

## What is *in silico* medicine?

Modern medicine is not modern. It was simply the best we could do before the dawn of the digital age. The human body is extraordinarily complex and in the past, we have met this complexity by doing what human beings always do when faced with a complex issue – we try to make it simpler.

Today we have the department of cardiology, the department of neurology, pathology, gastroenterology, the ear, nose and throat department, each operating in different buildings as if the organs of the human body were somehow disconnected from each other rather than completely interdependent on the actions of the other. While we can celebrate the advances we have made in medicine over the last decades it is time to turn our attention to the advances we have yet to make, by changing the very way we do medicine.

Large scale computer processing can today allow doctors and researchers to integrate the vast quantities of data from previously separated disciplines of science and medicine to allow for the first time, the investigation of the human body as a single complex system. This will have a huge impact on the regulatory system.

What does this mean for patients? It means that we now know what it means to enable personalised medicine, ensuring the right treatment, for the right patient, at the right time. Instead of receiving multiple drugs on a trial and error basis to see what works, patients will receive an individualised treatment with one medicinal product at a dosage set for just that patient to ensure maximum outcome and reduced length of stay in costly healthcare institutions.

What does this mean for healthcare providers? It means that medicinal products which may have worked effectively in 50% of patients could return to the market. By correctly identifying patients that would be receptive to certain treatments and moving away from the one size fits all approach we can ensure that effective medicinal products are not discarded.

The impact for healthcare professionals is even more pronounced. *In silico* models will act as the google translate for medical data, taking colossal quantities of recorded data and processing it into outcomes and findings of direct relevance to diagnosis and treatment.

If medicine is to become modern once more, then we must depart from the old model of ignoring complexity at the expense of targeted treatment and instead embrace it to the direct benefit of patients and researchers. *In silico* medicine will make medicine modern by providing the tools to make sense of this complexity. It will become not a niche science but a tool that will make sense of science itself.