



### Brain Health

When you smoke, your brain changes in response to the high levels of nicotine. Those changes in the brain are what causes addiction and makes it harder to quit.<sup>1</sup> Once nicotine is in your body it activates your brain receptors. When these receptors are activated, it releases a “feel-good” chemical called dopamine.<sup>1</sup> This pleasure response is a big factor in nicotine addiction. As you continue to smoke the number of nicotine brain receptors increases. Typically, addicted smokers have billions more of these receptors than non-smokers do.<sup>1</sup>

Quitting is already difficult, and the brain can make it even more difficult! When a smoker attempts to quit, the brain receptors no longer receive the nicotine, so the dopamine is not being activated and the pleasure response is cut off.<sup>1</sup> The brain receptors can be conditioned to expect nicotine in certain situations after you have stopped smoking.<sup>1</sup> For example, if you typically smoke after a stressful situation or after a drink, your brain is waiting for that dopamine rush from the nicotine. These “triggers” can cause the intense cravings for a smoke even if a person has stopped smoking for several months.<sup>1</sup> However, once you stop smoking entirely, the number of nicotine receptors in the brain will eventually return to normal.<sup>1</sup>

## HOW DOES NICOTINE WORK IN THE BODY?

**1** You smoke a cigarette or take a nicotine product. Nicotine is absorbed through the mucosal linings in the nose and mouth.

**2** When you inhale, nicotine passes through the lung's membranes and into the bloodstream.

**3** After it reaches the bloodstream, nicotine makes its way to your heart. There, it's transferred to your arteries, and up to your brain.

**4** Nicotine reaches the brain in 10-20 seconds. It stimulates the release of neurotransmitters adrenaline and dopamine.

**5** Nicotine is extensively metabolized to a number of metabolites by the liver.

**6** Nicotine is filtered by the kidneys and excreted in urine, with variable reabsorption depending on urinary pH.

**NICOTINE PRODUCTS**

- Cigarettes and e-cigarettes
- Chewing Tobacco and Snuff
- Pipes
- Dissolvable tobacco (lozenges)

[addictionblog.org](http://addictionblog.org)

<sup>1</sup> Bishop, S. (2012). How Do Smokers' Brain Change in Response to High Nicotine Levels? Mayo Clinic. Retrieved from How Do Smoker's Brains Change in Response to High Nicotine Levels? - Mayo Clinic News Network



Test your knowledge!

Connect the boxes on the left with the boxes on the right with the correct match.

Addiction

The chemical \_\_\_\_ is released when nicotine activates the receptors.

Receptors

Changes in the brain are what causes \_\_\_\_ and makes it harder to quit.

Dopamine

Nicotine is filtered by the \_\_\_\_ and excreted in urine.

Triggers

Nicotine reaches the \_\_\_\_ in 10-20 seconds.

Brain

These \_\_\_\_ can cause intense cravings for a smoke even if a person has stopped smoking.

Kidneys

Once nicotine is in your body, it activates something called \_\_\_\_ in your brain.



**Answer Key**  
 Addiction - Changes in the brain are what causes \_\_\_\_ and makes it harder to quit.  
 Receptors - The chemical \_\_\_\_ is released when nicotine activates the receptors.  
 Dopamine - Once nicotine is in your body, it activates something called \_\_\_\_ in your brain.  
 Triggers - These \_\_\_\_ can cause intense cravings for a smoke even if a person has stopped smoking.  
 Brain - Nicotine reaches the \_\_\_\_ in 10-20 seconds.  
 Kidneys - Nicotine is filtered by the \_\_\_\_ and excreted in urine.

Got questions on other health issues related to sleep health, physical activity, tobacco, or nutrition? Send your questions to [usaf.jbsa.afmsa.mbx.afmra-hpo@mail.mil](mailto:usaf.jbsa.afmsa.mbx.afmra-hpo@mail.mil). For more online health tips visit the Air Force Health Promotion webpage <https://www.airforcemedicine.af.mil/Resources/Health-Promotion/>



@AF\_HealthPromotion\_HQ



@AirForce\_HP



Air Force Health Promotion HQ

Luke Christy  
 609-1027  
 lucan.christy@us.af.mil