

# Major international study challenges notions of how genes are controlled in mammals

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Scientists at the Omics Science Center (OSC) of the RIKEN Yokohama Institute in Japan - along with researchers from McGill University and other institutions worldwide - are challenging current notions of how genes are controlled in mammals. Three years of intensive research by members of the international FANTOM consortium will culminate with the publication of several milestone scientific papers in *Nature Genetics* and other journals on April 20.

FANTOM4, the fourth stage of the Functional Annotation of the Mammalian cDNA collaboration, is led by Dr. Yoshihide Hayashizaki of OSC. Dr. Josée Dostie, a biochemist at McGill's Faculty of Medicine joined the FANTOM4 collaboration in 2007 and is its only Canadian member.

For several years, FANTOM researchers have provided the scientific community with extensive data on the genome of [mammals](#), including detailed information on molecular function, biology and individual cell components. Now, the FANTOM4 stage of the collaboration has culminated in a breakthrough that will alter the way scientists understand transcription, the process of cellular copying and reproduction.

"This study really challenges the way we understand cellular differentiation," explained Dr. Dostie, who participated in the primary FANTOM4 research and also authored a satellite paper for publication in the journal *Genome Biology*. "The dogma right now is that there are so-called 'master regulators,' a series of protein switches that sit in

specific places on the genome and induce genes. This is supposed to lead to a cascade that leads to cellular differentiation.

"The FANTOM4 studies show that this thesis is incorrect and there are no master regulators at all," she continued. "It's not like turning everything on like a switch. Instead, it looks like the expression of some genes needs to be decreased while others are increased in a more subtle, but coordinated way."

FANTOM4 is the first report of a large-scale gene network based on an experimental data-set and is likely to generate considerable excitement in the scientific community. The information is important for life science and medical researchers trying to uncover the processes by which cells undergo conversion or become cancerous. It is also related to controlling the growth and differentiation of stem cells and ensuring their safety for use in regenerative medicine.

"We are proud that we have created groundbreaking research in understanding more about how [genes](#) regulate cells at the molecular level and we want to acknowledge all consortium members for their great contribution to the research effort," said Dr. Harukazu Suzuki, scientific co-ordinator of the FANTOM4 consortium.

Source: McGill University ([news](#) : [web](#))

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