**Sangeeta Bhatia Part 1: Engineering Tissue Replacements**

1. In what situations, would you not need a hybrid device?
2. Describe your favorite bioengineered tissue replacement mentioned in the first 12 minutes of the video. Given the opportunity, what tissue replacement would you engineer and why? What category would it fall in: acellular, hybrid, or hybrid with cell-derived ECM?
3. What is the major limitation in culturing primary cells and how do stem cells bypass this?
4. Why is it crucial to match the degradation of the biomaterial with synthesis of the ECM?
5. What are the two types of insults imposed on tissues by cryopreservation? Can you think of other biological substances in which this might also be an issue?

**Sangeeta Bhatia Part 2: Microscale Liver Tissue Engineering**

*Relevance:* How does the therapeutic approach for liver diseases contrast with other organ systems?

What is the microenvironment of hepatocytes?

What is a major challenge that has hindered the advancement of cell based therapeutic strategies?

*Construct*: Describe two examples of light-based microfabrication techniques used in hepatic tissue engineering. What features do these techniques control for and why is this important?

*Interrogate*: What are some applications for the arrays of liver tissue in drug development? Can you envision a biological question that may be addressed via these micro-patterned co-cultures, be it with liver arrays or other organ arrays?

*Interact*: Based on the *P. falciparum* life cycle described, can you think of any experiments using the microscale human liver that might help prove this system a successful recapitulation of the full liver stage of *P. falciparum*? What do you think are some limitations of the microscale human liver?

What are some implications in the field of malarial research if this system is proven a successful recapitulation of the full liver stage?

**InVERT molding for scalable control of tissue microarchitecture Qs:**

1. What are some ways that the authors described as other alternatives for replicating "tissue architecture" in tissue engineering? Are there other methods you can think of?
2. What are the steps for the InVERT molding technique? Briefly describe figure 1a (or 2b) and redraw the steps on the board.
3. What are some cell types that might not work with InVERT molding? What are some cell types that would actually do worst in artificial microarchitectures?
4. What's the relevance of 2c? What if cell distribution didn't follow Poisson distribution? What would that mean?
5. Describe how interpenetrating seeding works (3b). What are some reasons for this being the optimal patterning? How does it differ from juxtaposed?
6. How did 4a,b demonstrate the biological importance of hierarchical architectural optimization?
7. What else would you have done with the nude mice and system that the authors had available to them in figure 4?