Antibody affinity maturation is the process by which B cells undergo extensive rounds of proliferation, somatic hypermutation, and antigen-affinity driven selection. B cells express B cell receptors (BCRs) on their cell membrane and allow the B cell to bind a specific antigen, against which it will initiate an antibody response (**Fig. 2**). Somatic hypermutation generates variability in the CDR loops of the antibodies (which contact the antigen). Those that bind well to the antigen will go on to proliferate and can undergo additional rounds of somatic hypermutation. Those that do NOT bind well to the antigen undergo programmed cell death (called apoptosis). This is thought to play a key role in the selection of high-affinity variants against the antigen. The B cell progeny with the highest affinities for antigen will be selected to survive and proliferate.

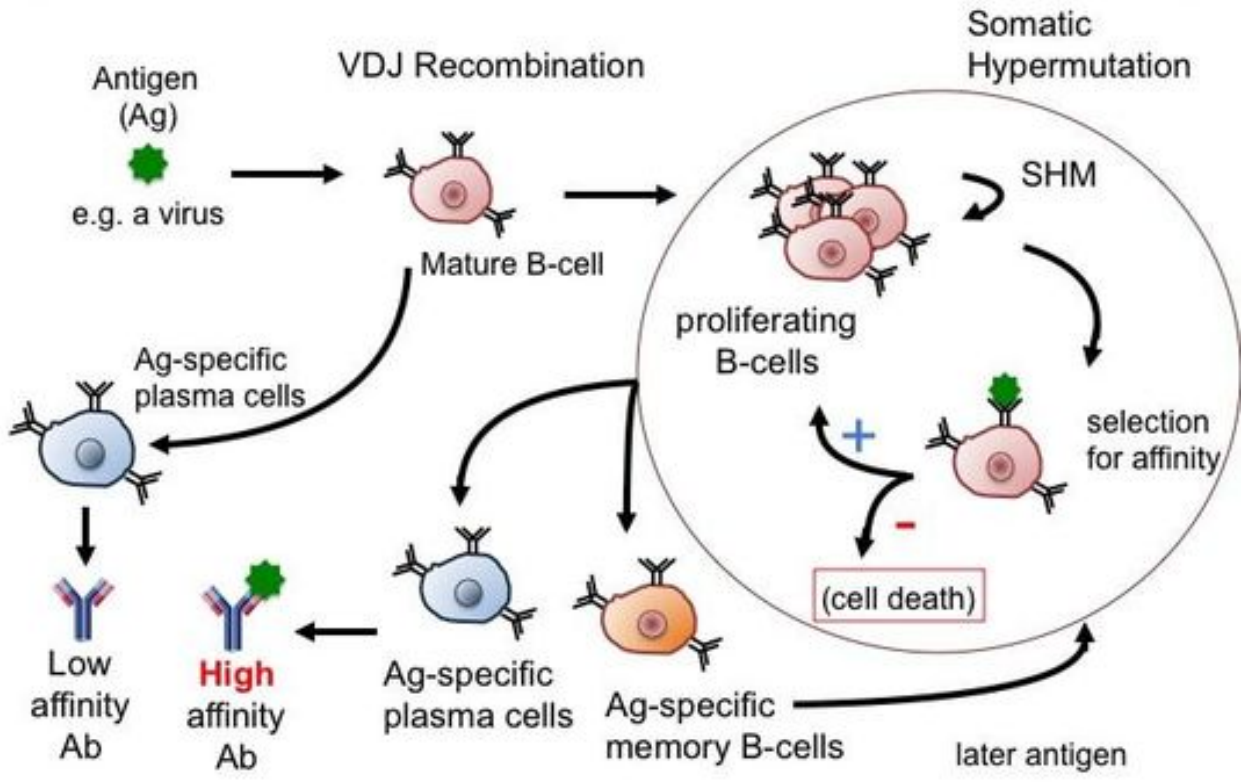

Figure 1. Schematic of Antibody Affinity Maturation

Over several rounds of selection, the resultant secreted antibodies produced will have effectively increased affinities for antigen. The result is the production of improved antibodies that effectively recognize infectious agents, and the production of memory B cells. Memory B cells respond more quickly

to a second exposure to antigen, or antibody-secreting plasma cells.

So what happens when B cells are presented with a mutating virus? Well, this antibody affinity maturation process repeats, resulting in new antibodies that can recognize the mutated virus. In fact, the same thing would happen during vaccination! Some vaccines contain portions of the virus, yet are non-infectious, and so an immune response would be launched since the portion of the virus presented would be considered foreign in the host.