

# SMOKING AND E-CIGARETTE USE INCREASES RISK OF CORONAVIRUS (COVID-19)

## SMOKING AND VAPING INCREASE SEVERITY OF COVID-19

Individuals with a history of smoking are over 9 times more likely to develop severe illness when infected with COVID-19 than those with no smoking history [27.3% vs. 3.0%,  $\chi^2 = 9.291$ ,  $P = 0.018$ ] (Liu et al. 2020).

Menthol and other flavorings have been shown to cause more severe lung inflammation (Lin et al. 2019; Gerloff et al. 2017), a major risk factor for viral infection.

Smoking and e-cigarette use are associated with a significantly higher risk of the development of chronic obstructive pulmonary disease [COPD] (Osei et al. 2020). COPD is an important risk factor for the severity of illness of individuals with COVID-19 (Guan et al. 2020).



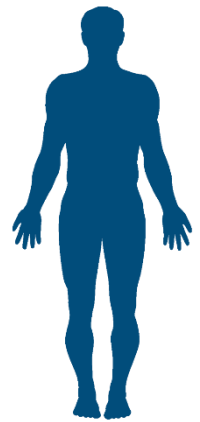
## SMOKING AND VAPING DECREASE THE BODY'S DEFENSES

Tobacco use may increase the expression of angiotensin-converting enzyme 2 [ACE2], the binding receptor and point of entry for COVID-19 (Cai 2020).

Ciliary dysfunction is associated with e-cigarette use (Carson et al. 2017), facilitating viral entry through lungs.

Impairment of neutrophil function has been observed in e-cigarette users, including an increase in neutrophil extracellular trap formation, which is injurious to the lungs (Reidel et al. 2018; Law et al. 2017; Clapp et al. 2017).

E-cigarette flavorings have been shown to decrease cellular immunity in the respiratory tract (Murakami et al. 2007; Clapp et al. 2019; Chao et al. 2008; Kim et al. 2010; Jung et al. 2010; Kim et al. 2011).



## SMOKING AND VAPING INCREASE SPREAD OF COVID-19

Smokers are more likely to have a cough during the asymptomatic phase of illness COVID-19, thus unknowingly spreading the disease. They are additionally more likely to misrecognize illness-induced cough to be "smoker's cough".

Smoking and vaping involves hand to mouth contact, which increases transmission risks of COVID-19 (CDC 2020).



## HOW TO QUIT SMOKING AND VAPING TO PROTECT YOURSELF FROM COVID-19

It is very important for people who smoke and vape to make every effort to quit. There is support to help you.

- Using nicotine patch plus gum to quadruple your chances of success and/or one of the other approved smoking cessation medications (bupropion or varenicline).
- Pair these medicines with expert coaching and support from the quitline (1-800-784-8669) and SmokefreeTXT (text the word "QUIT" (7848) to IQUIT (47848) for free help).

With these steps, you will have the best chance of quitting smoking and vaping. Quitting smoking and vaping can help protect you and your family from COVID-19. Please share this information with relatives or friends who may still be smoking or vaping.

## REFERENCES

- 1) Liu W, Tao Z, Wei W, et al. Analysis of factors associated with disease outcomes in hospitalized patients with 2019 novel coronavirus disease. *Chin Med J (Engl)*. February 2020. 2) Lin A-H, Liu M-H, Koh H-K, Peng D-W, Lee T-S, Kou YR. Menthol Cigarette Smoke Induces More Severe Lung Inflammation Than Non-menthol Cigarette Smoke Does in Mice With Subchronic Exposure - Role of TRPM8. *Front Physiol*. 2018;9:1817. 3) Gerloff J, Sander K, Fretter R, et al. Inflammatory response and barrier dysfunction by different e-cigarette flavoring chemicals identified by gas chromatography-mass spectrometry in e-liquids and e-vapors on human lung epithelial cells and fibroblasts. *Appl Vitro Toxicol* 2017; 3(1):28-40. 4) Choi AD, Miralbag M, Dimolye DA, et al. Association between E-Cigarette Use and Chronic Obstructive Pulmonary Disease by Smoking Status: Behavioral Risk Factor Surveillance System 2016 and 2017. *Ann J Prev Med*. 2020;58(3):336-342. 5) Guan W, Ni Z, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. February 2020. 6) Cai G. Bulk and single-cell transcriptomics identify tobacco-use disparity in lung gene expression of ACE2, the receptor of 2019-nCoV. *medRxiv*. January 2020. 2020.02.05.20020207. 7) Carson JL, Zhou L, Brighton L, et al. Temporal structure/function variation in cultured differentiated human nasal epithelium associated with acute single exposure to tobacco smoke or e-cigarette vapor. *Inhal Toxicol*. 2017;29(13):744-81. 8) Reidel B, Radford C, Clapp PW, et al. E-Cigarette Use Causes a Unique Innate Immune Response in the Lung, Involving Increased Neutrophilic Activation and Altered Mucin Secretion. *Am J Respir Crit Care Med*. 2018;197(6):802-815. 9) Law SM, Gray RD. Neutrophil extracellular traps and the dysfunctional innate immune response of cystic fibrosis lung disease: a review. *J Inflamm (Lond)*. 2017;14:29. 10) Clapp PW, Pawlak EA, Lashley JT, et al. Flavored e-cigarette liquids and cinnamaldehyde impair respiratory innate immune cell function. *Am J Physiol Lung Cell Mol Physiol*. 2017;313(2):278-292. 11) Murakami Y, Hirata A, Ito S, et al. Re-evaluation of cyclooxygenase-2-inhibiting activity of vanillin and guaiacol in macrophages stimulated with lipopolysaccharide. *Anticancer Res*. 2007;27(2):805-807. 12) Clapp PW, Lavrich KL, van Heussen CA, Lazarowski ER, Carson JL, Jaspers I. Cinnamaldehyde in flavored e-cigarette liquids temporarily suppresses bronchial epithelial cell ciliary motility by dysregulation of mitochondrial function. *Am J Physiol Lung Cell Mol Physiol*. 2019;316(3):L470-L486. 13) Chao JK, Hsu KF, Hsu HF, et al. Cinnamaldehyde inhibits pro-inflammatory cytokines secretion from monocytes/macrophages through suppression of intracellular signaling. *Food Chem Toxicol*. 2008;46(11):2103-11. 14) Kim BH, Lee YG, Lee J, Lee JY, Cho JT. Regulatory Effect of Cinnamaldehyde on Monocyte/Macrophage-Mediated Inflammatory Responses. *Mol Cell Med*. 2010;10(2):259-265. 15) Jung H, Song YS, Kim K, Lim C-J, Park E-H. Assessment of the anti-angiogenic, anti-inflammatory and antiosmectic properties of efferb vanillin. *Arch Pharm Res*. 2010;33(2):309-318. 16) Kim MG, Kim SJ, Kim DS, et al. Vanillic acid inhibits inflammatory mediators by suppressing NF- $\kappa$ B in lipopolysaccharide-stimulated mouse peritoneal macrophages. *Immunopharmacol Immunotoxicol*. 2011;33(3):525-52. 17) Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html>
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- Version date: March 17, 2020
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