



Properties of unitary IPSPs elicited in lacunosum moleculare interneurons in the CA1 region of the rat hippocampus



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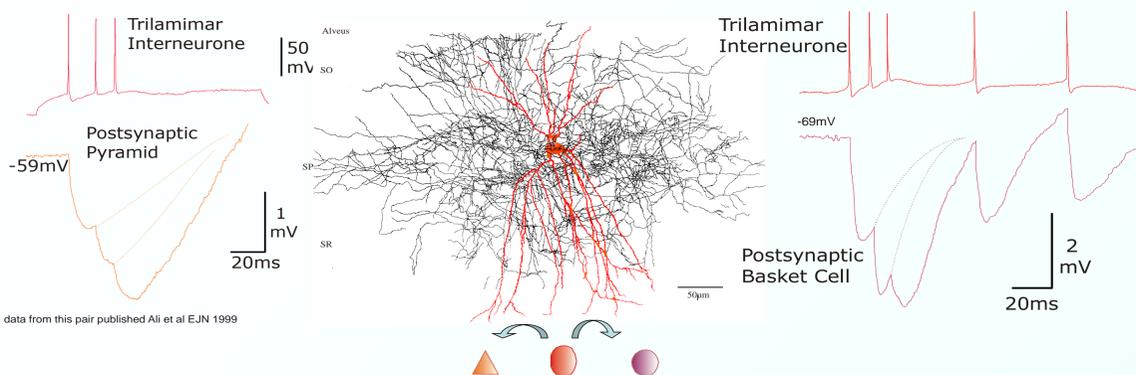
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1. Introduction

Different classes of interneurons contribute differentially to network oscillations at distinct frequencies. The pattern of transmission across excitatory synapses depends critically on both the type of excitatory connection and the pattern of presynaptic activity. Existing knowledge of the properties of excitatory inputs to interneurons does not alone, however, explain the patterns of activity of particular subclasses of interneurons during specific network oscillations *in vivo* (Klausberger *et al.*, 2003). To begin to assess another critical factor, inhibitory inputs to interneurons were studied with paired whole cell recordings with biocytin labelling and immunofluorescence in the CA1 region of rat hippocampus.

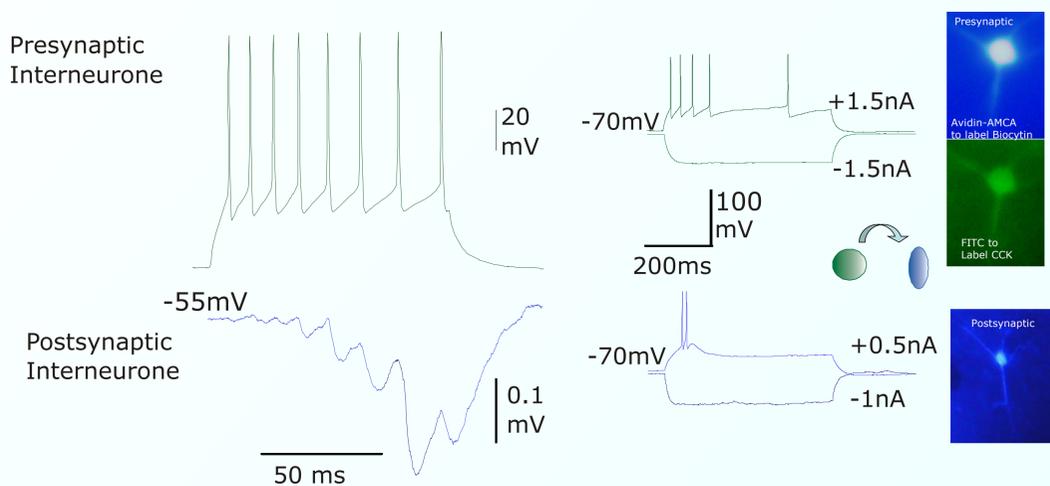
3. "Depressing" interneurone IPSPs in *S. Pyramidale*

Synaptic depression is typically seen at inhibitory inputs onto pyramidal cells from a wide variety of presynaptic interneurone classes and connections between *S. pyramidale* interneurons.

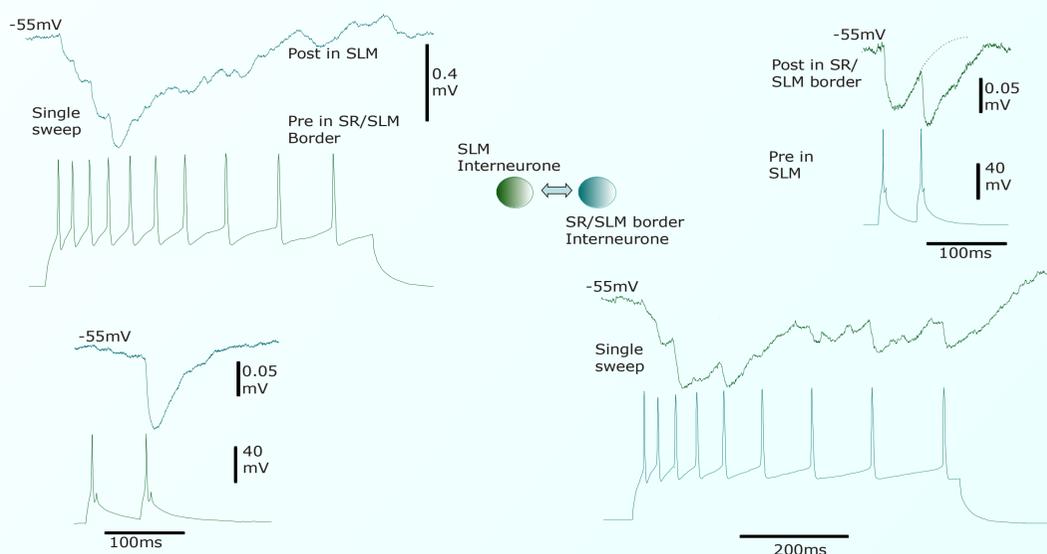


Trilaminar interneurone presynaptic to a pyramid and a basket cell.

