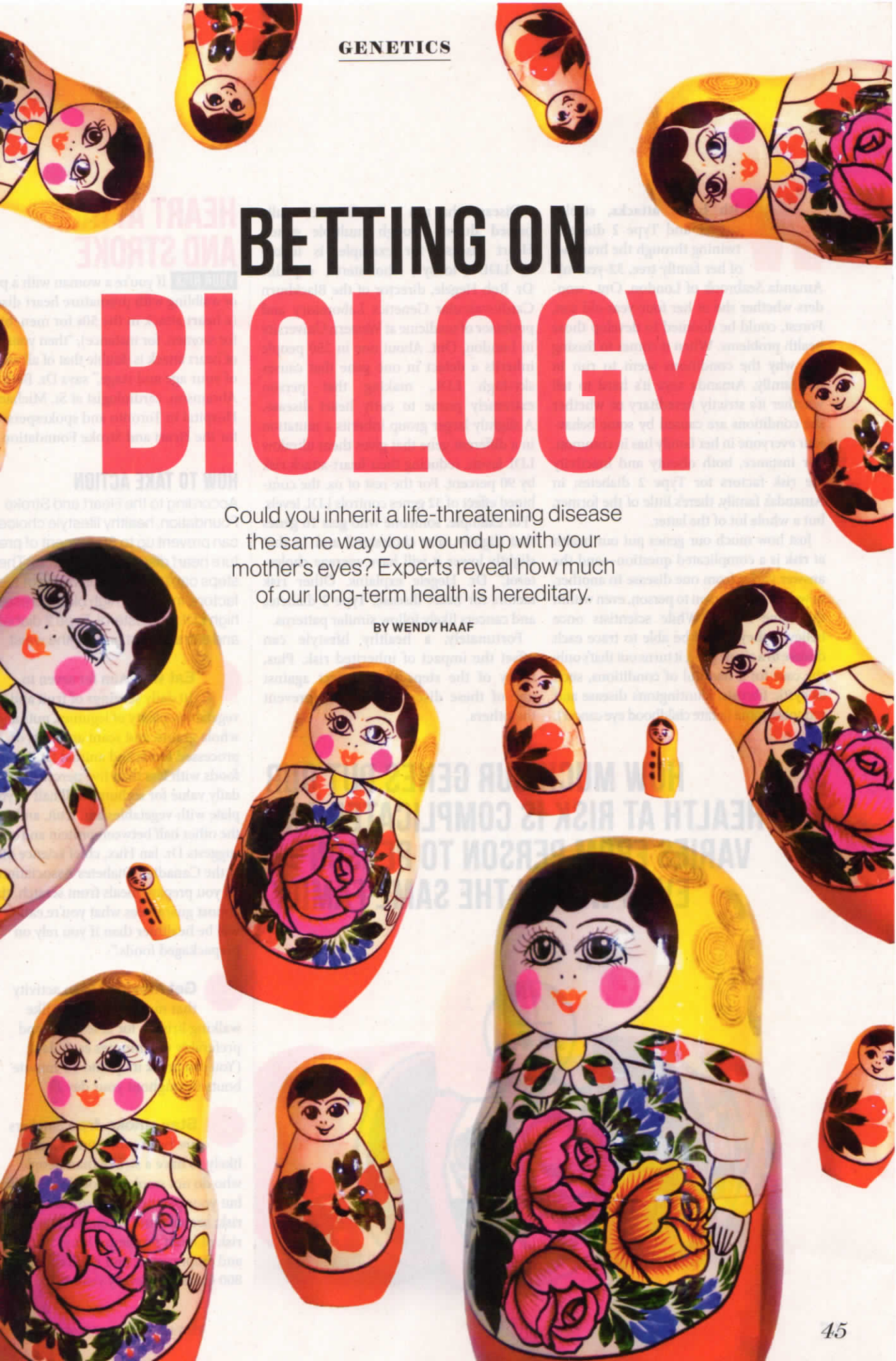


GENETICS

BETTING ON BIOLOGY

Could you inherit a life-threatening disease the same way you wound up with your mother's eyes? Experts reveal how much of our long-term health is hereditary.

BY WENDY HAAF



With heart attacks, stroke, cancer and Type 2 diabetes twining through the branches of her family tree, 32-year-old

Amanda Seabrook of London, Ont., wonders whether she or her four-year-old son, Forest, could be doomed to develop those health problems. When it comes to teasing out why the conditions seem to run in her family, Amanda says it's hard to tell whether it's strictly hereditary or whether the conditions are caused by some behaviour everyone in her family has in common. For instance, both obesity and inactivity are risk factors for Type 2 diabetes; in Amanda's family, there's little of the former, but a whole lot of the latter.

Just how much our genes put our health at risk is a complicated question—and the answer varies from one disease to another, as well as from person to person, even within the same family. While scientists once believed they would be able to trace each disease to a single gene, it turns out that's only the case for a handful of conditions, such as cystic fibrosis, Huntington's disease and retinoblastoma (a rare childhood eye cancer).

Diseases that run in families are usually passed down through multiple genes. Heart disease, for example, is linked to LDL ("lousy") cholesterol, explains Dr. Rob Hegele, director of the Blackburn Cardiovascular Genetics Laboratory and professor of medicine at Western University in London, Ont. About one in 250 people inherits a defect in one gene that causes sky-high LDL, making that person extremely prone to early heart disease. A slightly larger group inherits a mutation in a different gene that gives them ultralow LDL levels, reducing their heart-attack risk by 90 percent. For the rest of us, the combined effect of 32 genes controls LDL levels. "For example, someone who gets 16 genes that slightly raise cholesterol and 16 that slightly lower it will have average cholesterol," Dr. Hegele explains. Other risk factors for heart disease, Type 2 diabetes and cancers likely follow similar patterns.

