Model Assessment and Conclusions [*]

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Model Assessment and Conclusions

Model Assessment

Does the model exhibit the two phenomena:

_____(1) and

_____(2) ?

Using a bifurcation analysis, we found parameter regimes which did exhibit

- Tumor _____(3)

- Tumor _____(4)

- Tumor _____(5)

all of which have been clinically observed.

Response to chemotherapy can be tested by

_____(6) of equations using the parameters estimated from mouse data.

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Notes for Model Assessment slide:

(1) tumor dormancy

(2) asynchronous response to chemotherapy

(3) regression

(4) dormancy

(5) regrowth

(6) numerical simulation

Notes: The simulation to test asynchronous response to chemotherapy is assigned as one of the class projects. We also outline other possible model implementations, such as the inclusion of the development of a drug-resistant cell population or using alternate tumor growth laws.

Important Assessment Note: While the slides in this section are intended to serve as a conclusion for the module, we point out that the process of "model assessment" and validation was initiated in the section on Equation Development. The students should be encouraged to question assumptions and justify mathematical reductions at *every* phase of model development.

Model Assessment and Conclusions

Conclusions and Final Discussion

For each of the models we have seen, both in class and from student projects, discuss:

- What are the main differences between the models?

- What are some of the weak-points in the models?

- How useful might the models be in practice?

- What are possible model improvements?

- What clinical tests do the models suggest?

- What biological theories do the models support or refute?

Notes for Conclusions and Final Discussion slide:

These are open-ended questions with many possible answers. You may also wish to bring up the following:

- Many practioners feel that biological behavior necessarily must be described with a stochastic component. How might a stochastic component be included in these models?

- Will it ever be possible to measure these parameters accurately enough for a particular patient?

- Many experts feel that the usefulness of these mathematical models lies in informing future experiments at this stage, rather than prescribing treatment. In what ways might simulations reduce the amount of experiments necessary for therapy developments?