

# Yale SCHOOL OF MEDICINE

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### **RE: HB 7200 AN ACT PROHIBITING THE SALE OF CIGARETTES, TOBACCO PRODUCTS, ELECTRONIC NICOTINE DELIVERY SYSTEMS AND VAPOR PRODUCTS TO PERSONS UNDER AGE TWENTY-ONE.**

**Mr. Chairman and distinguished members of the Public Health committee. My name is Suchitra Krishnan-Sarin and I am a Professor in the Department of Psychiatry at Yale University School of Medicine. I have served on FDA and CDC panels on tobacco/nicotine-related issues, contributed to various Surgeon General and Institute of Medicine reports on tobacco/nicotine use among youth, and also lead the NIH/FDA funded Yale tobacco center of regulatory science. I am writing to urge you to approve HB 7200.**

Let me first start out by saying that I commend you all and other legislators in CT for passing tobacco laws to protect youth. We have known for a long time that most combustible tobacco use starts prior to the age of 18. Youth who start using combustible tobacco products early are also more likely to be more addicted and experience more chronic tobacco-related diseases. The introduction of strong public health measures has been responsible for the decrease in combustible tobacco use rates among youth all over the US, and particularly in CT. Unfortunately, we have to continue to stay vigilant because we are discovering the same things with e-cigarettes which are nicotine delivery devices. E-cigarettes are extremely popular especially among middle- and high-school adolescents and young adults. According to evidence from the National Youth Tobacco Survey, past month ecigarette use increased from 1.5% (220 000 students) in 2011 to 20.8% (3.1 million students) in 2018 ( $P<0.001$ ). Middle school students' use of e-cigarettes increased from 0.6% in 2011 (60 000 students) to 4.9% (570 000 students) in 2018 ( $P<0.001$ ). In fact, during between 2017-2018 alone, e-cigarette use rose by 78% in high school students and 48% in middle school students (Cullen et al., 2018; Wang et al., 2018). Our work in high schools in Connecticut has observed similar high rates of use of multiple e-cigarette devices (Krishnan-Sarin et al., 2019). We have also observed that use of these products is starting younger as shown in this news article about elementary students who were caught vaping (<https://patch.com/connecticut/stratford/students-caught-vaping-elementary-school-stratford>). This is very concerning because we know little about the short or long term effects of e-cigarettes.

We also need to be very concerned about the use of nicotine during adolescence. Nicotine is a neurotoxin in the adolescent brain. Adolescence is a critical developmental period for the brain. During adolescence the brain "matures" by undergoing pruning and reorganization of many areas and neural pathways. Many of these neural pathways are key for communications in the brain regarding responses to rewards, memory and attention, and emotions and behavioral self-control. Importantly the nicotinic cholinergic receptors, which are the sites that nicotine binds to, are key regulators of these neural pathways. So, exposure to nicotine can change these neural pathways and subsequently how the brain matures in youth. While we are still understanding these changes in human adolescents, there is clear evidence from preclinical studies (Yuan et al., 2015; Cross et al., 2017). For example, adolescent rats are more sensitive to nicotine and are able to use more nicotine than adult rats. Moreover, exposure of adolescent rats to nicotine produces changes in many cognitive processes, and also makes them more prone to using other substances and developing depression/anxiety like behaviors. We have found similar associations in human youth who use nicotine ie. that they experience memory and attention changes and are more likely to use other substances and develop depression and anxiety symptoms. So, nicotine use does produce long term changes to the adolescent brain.



We also need to be very concerned about exposure of youth to all the other substances in e-cigarettes and combustible products. We have an extensive amount of evidence that has observed that combustible products can also expose youth to a variety of toxins. We are also finding similar risks with e-cigarettes. E-liquids contain many chemicals like propylene glycol and glycerin and alcohol that are used as solvents, and benzaldehyde, cinnamaldehyde which are used as flavors. The aerosols produced from e-cigarettes contain these chemicals and metals formed from the heating coils. The flavors in e-liquids are also made up of chemicals which are known to have many irritant, inflammatory and toxic effects (e.g. Kaur et al., 2018; Erythropel et al., 2019). Exposure to all these can lead to or exacerbate respiratory problems like asthma which are very common in youth (Clapp and Jaspers, 2017) and can even lead to cardiovascular problems (Bhatnagar et al., 2019).

Tobacco 21 is a great initiative and needs to be supported. If we can prevent youth from starting to use nicotine then we can prevent nicotine-induced changes in how the brain matures, and in any long-term consequences of these changes. We also know that many younger kids get nicotine and tobacco products from their older siblings and friends. So, if we can prevent older adolescents from accessing tobacco products we may be able to reduce exposure of younger youth to these products. Tobacco 21 initiatives have been implemented in seven states to date and initial results do appear to be very promising. I strongly encourage you to approve this initiative in Connecticut.

Thank you,

Sincerely,



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