

Study Questions: Discussion 1 - Anatomy

Due: Monday Sept 20 by 5:00 p.m. (You may attach your answers to an email or leave in Liberman's Mailbox in EPL Front Office)

Review: Forge, A. and T. Wright (2002). "The molecular architecture of the inner ear." *Br Med Bull* 63: 5-24.

1a. Kikuchi, T., Kimura, R. S., Paul, D. L. and Adams, J. C. (1995). "Gap junctions in the rat cochlea: immunohistochemical and ultrastructural analysis," *Anat Embryol* 191, 101-118.

- a) What is a connexin; what is the relationship between connexins and gap junctions; give examples of some important intracellular molecules that either can or can't pass through a gap junction; and describe by what ultrastructural or immunohistochemical criteria the authors identified the locations of gap junctions in the cochlear.
- b) The authors propose that these gap junction systems are important in K⁺ recycling. Briefly describe the K⁺ cycle to which they are referring and the role of gap junctions in that cycle.

1b1. Liberman, M. C. (1980). "Morphological differences among radial afferent fibers in the cat cochlea: An electron-microscopic study of serial sections," *Hear Res* 3, 45-63.

- a) What was the main aim of the experiments described in this report: i.e. why was the author inspired to carry out this tedious and time-consuming serial-section study?
- b) What are the major new findings concerning the afferent innervation of the inner hair cell reported here?
- c) What are the predicted correlations between response properties and ultrastructure, and on what are they based?

1b2. Liberman, M. C. (1982). "Single-neuron labeling in the cat auditory nerve," *Science* 216, 1239-1241.

- a) This paper represents a direct test of the hypotheses set forth in paper 1b1. Which aspects of the hypotheses were confirmed, which were refuted and which could not be addressed?
- b) Describe the technique of intracellular labeling. How could the author be sure that fibers seen in the ultimate histological material really did correspond to the units from which he recorded?