1. Thalamus: Relay center for sensory information to and from the cortex
2. Hippocampus: involved in spatial memory and consolidation of short-term memories to long-term memories (HM case)
3. Striatum (caudate and putamen are the 2 parts of the striatum): Involved in voluntary movement. Neurons in the striatum die during Huntington’s Disease. Neurons in the substantia nigra that provide dopamine to neurons in the striatum die during Parkinson’s Disease
4. Fornix: fibers connecting the hippocampus to the mamillary bodies
5. Basal forebrain: Neurons in this area are the first to die in Alzheimer’s Disease
6. Amygdala: Involved in fear and emotion
7. Internal capsule: Fibers that carry information between the thalamus and cortex
8. Corpus callosum: Bundle of fibers connecting the left and right brain hemispheres.
9. Globus pallidus: Output neurons of the basal ganglia. Sends projections to the thalamus.
10. Mammillary body: These neurons die in patients showing alcohol-induced dementia.
2. Entorhinal cortex to dentate gyrus through perforant pathway
Dentate gyrus to CA3 through mossy fiber pathway
CA3 to CA1 through Schaffer collateral pathway

3. The presynaptic neuron fires an action potential. The action potential propagates down the axon. The depolarization it causes in the presynaptic terminal allows influx of Ca2+. The Ca2+ influx triggers a synaptic vesicle to fuse with the membrane, releasing transmitter into the synaptic cleft (note, this is a probabilistic process, so an action potential won’t ALWAYS cause vesicle fusion). The transmitter diffuses through the cleft and binds to receptors on the postsynaptic neuron. Depending on the type of transmitter and receptor this will either result in an inhibitory postsynaptic potential (IPSP) or an excitatory postsynaptic potential (EPSP) in the postsynaptic neuron.
4. Pontine nucleus- information about conditioned stimulus
inferior olive- information about the unconditioned stimulus
Information about the CS and US combine in the cerebellum

In the introduction, it was explained that the pontine nucleus carries CS information and that the inferior olive carries US information. This was determined by extracellular recordings and lesion studies. Steinmetz et al., Fig. 1, filled circles from “ACQ” sessions shows that pairing the CS and US results in learning, suggesting these two regions are sufficient to carry CS and US information (other structures may be involved, but you can get learning just by stimulating these 2 sites). Although not displayed in a figure, they say that lesioning the interpositus nucleus disrupted the learned eye blink conditioning. The interpositus nucleus is one of the outputs of the cerebellum. So, even though the pontine nucleus and inferior olive remained in tact, the learning was abolished. Therefore, the cerebellum is likely to be the structure in which information about the CS and US comes together and is processed during classical conditioning.

5. These groups are not statistically different. It would need a p value less than .05. The p =.08 means there is an 8% chance the difference in the 2 groups is due to chance. This is not acceptable to biologists, who require there to be a less than 5% chance that you are wrong (convention, nothing particularly magic about .05).