



# Examining Health Care

Sometimes you don't get what you pay for. The U.S. spends more per person on health care than any other country yet lags behind many developed nations in overall health. Much money that could be better spent on sound, evidence-based medicine is currently being spent on needless tests and practices unsupported by evidence. Naturally, biology and chemistry are crucial to improving the efficiency of health care, but mathematics, especially probability and statistics, plays a role, too. For example, years of data proved that the annual chest x-ray and some diabetes drugs actually did more harm than good. Those practices have now been abandoned, saving lives and money.

One area of medicine that requires more analysis is chemotherapy. Many dosing strategies are prescribed based on a patient's ability to tolerate side effects, not necessarily on demonstrated efficacy. At times untreated tumors shrink while treated tumors grow. Differential equations and numerical analysis have been used to solve this puzzle by modeling the interactions of tumor cells, immune cells, host cells, and drugs in a patient. This allows for more complex combinations of chemotherapy and immunotherapy (besides all or nothing) so as to maximize the treatments' benefits while minimizing their side effects.

**For More Information:** *Modelling in Healthcare*, The Complex Systems Modelling Group, 2010.



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