**Program Number:** 229.11 **Day / Time:** Sunday, Nov. 9, 3:30 PM - 3:45 PM

# Early generation of stimulus specificity in V1 of alert monkeys.

M.Gur [1*]; I.Kagan [2]; M.D.Snodderly [3]

*1. Technion, Haifa, Israel; 2. Caltech, Pasadena, CA, USA; 3. Med. Col. of Georgia, Augusta, GA, USA*

In V1, there is an alternating arrangement of cells in input layers 4A, 4C, and 6 that are more spontaneously active, have larger receptive fields (RFs) and are less orientation selective than cells in output layers 2/3, 4B and 5 (Snodderly & Gur, 1995). Recent anatomical reports (Boyd et al., 2000; Lund et al., 2003) have described an even finer pattern within layer 4C producing a sublayer, mid 4C (4Cm), located between sublaminae 4C$\alpha$ and 4C$\beta$. Here we report on single cell characteristics from 4Cm in V1 of alert monkeys performing a fixation task. Cells were stimulated with drifting increment and decrement bars while compensating for changes in eye position. In many penetrations there is a lull in spontaneous activity between the spontaneously active layers 4C$\alpha$ and 4C$\beta$. We recorded in this region from 12 single cells having characteristics different from either 4C$\alpha$ or 4C$\beta$ cells. Almost all cells (11/12) had low maintained discharge (0-2 spikes/sec; $\mu$ = 0.4 s/sec) and 11/12 had small cRF(5-24'; $\mu$ = 14'). All 7 cells for which we had orientation tuning curves were narrowly tuned (bandwidth: 7-19°, $\mu$ = 12.2°; circular variance: 0.04-0.23, $\mu$ = 0.11) and most cells (9/12) were strongly directional (DI $\geq$ 0.9). Thus, in 4Cm, very selective cells are generated very early in the cortical network, probably requiring strong inhibitory contributions. 4Cm axons synapse on the large pyramidal cells of layer 3B where we frequently encounter large spike cells (Gur et al., 1999) that are also very spatially selective. We hypothesize the existence of a pathway originating in the convergence of inputs from the magno- and parvocellular input layers onto 4Cm cells generating silent cells with oriented, directional, small cRFs. These cells project to layer 3B cells where additional processing creates neurons that are extremely selective for specific stimulus properties-on par with our best perceptual abilities.

*Support Contributed By: NIH EY12243; Technion Fund 130372*

**Citation:** M.Gur, I.Kagan, M.D.Snodderly. Early generation of stimulus specificity in V1 of alert monkeys.. Program No. 229.11. *2003 Abstract Viewer/Itinerary Planner.* Washington, DC: Society for Neuroscience