Fortunately, a healthy lifestyle can offset the impact of inherited risk. Plus, many of the steps that protect against one of these diseases also help prevent the others.

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HEART ATTACK AND STROKE

YOUR RISK If you're a woman with a parent or a sibling with premature heart disease (a heart attack in the 50s for men, or 60s for women, for instance), "then your risk of heart attack is double that of all women of your age and stage," says Dr. Beth Abramson, cardiologist at St. Michael's Hospital in Toronto and spokesperson for the Heart and Stroke Foundation.

HOW TO TAKE ACTION

According to the Heart and Stroke Foundation, healthy lifestyle choices can prevent up to 80 percent of premature heart disease and strokes. These steps can help ward off many of the risk factors, including high blood pressure, high LDL cholesterol, Type 2 diabetes and extra weight around the waist.

Eat well Aim for seven to 10 daily servings of fruit and vegetables, plenty of legumes, nuts and whole grains, and scant amounts of processed foods and animal fat. Choose foods with less than five percent of their daily value for sodium. "Fill half of your plate with vegetables and fruit, and split the other half between protein and starch," suggests Dr. Jan Hux, chief science officer at the Canadian Diabetes Association. "If you prepare meals from scratch, that almost guarantees what you're eating will be healthier than if you rely on prepackaged foods."

Get moving Do an activity that makes you sweat, like walking briskly, for at least 30, and preferably 60, minutes each day. (You can break it up into 10-minute bouts throughout your day.)

Stay smoke-free Smokers are two to four times more likely to have a stroke than people who do not smoke. If you don't smoke but your partner does, you are still at risk; secondhand smoke increases the risk of heart problems, lung cancer and emphysema, and it kills about 800 Canadians every year. ◊



RESEARCH SHOWS THAT ROUGHLY HALF OF CANCERS COULD BE PREVENTED SIMPLY BY CHANGING OUR EVERYDAY HABITS.





CANCER

"Breast cancer is always on my mind," says Jenny Marino, 45, of Guelph, Ont., whose mother died from the disease at 52. "I really started thinking about it when I had my daughter, Bella, who's now 10."

YOUR RISK Your chances of inheriting an abnormal gene that may cause cancer, even the most common cancers—lung, breast, prostate and colorectal—are small. A genetic link accounts for just five to 10 percent of all breast cancers, according to the Canadian Cancer Society. "Both genetic and epigenetic 'errors' are commonly observed in cancer, suggesting that genetics does not provide the full story," says Martin Hirst, head of epigenomics—which studies how chemical modifications to DNA and proteins impact genes—at the BC Cancer Agency in Vancouver.

HOW TO TAKE ACTION

The American Institute for Cancer Research estimates that roughly half of cancers could be prevented by changing our everyday habits.

-  **Maintain a healthy weight** A postmenopausal woman with a body mass index (BMI) of 22.6 or lower is 2½ times less likely to develop breast cancer than someone with a BMI of 31.1 or higher. (A BMI between 18.5 and 24.9 is within the healthy range.)
-  **Limit alcohol** Alcohol is linked to an increased risk of several cancers, so indulge sparingly (one drink per day for women), if at all.
-  **Take action** Regular exercise is linked to a lower risk of colon, breast, lung and uterine cancers.
-  **Don't smoke** It could prevent 30 percent of cancer deaths.
-  **Limit red meat** To minimize risk of colon cancer, the American Institute for Cancer Research recommends eating no more than 18 ounces (510 grams) of cooked red meat per week.
-  **Be sun smart** Shielding your skin from ultraviolet rays reduces the risk of skin cancer.

TYPE 2 DIABETES

YOUR RISK Being overweight and having a family history of Type 2 diabetes are two strong risk factors for the disease, but it's tough to determine just how much either is to blame. "It's important to stress that both play a role," says Dr. Hux, "because there's a tendency to blame the people who are affected, especially if they're overweight or obese." Other factors beyond our control, such as income and proximity to grocery stores that sell healthful food, also influence risk.

HOW TO TAKE ACTION

It's sometimes possible to reverse the disease with weight loss, exercise and changes in diet. "I've had patients come off blood pressure, cholesterol and diabetic medication with losing weight and increasing physical activity," says Dr. Abramson.

-  **Lose a little** If you're 180 pounds, losing nine to 18 pounds—five to 10 percent of your weight—can make a big difference. "Even if you stop gaining weight," says Dr. Hux, "that's beneficial to your health."
-  **Add activity** Exercise hard enough to sweat lightly for at least 150 minutes per week—a little more than 20 minutes a day. In one U.S. study of high-risk individuals, this much exercise assisted in modest weight loss, which reduced their odds of developing Type 2 diabetes by 58 percent over an average followup of just less than three years.
-  **Drop sweet drinks** According to the Canadian Diabetes Society, drinking sugary beverages is directly linked to the risk of developing Type 2 diabetes. "Don't drink your calories, whether it's in pop, fancy coffees, alcohol or sweet juices," Dr. Abramson stresses. "Drink more water or eat a piece of fruit instead."
-  **Avoid tobacco** Smokers have a 30 to 40 percent higher risk of developing Type 2 diabetes over non-smokers, according to the U.S. Centers for Disease Control. ●