family mbr has/ had     breast     ovarian     prostate
- Friend has/had cancer     breast     ovarian     prostate

- I can volunteer for short assignments when needed by PNRI for the purpose of supporting the research.**

**I am affiliated with PNRI because I am:**

- a former patient of Dr. William Hutchinson
- a friend of a current or former researcher at PNRI
- simply interested in helping conquer these diseases
- Researcher     Scientist     Teacher     Patient

- Please put me on your "UPDATE" list to receive updates on the break-through work at PNRI.**

E-mail: \_\_\_\_\_

Fax: \_\_\_\_\_

- I would like to arrange for one of PNRI's researchers to address a civic/social group to which I belong.**

\_\_\_\_\_ Group Name

## The Science of Prediction

Researchers don't yet understand why some people develop type 1 diabetes, why their immune system turns against their own cells and destroys their ability to produce insulin.

But scientists are zeroing in on genetic conditions that seem to predispose certain individuals to the disease. And this is helping pinpoint who is most likely to develop it.

A number of recent studies have led researchers to believe that persons with certain identifiable gene combinations in their DNA have a greater than average risk of type 1 diabetes. The particular gene is technically called HLA-DQ, which is inherited in about 20 slightly different versions. Researchers have shown that persons with certain versions of HLA-DQ are much more susceptible than others to the disease.

The Diabetes Evaluation in Washington study will be looking for this condition in its screening of Washington children.

But PNRI's Bill Hagopian, the study's principal investigator, is quick to point out that the presence of this particular genetic "marker" does not in itself predict the eventual onset of diabetes. It's only a good indicator of the children who will benefit from further predictive tests.

Only about one person in every three hundred develops type 1 diabetes. But the genetic marker Hagopian and other researchers are studying exists in roughly 17% of the general population, that is, almost 80 times as many people as will actually ever develop the disease. So finding the genetic marker is only a first-step on the path to prediction.

Follow-up tests are necessary to predict diabetes much more closely, tests which show that the immune system, in the form of auto-antibodies, is actually attacking the pancreas.

So, why use the screening test at all? For three reasons.

- Because it immediately identifies 83% of the population as LOW RISK for developing type 1.
- Because it is quick and easy and inexpensive, using newborn blood samples that are already collected by law for other screening purposes—a clear gain for the families involved and for the general health of the public.
- Finally, because it gives parents of children who do show the genetic marker an opportunity to receive more exact predictive testing. For the very small number of children who are subsequently shown to be at high risk, the combination of screening and diagnostic tests provides an opportunity to get a head start on the disease. Understanding it more fully, parents and health care providers will be able to recognize and treat it earlier, moderate its consequences, and improve their child's quality of life in living with diabetes.

*a future in which diabetes and cancer are history . . .*

ADDRESS SERVICE REQUESTED

**THE LASER**  
FEBRUARY 2002

**PNRI  
MISSION  
STATEMENT**

The mission of the Pacific Northwest Research Institute is to prevent and cure cancer and diabetes and thereby help relieve human suffering.

Visit us on the web at:  
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## WINTER/SPRING 2002 SEMINAR SERIES

Noon – 1:00pm  
Renshaw Room  
720 Broadway  
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### January 9, 2002

- Frederick Appelbaum, MD  
FHCRC, Division of Clinical Research  
The Evolution of Hematopoietic Cell Transplantation

### January 18, 2002

- Philip Cryer, MD  
Washington University, St. Louis  
The Pathophysiology of Hypoglycemia in Diabetes

### January 25, 2002

- Elizabeth R. Seaquist, MD  
University of Minnesota  
Brain Glucose Metabolism in Normal Volunteers and in Patients with Diabetes

### February 13, 2002

- Robert Eisenman, PhD  
Fred Hutchinson Research Center  
A Transcription Factor Network Regulating Cell Behavior

### March 13, 2002

- Robert L. Heinrikson, PhD  
Pharmacia & Upjohn Corporation, Michigan  
Aspartyl Proteases as Therapeutic Targets in AIDS and Alzheimer's Disease

### April 5, 2002

- Daniel Drucker, MD, FRCPC  
University of Toronto  
Glucagon-Like Peptides and the Integrated Regulation of Energy Homeostasis

### April 10, 2002

- Jeffrey Pessin, PhD  
University of Iowa  
An Adipocentric View of Insulin Signaling