Driving back diabetes

As Western lifestyles spread around the world, diabetes has become an epidemic. Improved treatments are desperately needed, and the funding is there for those who may be able to help, says Ricki Lewis.

One of the earliest references to diabetes mellitus is in an Egyptian papyrus describing the sweet-smelling urine that is a symptom of the disease. Though spotted thousands of years ago, diabetes — in which the body either fails to produce enough insulin (type 1) or becomes unable to use it effectively (type 2) — was left untreated until 1920, when insulin was used to reverse the condition in dogs. Despite further advances, including recombinant human insulin and transplants of insulin-producing islet cells, new ways to treat this life-threatening condition are needed urgently. Its global incidence, according to the World Health Organization, has rocketed from 30 million in 1985 to more than 170 million and is likely to reach at least 300 million by 2025. This epidemic stems from a population that's both ageing and piling on weight.

"There will be a great increase in funding in both private and public sectors, due to ageing and to the explosive increase in obesity, which is a key factor in developing Type 2 diabetes," says George Vlasuk, vice-president, cardiovascular disease and metabolic disease, at Wyeth Research in Collegeville, Pennsylvania.

Some 90% of diabetes is type 2, or non-insulin dependent (NIDDM) — once known as 'adult-onset diabetes' but now appearing at all ages.

DIABETES RESEARCH INSTITUTE

TGEN

Ellen Feigal: increase will continue.

Fortunately, new approaches to untangling the causes of the disease are becoming available. Along with increased public and private funding, these are providing job opportunities for those who want to tackle diabetes, says Ellen Feigal, vice-president of clinical sciences and deputy scientific director at the non-profit Translational Genomics Research Institute (TGen) in Phoenix, Arizona. Mary Loeken, investigator at the Joslin Diabetes Center in Boston, agrees. "There will continue to be an increase in jobs in biomedical research in general, and diabetes in particular," she says.

Diabetes research crosses the board and involves large drug companies, government laboratories, academic centres and non-profit research institutions. And jobs aren't restricted to the bench or clinic. TGen, for example, has openings for science writers, director of grants administration and laboratory managers.

CAREER SATISFACTION

Although diabetes can be understood at the molecular and cellular levels, symptoms occur at the organ level, and the condition is more common in certain groups. So a satisfying career in diabetes research can combine a specific expertise, such as in signal transduction, with attention to the bigger picture, such as epidemiology or population genetics.

The diversity of the 30 researchers in Vlasuk's group reflects that range. His team members have qualifications relevant to drug development, in biochemistry, cell biology, molecular biology, gene expression and animal pharmacological models.

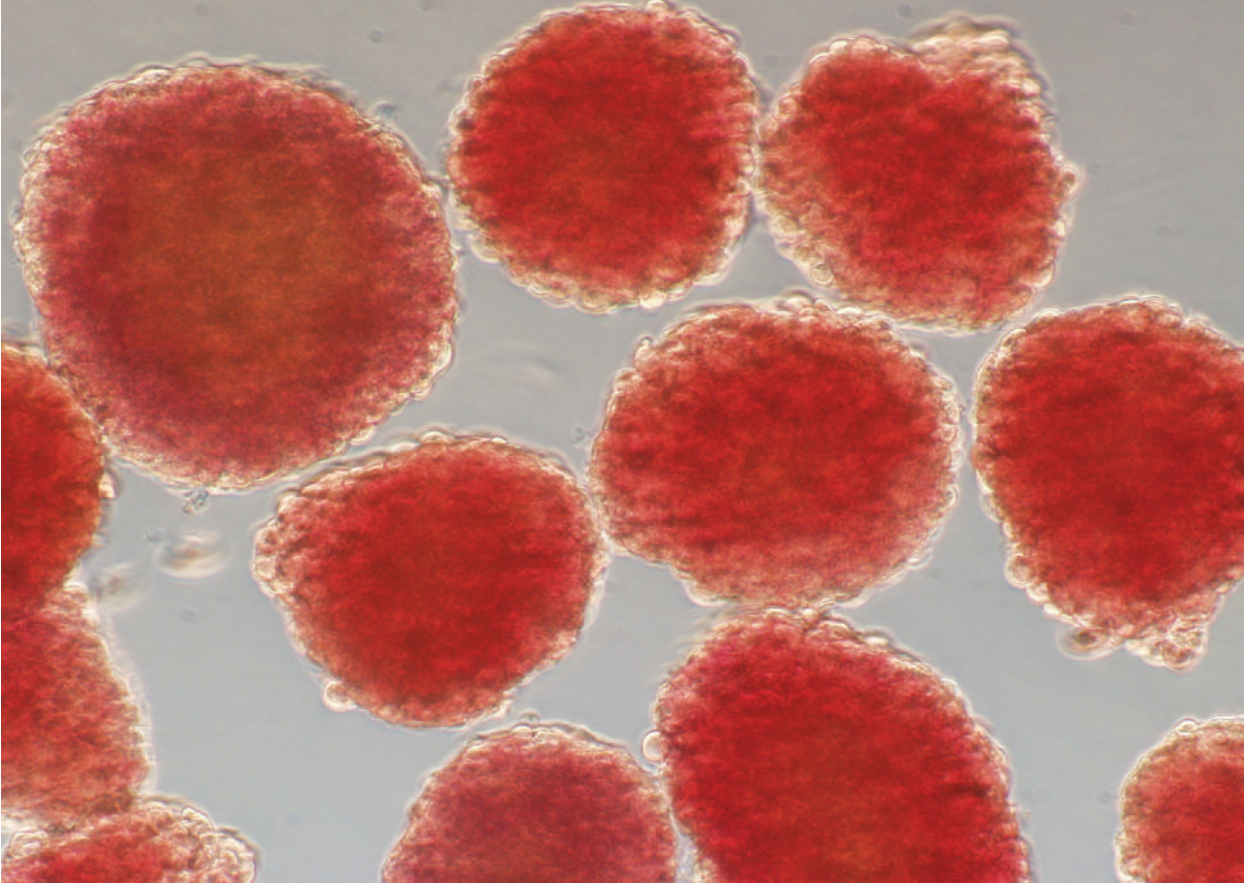
At TGen, projects range from dissecting the genetic bases of diabetes and its complications, to pharmacogenetics, to nutrition. TGen is closely involved in the 'Healthy Avondale 2010' project, an effort to improve the health of a community. Some of TGen's projects include communities such as the Pima Indians, who have one of the highest rates of diabetes in the world.

