Abstract

Blood type in humans is determined by a single gene, the ABO blood group gene. This gene is expressed as four different blood types: O, A, B, and AB. Human populations differ in their distribution of blood types. For example, the majority of United States population has either type O or A, whereas the Ainu population in Japan has roughly equal proportions of type A and B (30% each) as well as type O and AB (20% each). This leads to the question: why do different populations have such different blood type distributions? We create a stochastic model to investigate how blood type distributions in human populations might evolve over time. We also use a system of differential equations to approximate this model in terms of average behavior. In particular, we analyze the mean-field equations of the stochastic model. Based on our literature search, our model assumes that the two most influential forces affecting blood type distribution in human populations are ABO incompatibility and diseases that target a particular blood type.