

Title: The Role of Mathematics in 21st Century Medicine

Abstract:

The discovery of the circulation of blood through the body was widely considered one of the greatest medical discoveries of the seventeenth century, resulting in a fundamental revision of physiology. The Scottish physician Archibald Pitcairne, in a sequence of publications beginning in 1688, proposed a mathematical explanation of circulation, a *Principia medicae*, that mirrored Newton's *Principia mathematicae*, published the year before, with the beating heart playing the role of gravity. Pitcairne insisted that only mathematical statements were admissible about things we cannot see. Both mathematics and medicine have come a long way since Pitcairne's proposal, and we are closer now to his vision of a mathematical foundation of medicine. This talk will present some examples of a mathematical formulation of an important problem in medicine, serving as signposts along the road to Pitcairne's vision. They are examples of efforts toward the creation of so-called medical digital twins, a key modeling technology on our way to precision medicine.