

4.2 Postsynaptic potentials

Cellular Mechanisms of Brain Function

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Glutamatergic excitatory postsynaptic potentials



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 $I_m = I_C + I_K + I_{Na} + I_{Cl} + I_{AMPA} + I_{NMDA}$ $I_{\rm C} = C_{\rm m} \cdot dV_{\rm m}/dt$ $I_{\kappa} = (V_m - E_{\kappa}) \cdot G_{\kappa}$ $I_{Na} = (V_m - E_{Na}) \cdot G_{Na}$ $I_{CI} = (V_m - E_{CI}) \cdot G_{CI}$ $I_{AMPA} = V_m \cdot G_{AMPA}$ $I_{NMDA} = V_m \cdot G_{NMDA}$

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EPSPs – excitatory postsynaptic potentials



- Approximately 80% of synapses in the brain use glutamate.
- Glutamatergic EPSPs are driven by fast AMPA and slower, voltagedependent NMDA conductances.
- EPSPs are larger and faster in dendrites, giving rise to smaller and slower EPSPs in the soma.
- For most cell-types, many uEPSPs must summate in order to reach action potential threshold.

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