

# Using Innovative Methods to Predict and Improve the Efficacy of Drugs



Peter Tonge  
Professor, Chemistry

## CURRENT RESEARCH


Understanding how drugs work will lead to improved therapies for all areas of disease

The current drug discovery process is extremely inefficient: more than 90% of drug candidates fail in human clinical trials. Dr. Peter Tonge, Professor of Chemistry at Stony Brook University, is developing novel methods to improve the prediction of drug activity in the human body and to design safer, better drugs. Current approaches largely ignore the rate at which drugs bind to and dissociate from their targets. By designing innovative mathematical models that use drug-target kinetics Dr. Tonge seeks to improve the science of drug discovery and our ability to predict how well drugs will work. This has important implications for improving drugs in all therapeutic areas of disease. He also develops bacteria-specific imaging agents to quantify drug efficacy.

The primary reason drugs fail in clinical trials is because the "therapeutic window" is not large enough. Too little drug can be ineffective, but too much drug may result in unwanted side effects. Dr. Tonge wants to improve the science of drug discovery by fundamentally understanding how drugs work in humans; where they go, what they bind to, and how long they stay there. To make better, safer drugs, Dr. Tonge is developing compounds that dissociate slowly from their targets; such compounds will have extended activity at low drug concentration, thus reducing the frequency of dosing and improving safety. To do this, Dr. Tonge measures both the thermodynamics and kinetics of drug target interactions (i.e. the rates at which drugs bind to and dissociate from their targets), and uses mathematical models to predict the amount of drug needed to cause the desired effect. Current drug discovery programs typically rely on thermodynamic parameters...

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## AFFILIATION

 Stony Brook University

## EDUCATION

- BSc Hons 1st Class in Biochemistry 1982, University of Birmingham UK
- Ph.D. in Biochemistry 1986, University of Birmingham UK

## RESEARCH AREAS

Life Science, Diagnostics, Infectious, Oncology / Cancer

## FUNDING REQUEST

Your contribution will help fund Dr. Tonge's continued research in identifying how drugs function in the body, and the rate in which they bind to bacteria. This crucial information will lead to improved drug development in all sectors of disease and infection. To run his lab, costs total \$750K/year. \$500K supports personnel costs and \$250K is necessary for supplies and small equipment. Play a role in increasing the efficacy of drugs; fund Dr. Tonge.

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