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Xiaofeng Ma and Nobuo Suga

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▼ **Ma & Suga Findings Actually Support Weinberger Model of Auditory Fear Conditioning**
Norman M. Weinberger (4 May 2010)

Ma & Suga Findings Actually Support Weinberger Model of Auditory Fear Conditioning

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Ma and Suga reported that electrical stimulation of the lemniscal ventral division of the medial geniculate nucleus (MGv) produces shifts of tuning of neurons in the primary auditory cortex (A1). In contrast, stimulation of the non-lemniscal medial division of the mediate geniculate nucleus (MGm) produced only general increases of cortical responsiveness. They interpreted these findings as support for the Suga-Ma model and inconsistent with the Weinberger Laboratory model (WL). However, our model postulates that the MGm exerts an undifferentiated and widespread increase in excitability on the apical dendrites of pyramidal cells in A1 (Weinberger, 1998). This is precisely the finding that Ma and Suga report. Therefore, rather than contradicting the WL model, their results actually support the hypothesized role of the MGm.

The authors also reported that stimulation of the MGv alone produces tuning shifts in A1. Unfortunately, they did not test the capabilities of MGv stimulation under circumstances that occur during actual behavioral learning. Rather, their stimulation consisted of trains of pulses at a rate of 10/s for 30 minutes, i.e., 18,000 pulse trains. There is no published record on associative learning in which any stimulus is presented continuously for minutes, let alone for half an hour. Therefore, their tuning shifts might indicate what the brain can be made to do rather than what it does during normal learning.

Also, their model denies convergence of sound and shock in the MGm, whereas scores of studies have reported this and associative plasticity in the MGm (e.g., Table 2, Weinberger, 2008).

References

Weinberger NM (1998) Physiological memory in primary auditory cortex: characteristics and mechanisms. *Neurobiol Learn Mem* 70:226-251.

Weinberger NM (2008) Retuning the brain by learning, literature, and logic: Reply to Suga. *Learn Mem* 15:202-207.