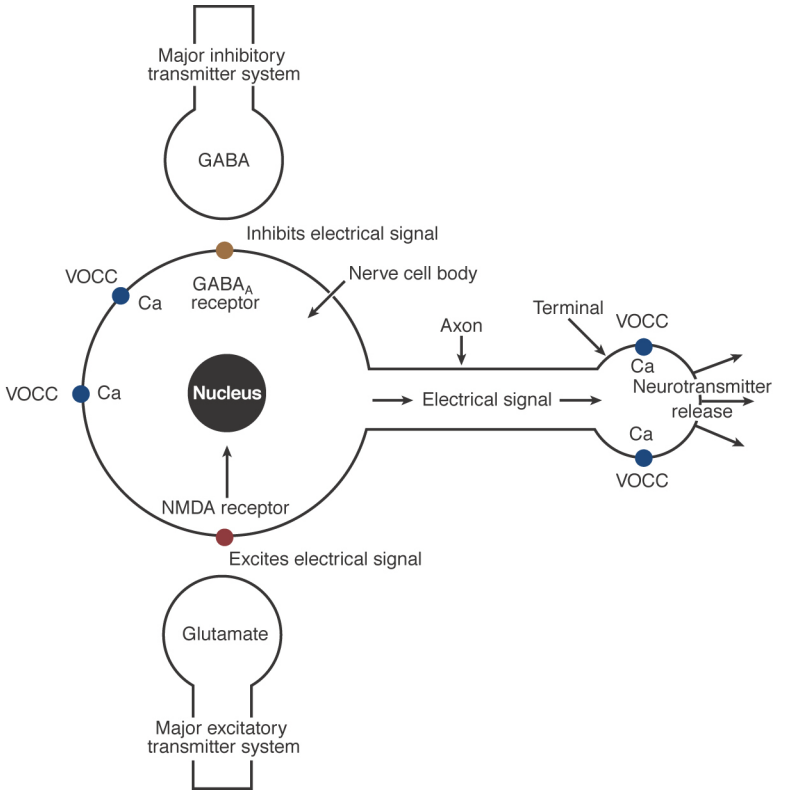
Schematic representation of some of the major neurochemical systems affected by alcohol



Nerve cells (i.e., neurons) convert chemical messages received at the cell body (at left in this simplified neuron) into an electrical signal that is conducted along the axon to the terminal (at right). At the terminal, the electrical signal is converted back into a chemical message (i.e., a neurotransmitter) that is released from the terminal and carries the information to the next neuron in the circuit. Alcohol increases (i.e., potentiates) the effects of the major inhibitory neurotransmitter in the brain, gamma-aminobutyric acid (GABA) at the $GABA_A$ receptor. GABA's effects tend to inhibit electrical signaling through the neuron. Alcohol further decreases electrical activity by inhibiting the major excitatory neurotransmitter, glutamate, particularly at a glutamate-receptor protein called the N-methyl-d-aspartate (NMDA) receptor. By inhibiting glutamate at the NMDA receptor, alcohol slows the flow of calcium (Ca) into cells. Regulation of the cell's calcium balance is essential for normal cell function. In addition to its effects at the NMDA receptor, alcohol can alter the flow of calcium through voltage-operated calcium channels (VOCC's) at the cell body as well as at the terminal, where calcium is necessary for neurotransmitter release.

Source: Littleton, J. Neurochemical mechanisms underlying alcohol withdrawal. *Alcohol Health & Research World* 22(1):13–24, 1998.

Updated: October 2000