It is widely assumed that a person’s genome, composed of DNA, is the sole source of inherited predispositions for health and disease. But the story is much more complex than that. Epigenetic changes, which can redirect the activity of genes without altering the DNA sequence itself, are prime regulators of biological function. These changes have been associated with numerous health conditions, ranging from cancer to heart disease to autism.

Rockefeller University scientist David Allis, recipient of a 2015 Breakthrough Prize in the Life Sciences, is renowned for his groundbreaking research on epigenetic changes. At the Parents & Science CELEBRATING SCIENCE Benefit Lecture, Dr. Allis will explain how epigenetics research has raised the possibility of new therapies designed to control disease by shutting down specific genes or allowing others to be expressed. Certain epigenetic modifications, for example, have been found to play an important role in stem cell reprogramming and are already having an impact on the emerging field of regenerative medicine.

Recent research has also led to the surprising revelation that epigenetic changes can occur in rapid response to shifting environmental and lifestyle factors, such as diet, exercise, or stress. Studies have shown that—contrary to all expectations—epigenetic modifications can be passed from one generation to the next. The child of a cigarette smoker, for example, could inherit epigenetic traces that reflect the parent’s level of exposure to tobacco. Research conducted by Dr. Allis, a member of the National Academy of Sciences, is revising our understanding of heredity and bringing fresh perspectives to the study of evolution. His contributions to the rapidly advancing field of epigenetics also have vital implications for medicine’s future.

The evening’s hosts will be Rockefeller University President Marc Tessier-Lavigne and special guest Alan Alda. The lecture will be followed by a dinner honoring James and Marilyn Simons for their philanthropic leadership in the fields of biomedical research and math and science education.