



Michigan Society
for Medical Research

BioFocus

A Newsletter Exploring Science & Biomedical Research Issues For School Educators

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Our Mission

The Michigan Society for Medical Research (MISMR) is a nonprofit educational organization that supports biomedical research and testing and the judicious use of animals in research, education and testing in the interests of human and animal welfare. Established in 1981, MISMR is made up of the state's leading research universities, teaching hospitals, pharmaceutical companies, voluntary health organizations and hundreds of scientists, educators and students who understand and support the importance of animal research and testing in advancing health care and treatment.

MISMR Educational Projects & Activities

Annual Essay Contest

Every year MISMR sponsors an essay contest open to all Michigan high school students. Students from well over 500 schools in the state have annually participated in the contest to address the benefits of biomedical research. Prizes are awarded.

Speakers Bureau

MISMR volunteers visit K-12 schools and civic community groups throughout Michigan each year to educate the public about biomedical research and to dispel commonly held myths.

The Animal Research Minute

A daily radio editorial broadcast to more than 3,500 stations



nation wide, The Animal Research Minute discusses the humane and responsible use of animals in research that are leading to human and animal health improvements. **CLICK**>www.FBResearch.org

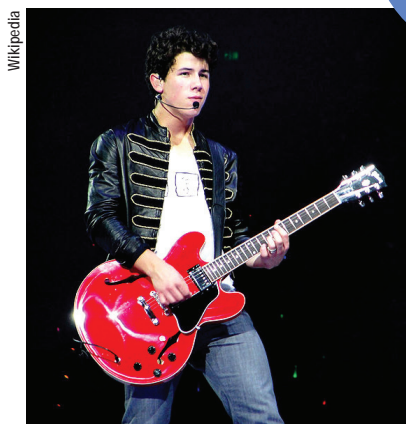
www.mismr.org

It's in the Blood

By Doug Hagley, BA, MFA



Universal symbol for diabetes.



Nick Jonas of The Jonas Brothers was diagnosed with type 1 diabetes.

Five years ago, Nick Jonas — at 13 the youngest of the Disney-propelled, multi-media pop phenomenon The Jonas Brothers — was diagnosed with type 1 diabetes. Now the group performs a song about Nick's illness at every concert, and the brothers' website, www.changeforthechildren.com, aims to educate youngsters about diabetes.

This popular attention comes at a fortuitous time: cases of diabetes — a major cause of death in the U.S. — doubled between 1990 and 2005, when Nick was diagnosed. A third of children born in 2000 are expected to develop the disease. Nearly 24 million people in the U.S. currently have diabetes, while about 57 million (including 2 million adolescents) are in a "pre-diabetic" state.

Diabetes is a metabolic disorder in which our bodies are unable to get energy from the food we eat. Most of what we consume is broken down during digestion into glucose, a form of sugar transported by the bloodstream throughout the body to our cells, which need it for growth and energy. Each cell in our body, however, is protected by a cell membrane that blocks the entrance of substances from the bloodstream, including glucose.

Insulin is a hormone that is released after we eat and acts like a door to allow glucose to pass through cell walls. It is produced by 3 million special cells (called Islets of Langerhans), in the pancreas, a 6" leaf-shaped organ behind the lower stomach that also excretes digestive fluids. Diabetes occurs when the pancreas isn't producing enough insulin, or the insulin isn't doing its job. Cells starve and blood glucose rises to toxic levels, damaging nerve cells and blood vessels, and causing kidney failure, cardiovascular disease, blindness, gangrene, amputation and death.

There are three kinds of diabetes:

- **Type 1** — The pancreas produces no insulin.
- **Type 2** — Insulin production is low or there is "insulin resistance".
- **Gestational Diabetes** — A temporary metabolic imbalance that may occur during pregnancy.

While gestational diabetes usually ends after childbirth, types 1 and 2 are incurable medical conditions that require lifelong treatment.

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It's in the Blood... *Continued from page 1*

Type 1 Diabetes

Type 1 diabetes is not preventable. It is also called “juvenile diabetes” because onset mostly occurs before age 20. Fifteen percent of all diabetes cases are type 1. It's treated with injections of insulin, which was isolated in Toronto in the early 1920s by Drs. Frederick Banting and J. MacLeod, who won the Nobel Prize for their work. Their first use of insulin was one of medicine's most memorable moments, as children in diabetic comas literally awoke within minutes after receiving injections.

Type 1 diabetes is an auto-immune disease in which the cells that make insulin are attacked and destroyed by the body's own immune system. The management of type 1 diabetes requires injecting insulin, either manually or with an automated pump attached to the body. Blood glucose levels must be balanced with the injected insulin through exercise and a diet low in fat, salt and sugar. High glucose levels (hyperglycemia) result in the symptoms described earlier, while low glucose levels (hypoglycemia) — due to missed or mistimed meals — cause erratic heartbeat, dizziness, confusion, fatigue, shakiness, and loss of consciousness.

Every year, type 1 diabetics lose their lives or their licenses because they pass out while driving with low blood glucose. Besides regularly testing finger-prick blood samples with a glucose meter, patients need to be able to identify the onset of a “low” and treat it immediately by taking a fast-acting carbohydrate like glucose tablets, candy or juice. They should always carry these items.

Type 2 Diabetes

90% of diabetics are type 2, sometimes called non-insulin dependent diabetes mellitus or adult-onset diabetes, though the incidence of type 2 in adolescents has increased 10-fold in the last 10 years and now constitutes a third of childhood cases. Type 2 begins when cells don't use insulin properly. It is strongly associated with obesity, and nearly 1/3 of American children and 80% of people over 20 are now overweight, most not exercising. Close to 10% of adolescents 12–19 are estimated to be pre-diabetic: they have high glucose blood levels that can lead to type 2 diabetes. Ironically, losing as little as 10–15 pounds and walking 30 minutes a day can prevent pre-diabetes from becoming type 2.

Obesity seems to contribute to diabetes by increasing the body's resistance to insulin. Overnutrition (when the body has more calories than it can use) causes a special membrane, the endoplasmic reticulum, to stop insulin receptors from responding to insulin. Recent research at the University of Cincinnati suggests that changes in fat cells themselves cause symptoms of diabetes.

In addition to 250,000 diabetes-related deaths a year, the direct (medication, equipment and hospitalization) and indirect (disability compensation, work loss) costs of the disease are estimated at over \$175 billion a year.

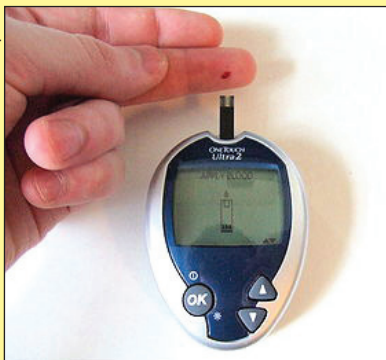
Transplants

While efforts focus on preventing type 2 diabetes and developing better glucose meters and insulin pumps for type 1 patients, advances in biotechnology hold the possibility of a future cure.

In the 1970s, transplants of the insulin-producing Islets of Langerhans cells were conducted on mice with mild success, but results didn't transfer to humans. In 2000, Canadian researchers used an enzyme to remove a million islet cells from the pancreas

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Wikipedia



Blood glucose testing with glucose meter.

Wikipedia



Obesity is a major contributing factor in type 2 diabetes.



WE WANT TO HEAR FROM YOU!

We want to include your stories, comments or questions relating to animals in your classroom in upcoming editions of *BioFocus*. Please e-mail stories to: mismr@umich.edu

www.mismr.org

