Understanding how the body fights off viruses

The body does not have just one defense against invading viruses, but many. The first defense is the skin, which also includes mucus membranes at the entry ways to our body, the mucus will push out foreign substances in the following ways; you will cough or sneeze to dispel any from air passageways, you will vomit, or have diarrhea in an attempt to rid your body of the invading army. Even your temperature is a defense again viruses as they have a very narrow temperature threshold for optimal growth, so your body overheats us in an attempt to kill the virus. Even still, some viruses are more resistive and can still overcome our first defenses and start overcoming our initial responses. The next step is fought on at the cellular level with differentiated cells called B cells and T cells. Both cells originate from the bone marrow but for the B-cell that is where its development is completed and mature B-cells emerge from the bone marrow, and go on to engulf foreign viral cell bodies by surrounding them and effectively eating them, during this process they mimic the 'code' of the virus cell, kinda like making a mold of a lock and key found on the virus and then once fully 'eaten' they expel plasma and the secreted antibodies which are the *Key copies for the lock found on the virus. These 'key' copies are the 'death' for that virus, because it will let our killer T cells inside. These T cells emerge from the bone marrow also just not yet fully developed, at this stage they are considered double negative because they do not have a complete TCR, CD4 or CD8 and they make there way to the cortex of the Thymus where they start to form a TCR and now because they can synthesize both CD4 and CD8 they are considered double positive *DP. This process is particular interesting to me because 97% of all cells will produce a TCR that does not bind to any peptide and will die off through neglect of not being used. The remaining 3% of cells that do produce a TCR that does bind to a peptide presented in class 2, will stop expressing CD8 and become CD4 T cells, these cells go on to be Th1 cells in cell medicated immune responses and Th1 helper cells for cytotoxic T lymphocytes as well as the Th2 helper cells needed to help the B-cells . This process is called positive selection. The next process called negative selection which happens in the medulla of at the Thymus and the process selects out any cells who binds very strongly to the self-peptides and self-MHC and are again effectively killed by apoptosis *neglect . The negative selection process is a very important part because the cells that bind to tightly are the ones in danger of mounting an autoimmune attack, which could be just as dangerous if not more so than the invading virus.

Once The Killer T cells are equipped with the antibodies *key code they are able to bine to the unique peptides in the virus and secrete molecules that destroy the cell to which it has bound. All of the differentiated cells will fight different things, the CD8 cells can hunt out and find virus fragments on the surface of cells, and destroy the cell before releasing a new crop of viruses. The CD4 cells bind to a class II molecule and will release and attractant for more cells to come and help. This larger group of cells will cause inflammation as they attempt to wall off the viruses and destroy the material, and example of this is an abscess or rash to poison.

At this point I would like to bring back up the negative selection process because all cells express fragments or molecules derived from self peptides. Which presents the perpetual risk of the T-cells recognizing these fragments as an invading army and mounting that auto immune response I talked about earlier. So an important note is that moderation within the system of our immunity has a very important donation, as it does in so many areas of life.

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References

How does your immune system help you fight colds and flu?
By ABC Health and Wellbeing's Dr Jocelyn Lowinger
Updated 6 August 2015 at 1:58 am
First posted 6 August 2015 at 1:34 am
http://www.abc.net.au/news/health/2015-08-06/how-does-your-immune-system-help-you-fight-colds-and-flu/6650768

How Your Immune System Fights Infection
https://www.webmd.com/cold-and-flu/immune-system-fight-infection#2

B Cells and T Cells
http://www.biology-pages.info/B/B_and_Tcells.html