Although much research is done in the clinic, there is a place for scientific expertise to bridge the gap between bench and bedside. Whereas clinical trials are largely the turf of physicians, a cell biologist might work in drug discovery or toxicology, says Deborah Anzalone, senior medical director working on a drug

Wanted: islet specialists

With demand for islet transplants far exceeding supply, scientists are needed who can handle the delicate pancreatic insulin-producing tissue. The universities of Miami and Alberta offer training.

Camillo Ricordi, head of cellular transplantation at the Diabetes Research Institute at the University of Miami School of Medicine, works with several 'human-islet processing scientists'. The ideal candidate is a PhD level technologist with one to four years' experience in preparing this hard-to-sustain tissue. Technicians are also needed. The extensive training reflects the complexity of the material — the rare islets are dispersed and nestle intimately within the vast digestive portion of the pancreas. "An islet transplant is complex," says Ricordi, who in 1986 invented the device used worldwide to separate islets. "It involves more than a couple of technicians and a pancreas." R. L.



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Islet of dreams: transplants of these insulin-producing cells could one day make insulin injections unnecessary, but success remains tantalizingly rare.

for type 2 diabetes at AstraZeneca in Boston. Medical schools increasingly stress scientific skills as preparation for careers in drug development. "A basic knowledge of biostatistics is fantastic to have, and biochemistry is also useful," she adds.

Johanna Wolford, an associate investigator at TGen who collaborates with physicians and diabetes educators, says, "A paediatric endocrinologist might call me and say, 'I'm seeing many more children with type 1 diabetes, what's happening?' An interface between clinical and laboratory research is critical."

Large-scale studies also mix basic research and clinical investigation. The Finland–United States Investigation of NIDDM Genetics, for example, probes the genomes of Finns and Ashkenazi Jews for a particular gene variant associated with NIDDM in these groups. Investigators in the project have expertise in cell biology, human population genetics and new gene-scanning technologies, says Catherine McKeon, senior adviser for genetic research at the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) in Bethesda, Maryland, which is one of the project's funders.

The Type 1 Diabetes TrialNet investigates immune function and metabolism in close relatives of people with diabetes in 18 clinical centres in the United States, Canada, Europe and Australia. Many of the Immune Tolerance Network's 80 physicians and clinical scientists at more than 40 institutions focus on islet transplants. The International Type 2 Diabetes Linkage Analysis Consortium probes genomes in several countries. For those interested in technology, the Endocrine Pancreas Consortium chronicles pancreas development using the PancChip DNA microarray.

Training positions are available at the NIDDK's Phoenix Epidemiology and Clinical Research branch, for example. "We have positions for researchers wanting a year or two of research, perhaps between university and a doctoral programme or medical school," says the branch's head, Clifton Bogardus.

With federal funding for human embryonic stem-cell research currently restricted in the United States, foundations are filling the void. The Juvenile Diabetes Research Foundation (JDRF) funds efforts in the United States, Australia, Canada, Israel, Sweden, Finland and Britain. Its 2004 $93-million portfolio includes grants of $100,000 to fund research too speculative to win money from the National Institutes of Health (NIH).

OBESITY RESEARCH EXPANDING

For 2005, the NIH is requesting $150 million for a Special Type 1 Diabetes Initiative, and $22 million for expanded research into obesity and diabetes. The multi-organ nature of diabetes is reflected in work on diabetic retinopathy at the US National Eye Institute in Bethesda, Maryland; on autoimmunity at the National Institute of Allergy and Infectious Diseases; and on diabetic neuropathy at the National Institute of Neurological Disorders and Stroke.

In Britain, the Medical Research Council supports diverse approaches to diabetes. The UK Prospective Diabetes Study, which ended in 1998, monitored health; the Protein Phosphorylation Unit takes a molecular approach. Genetic efforts map individual susceptibility genes and screen half-a-million people as part of the UK Biobank database project.

Now that islet-cell transplants work, and stem cells are poised to tackle the supply and rejection problems, diabetes may one day make history again — by becoming completely treatable. But that's at least a decade away, say researchers. In the meantime, working to vanquish diabetes can provide a challenging and rewarding career. ■

Ricki Lewis is a freelance science writer in Scotia, New York.