Chair Pugh and Committee Members of the House Health and Services Committee:

Thank you for the opportunity to address H.170 and it's potential benefits for our public health. I am a practicing Neurologist at the Larner College of Medicine at UVM, having graduated from Harvard College in 1965 with a BA in Physics and Baylor College of Medicine in 1971 with an MD and PhD in Neurophysiology.

I have substantial experience specifically in cannabis-related medicine, having served as a member of the Legislature-created committee to study medical cannabis many years ago. That committee's report recommended legalization of medical marijuana (cannabis) and home growing. Currently I am the Chair of the State's Marijuana for Symptom Relief Oversight Committee, and our reports have been submitted to the Legislature annually for the last 3 years. I have also provided continuing education in the form of Neuro Science Grand Rounds and presentations to the Pain Doctors and other medical groups since 2005 on pain, cancer and other 'cannabis as medicine' topics, most recently on March 17, 2017.

Looking over the testimony to this committee from last week I will start with the point that good people believe what they say based on flawed science. Science is nice because it is reproducible. If it is not repeatable, it is not science. As I pointed out last year, the Health Impact Assessment (HIA) provided to the Legislature last year by the Department of Health (DoH) is a waste of taxpayer money except for the middle paragraph of page 36, dealing with adverse childhood events, and pages 49-60 dealing with optimal regulation of alcohol and tobacco. It fails to include the most thorough and recent driving data published 11 months before they filed the HIA, documenting no adverse impact of cannabis alone on driving and excellent dose response data on alcohol making it evident that if the Legislature wants to improve highway safety lowering the per se limit for alcohol to less than 0.05 would be a start.

The DoH website, American Academy of Pediatrics and Drs. Rettew and Hughes repeat the "8 IQ point loss if kids use cannabis" flawed science. This study's fatal flaws are due to not controlling for well-known risk factors for poor outcome, including childhood depression, family history of substance abuse, childhood conduct disorder, minority status facing life long discrimination, and other early drug use (primarily alcohol, tobacco).

Taking away adolescent cannabis or alcohol use alone does not impact outcomes. There are interventions that can be taken at age 14 that impact the outcome, and benefit the entire school class with lower problematic drug (including alcohol) use. What the counselors in high school and college lack is the knowledge that cannabis is a symptom of an underlying problem. **Treating cannabis use as the problem, rather than a symptom of the problem, is bad for kids**, because it obfuscates the diagnosis of the pain the kid feels. Honing in on cannabis use just alienates the kids who know more than the counselors. I would not advise more money for programs that do not work for the benefit of the kids and their classmates. Interventions at age 14, medical, counseling or techniques for life will benefit the kids, their classmates and the public at large.

As the Legislative Committee worked on the medical cannabis (2002) recommendations the enforcement members of the committee (representatives of the AG and police Chiefs) feared that kids would get the message that cannabis is medicine so it is safe and increase use. That fear proved unfounded as research comparing the rates of teen use before and after medical cannabis laws were implemented in states compared to neighboring demographically similar states – the rates went down, not up, in medical cannabis states.

You have been told that exposure to cannabis smoke causes a contact high. This is, on the face of it nonsense and fuzzy thinking, based on a false assumption that cannabis smoke is as toxic as tobacco smoke. The science is if you hold your cannabis vapor for 10 seconds, 63% is absorbed. What is exhaled diffuses through the air at 1700 feet per second. To pass that 37% exhaled to another will require mouth to mouth contact. Contact high is a term used to describe the mellow state of mind available to a non participant who is with a group of mellow persons throwing no sharp elbows and perhaps discussing abstruse or quirky topics. Multiple controlled studies have shown that except in a sealed chamber with no ventilation, there is no measurable transfer of THC.

You have been told higher potency cannabis is available and you should fear greater addiction. In the 1950s tobacco companies determined people smoke to get their nicotine fix. So they replaced Camels and Lucky Strikes, high nicotine, with Virginia Slims, low tar and nicotine, so they could sell more packages of tobacco. Science says people use cannabis to get their "high" related to THC. Higher potency cannabis means less carbon monoxide and polycyclic hydrocarbons which are harmful. Of course the same science says vaporizing eliminates the polycyclic hydrocarbons and carbon monoxide entirely. High potency cannabis is a good thing, but vaporizing is what the public needs to know is the safer way to use the drug.