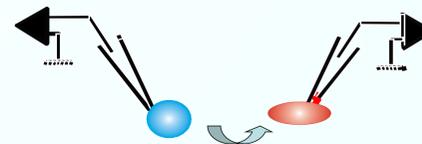
5. Delayed onset of powerful facilitation at connections between interneurons in *S. radiatum*.



6. Reciprocal inhibitory connections in *S. radiatum* and *S. Lacunosum moleculare*, also exhibit powerful facilitation.



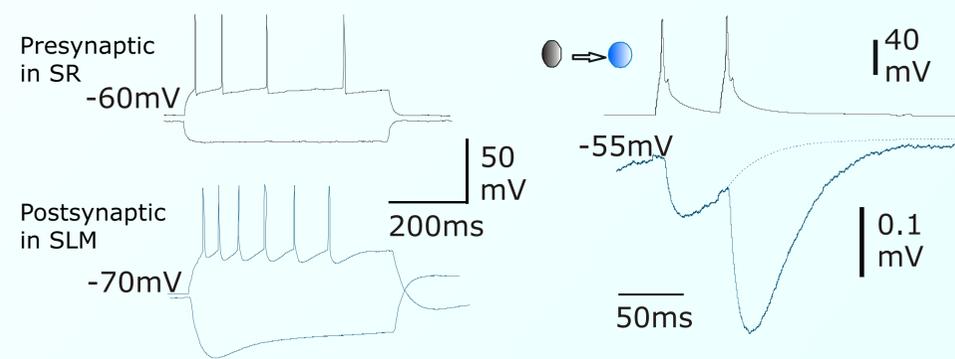
2. Method



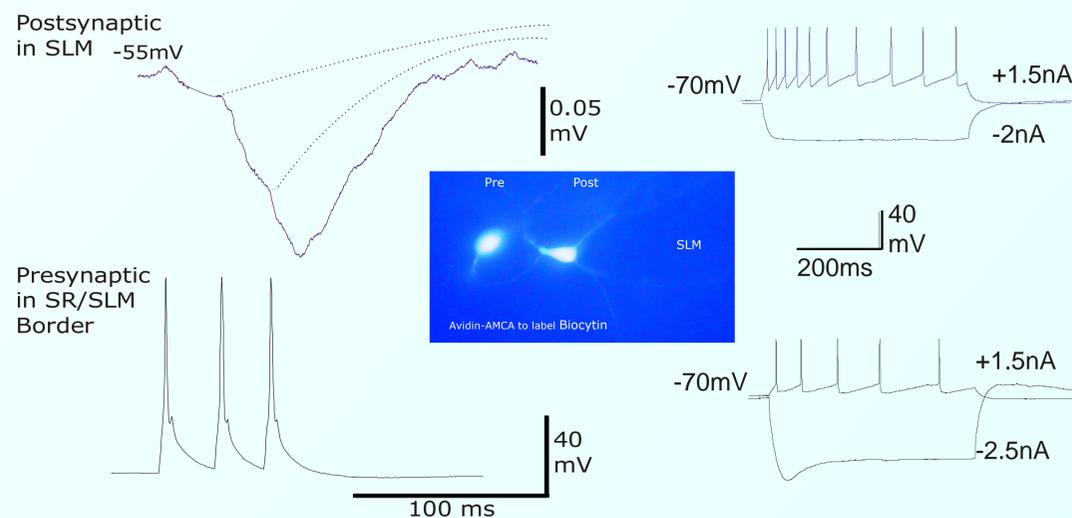
Local circuit connections between interneurons were studied using dual whole-cell recordings combined with double immunofluorescence and biocytin labelling in acute slices of the CA1 region of 18-22 day old rat hippocampus.

4. "Facilitating" IPSPs in *S. lacunosum moleculare*

The IPSPs elicited in postsynaptic *S. lacunosum moleculare* interneurons by fast spiking interneurons located in *S. lacunosum moleculare* or *S. radiatum*, displayed strong paired pulse facilitation.



Trains of presynaptic action potentials at short interspike intervals elicited IPSPs, which summated.



7. Conclusion

There are several different time courses of facilitation observed between interneurone connections in *S. radiatum* and *S. lacunosum moleculare*. This facilitation is in striking contrast to the depression typically seen at inhibitory inputs onto pyramidal cells from a wide variety of presynaptic interneurone classes and suggests that the delayed onset of inhibition in these interneurons may play an important role in their spike timing.

Reference

Klausberger, Magill, Marton, Roberts, Cobden, Buzsaki, Somogyi (2003) Brain-state- and cell-type-specific firing of hippocampal interneurons in vivo. Nature: 421(6925):844-8.

Acknowledgments

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