Modeling Mice Tumors

The Problem

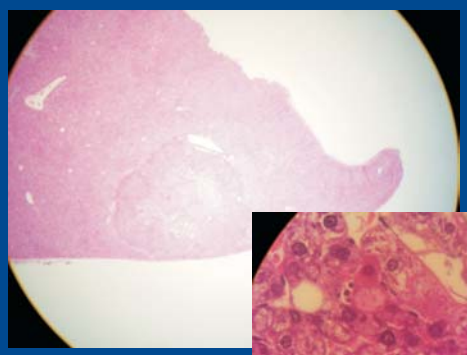
Dichloroacetate (DCA) and trichloroacetate (TCA) are by-products from chlorine-treated drinking water. Toxicologists are interested in the effect of DCA-TCA to the initiation and the growth of liver tumors in mice. The number of tumors and the volume of each tumor were recorded. We need to estimate the rate of the initiation and growth and understand their relation to the doses of DCA/TCA.

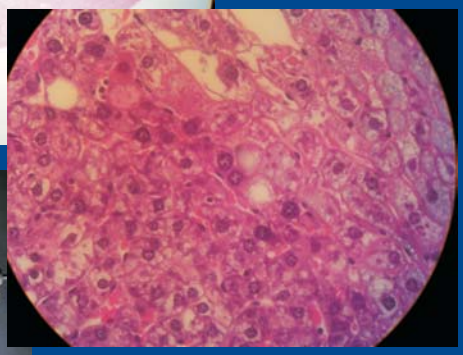
The Approach

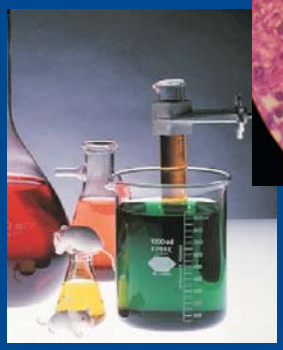
- Develop general multiple-path (different tumor types) and multiple-stage stochastic processes to model tumor/cancer development
- Obtain parameter estimations by maximizing the likelihood functions given observed values

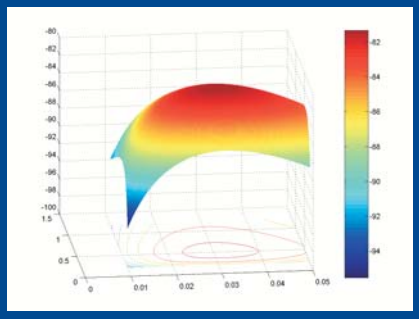
The Accomplishments

- Developed multiple-path two-stage stochastic model to handle tumor number and tumor size data simultaneously
- Implemented the maximum likelihood approach for parameter estimations in MathCad and MATLAB
- Provided a framework for biologically based interpretation of the tumor data









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