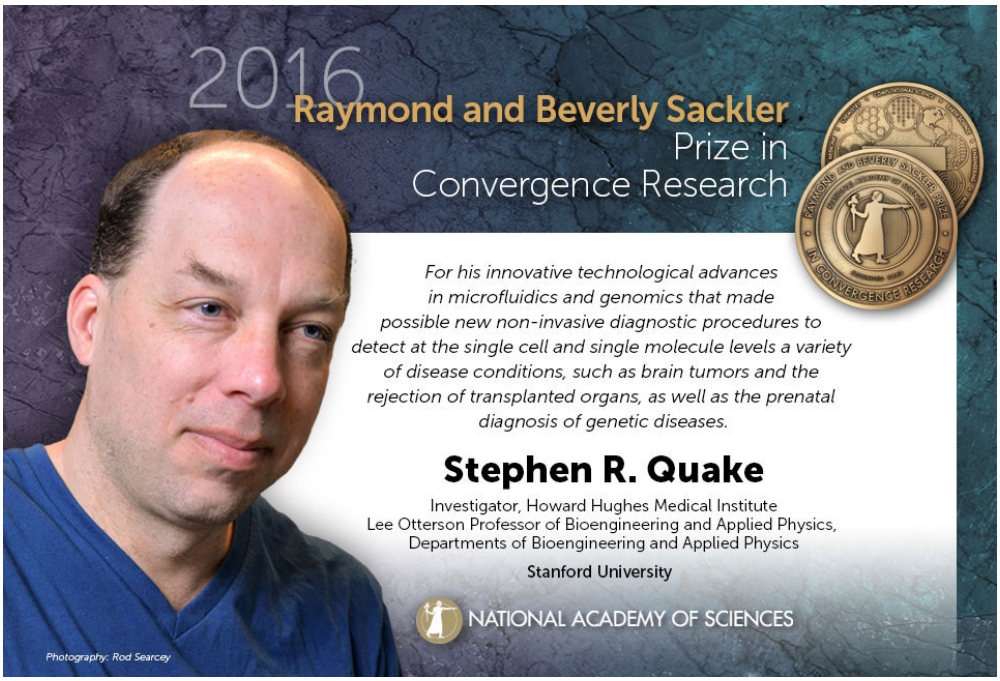

Quake has combined many disciplines—including bioengineering, biophysics, genetics, medicine, and molecular biology—in the creation of non-invasive diagnostic procedures that are advancing human biology and have yielded practical benefits in clinical medicine. He invented microfluidic large-scale integration by fabricating devices with thousands of micromechanical valves, creating the biological analogues of the integrated circuits used in electronics. These “lab-on-a-chip” devices, which allow researchers to work with extremely tiny samples, have been widely applied to many areas of chemistry and biology. Quake’s lab also pioneered the development of an automatic microfluidic platform that allows the capture and lysis (opening) of individual cells so that their DNA and RNA can be analyzed, yielding DNA sequences and gene expression profiles for single cells. Such work has allowed Quake and his colleagues to characterize the diversity of messenger RNA in human brain tissue and to dissect the origin of lymphoblasts in childhood acute lymphoblastic leukemia. His lab also demonstrated the feasibility of single-molecule DNA sequencing, leading to the first clinical annotation of a whole human genome—Quake’s own. This type of personal genomics has already found clinical applications, including a non-invasive approach for the prenatal diagnosis of genetic diseases such as Down syndrome and the early detection of heart transplant rejection.