Cannabis has not been taught in medical school since 1941 and most doctors believe the NIDA (National Institute for Drug Abuse) flawed science. NIDA originally funded research to show life long THC would be bad for rodents. The rodents were leaner and had fewer tumors than their littermates. The research was buried. There is now evidence of benefits on obesity rates in humans, as well as benefits for diabetics in the population Also in the 1970s NIDA funded research to show cancer went wild in the presence of THC, CBD and CBN. The cancer cells died and the normal cells thrived. The research was buried. It took a Spanish Neurosurgeon in the 1990s who recalled reading that 1976 article to start the cancer research that should have been done starting in 1976. Bad for people to delay this research.

A subset of researchers learned they have to declare harm if they want funding from NIDA. There is nothing in the mandate for NIDA from Congress to find any beneficial effects of illegal drugs. In 2002 a group published in Neurology (a very reputable place to publish) that heavy cannabis use resulted in cognitive decline. Looking at the data, the only way they found this was to exclude the above average IQ heavy smokers who scored highest on tests of higher cognitive function.

The 8 point IQ loss comes from flawed data analysis of a cohort of 1000 kids born in Dunedin NZ in 1972. In 2012 the association of a bad outcome at age 35 and cannabis use was reported. They ignored data on 1000 kids born in 1972 in Christ's Church, NZ that showed if you look at kids born into a minority

facing life long discrimination all sorts of bad outcomes were twice as likely as the European descendent kids. But the 8 IQ authors did reanalyze the same data and included childhood risk factors, adverse childhood event essentially, and found adolescent cannabis use did not impact the outcome, in 2016. But those who don't know hold the 8 IQ point propaganda and hurt kids, unintentionally.

In 2014 another NIDA funded paper claimed brains differ between young adults who have used cannabis and those who have not. Six months later another group tried to replicate the study and included control for alcohol – no effect on brain structure from cannabis. And two months later another group compared siblings who smoked to their non smoking siblings, minimizing genetic factors and found no brain changes. Science is reproducible and the "Gilman" article contributed nothing to science. **Association is not causation**. The brain changes "caused" by cannabis use in these young adults are similar to those seen in Republican/conservatives versus Democrat/liberals. Cannabis using young adults are more likely to become liberals than their abstaining fellows.

To sum up: NIDA propaganda is harmful because good people believe untruths and fail to do the right diagnostics. And scare legislators. Cannabis is safer than aspirin or Tylenol. Kids should be discouraged from drug use, especially tobacco and alcohol. No one should smoke anything. Brains are developing through age 50 years (taking up meditation can get your fMRI back to how it worked at age 25). But street marijuana is not necessarily cannabis – there are chemicals (Hu210 for instance) that are 700 times as potent as THC and if they have been put on plant material and sold as marijuana people can get strokes and heart attacks. Not good. H170 will permit those adults with the interest, time and place to grow real organic cannabis which is safer and more reliable than street marijuana.

So who will benefit from H170? Kids have access from dealers who have a knapsack full of marijuana and a pocket full of pills, and risk is cool. 20-35 year olds have trusted dealers. Older folk do not like risks, do not want to meet dealers and have no access to cannabis now. Why would elders be interested in cannabis? The side effects of cannabis are anxiety reduction, pain relief, anti inflammatory, and improved sleep quality. For seniors to be able to grow their own cannabis in a shielded garden or basement will be good public health. Safer than aspirin or Tylenol, no violations of state law, good for what ails them – yes, those folk will be the group increasing use – for good reason. And, there is sleep. Youngsters like us can work out and get our endocannabinoid system to fix sleep. But elders with arthritis, sore knees, stiffness and cramps will benefit from some vapor of cannabis at bed time. Or a special cookie for desert at dinner. Prudence, a virtue of the elderly, will keep those pesky grand kids away from grandpa's medicine.

Finally, dementia. The Glymphatic system. Slow wave sleep. The NY Times: https://www.nytimes.com/2017/04/08/fashion/sleep-tips-and-tools.html?smid=nytcore-ipad-share&smprod=nytcore-ipad&_r=0

H 170 is neither an impairment to the enforcement of cannabis laws nor going to impact adolescent use and has great benefits for the public health.