



Defense Health Agency

Defense and Veterans Brain Injury Center
“Clinical Updates in Brain Injury Science Today [CUBIST]” Podcast
“The Influence of Chronic Cigarette Smoking on Neurocognitive Recovery
after Mild Traumatic Brain Injury”

TRT: 11:14

Host: Dr. Donald Marion

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Marion: Hi! Welcome to Clinical Updates in Brain Injury Science Today, or CUBIST, a podcast for health care providers about current research on traumatic brain injury, also known as TBI.

This program is produced by the Defense and Veterans Brain Injury Center, otherwise known as DVBIC. I’m your host today, Donald Marion. I’m a neurosurgeon here at DVBIC.

In today’s episode, I’ll be talking with Betsy Myhre, a nurse practitioner at DVBIC. Betsy and I will discuss a study entitled: The Influence of Chronic Cigarette Smoking on Neurocognitive Recovery after Mild Traumatic Brain Injury an article published by Durazzo and colleagues, in the *Journal of Neurotrauma*, June 2013.

Marion: Hi Betsy, How are you today?

Myhre: Great Don, how are you?

Marion: Good. So, Betsy, what were the objectives of this study?

Myhre: This study was conducted to assess the influence of chronic cigarette smoking on changes of neurocognitive function at one and approximately seven months after a mild TBI or traumatic brain injury.

Marion: What made you select this study for CUBIST?

Myhre: Currently there is a lot of focus in the news about the hazards of cigarette smoking and tobacco use post-concussion. And per the authors, a lot of mild traumatic brain injury studies remove participants with tobacco use; thereby resulting in selection bias that results in cohorts that don’t represent a large proportion of people seeking medical treatment, and certainly not representing our population in the military and veterans based on their self-reported tobacco use. We know from other studies that 41 percent of active-duty military personnel report using one form or another of tobacco, and 17 percent of service school cadets or midshipmen report tobacco use. Therefore, this is a very relevant topic for us at the Defense and Veterans Brain Injury Center. Additionally, there are a lot of guidelines

that recommend avoidance of substance use during the acute concussion period, but not a lot of science to support those recommendations.

Marion: Interesting, so how was the study done Betsy?

Myhre: This study was done by administering a comprehensive neurocognitive battery of tests to 25 people with an mTBI who did not smoke cigarettes, 19 people with an mTBI who did smoke, and a control group of 20 non-smokers, who were only light alcohol drinkers and did not have a mild traumatic brain injury. The tests were administered at 38 days plus or minus 22 days post-injury and then again at 230 days plus or minus 36 days. The participants completed approximately two hours of testing which evaluated neurocognitive functions known to be adversely affected by mTBI, smoking or alcohol use. The tests evaluated nine domains: auditory-verbal learning, auditory-verbal memory, executive skills, processing speed, visuospatial learning, visuospatial memory, visuospatial skills, working memory and global neuro-cognition.

Marion: So, just a couple of things I want to point out Betsy. First of all, you had mentioned earlier that we're talking about tobacco use but really what we're talking about is smoking cigarettes correct?

Myhre: We are just talking about smoking cigarettes, so you're right so it's not just tobacco use from vaping or from chewing, we're talking about cigarette smoking.

Marion: The other thing I wanted to emphasize is all of those tests, those specific tests that you mentioned are all just tests of cognitive function, right?

Myhre: Right, they are all tests of cognitive function.

Marion: Alright, so, what were the key findings of this study then?

Myhre: At the first test administration point, non-smoking mTBI and smoking mTBI patients performed worse than the controls on both auditory-verbal learning and memory tests; additionally, the smoking mTBI patients performed worse than the controls on working memory measures; and the non-smoking mTBI patients performed worse than controls on processing speed and global neurocognition. During the time from the first to the second test administration periods, the interval of approximately seven months, the non-smoking mTBI patients showed significant improvement in processing speed, visuospatial learning, visuospatial memory, visuospatial skills, and global neurocognition. Smoking appeared to impair recovery, and the mTBI patients who smoked only showed significant improvement in executive skills during this interval.

Marion: So, kind of the big picture is smoking limited your cognitive recovery, is that what you're saying?

Myhre: Absolutely, and the longer you had smoked or the more amount of smoking that you did per year also limited your cognitive recovery.

Marion: Ok, so don't smoke. So, what are the limitations of this study?

Myhre: So, the limitations of this study were, first of all, the sample size was pretty small, a total of 44 patients plus controls, and very homogenous, 70 percent Caucasian and male. The control subjects were an average of five years older than the mTBI patients. And the mechanism of injury for the mTBI patients was not typical: bicycle or skateboard accidents in 50 percent which is sort of interesting.

The participants received neurocognitive testing for the first time at 38 days, and like I said plus or minus 22 days. And we know that the majority of people with mTBI have improved symptoms by 14 days post-concussion. So there may have been a significant amount of recovery across all of the domains prior to the testing. The third limitation was there was no "smoking" control group. So there was no group that was a control group without an mTBI that smoked cigarettes. This is probably the most surprising limitation as it would seem very easy to me to find a control group who did smoke tobacco.

Another limitation was the inclusion criteria used to diagnosis mTBI. The standard Glasgow coma score of 13-15 and post-traumatic amnesia of less than 24 hours were used to diagnose mTBI, but a witnessed loss of consciousness of less than 30 minutes was also a criteria. We know from other studies that up to 50 percent of mTBI can occur with no loss of consciousness, so I wonder if including a witnessed LOC as a diagnostic criteria may have limited the size of the sample. In addition, it was possible that some of the patients had intracranial hemorrhage or other brain injury on CT and we were only told that they did not have a depressed skull fracture.

Marion: Ok, I would point out with sort of interest, that the study took place in San Francisco at San Francisco General Hospitable and that probably or might account for the bicycle and skateboard mechanism of injury. This probably wouldn't be seen in a more rural community or some other metropolitan area, but very interesting. To summarize, what would you consider the key take-a-ways from of study Betsy?

Myhre: For primary care providers seeing a patient with an mTBI, first assess not only tobacco use, but also type of product, total number of cigarettes currently smoked per day, number of years of smoking and pack years, calculated by number of cigarettes per day divided by 20, times number of years of smoking. A lot of primary care providers will ask somebody do you smoke, and you know, get the answer yes. But not sort of delve into, 'how much do you smoke, how long have you smoked', and we know from this study, that those can be significant findings. I think also providing education on risks of increased neurocognitive symptoms and decrease recovery in patients who smoke is important for primary care providers. Since the results of this study show that greater lifetime duration of smoking was related to less improvement on the domains of visuospatial learning, memory, and skills, in addition to working memory, early consultation to a holistic concussion care clinic with physical therapists, OT, and cognitive rehabilitation providers may be warranted to improve both the level and speed of recovery for patients who smoke tobacco. And finally, although this study was focused on tobacco use through smoking, vaping is becoming much more widely used among young people and with a higher nicotine concentration than in cigarettes, assessing your post-concussion patients' vaping habits and providing similar patient education is warranted. I would love to see a future study conducted on neurocognitive recovery and vaping after mild traumatic brain injury.

Marion: That's an interesting point, the vaping issue. I guess it gets to the question of, 'is it the nicotine or is it hypoxia from breathing in the cigarette smoke.' So, certainly if it's the nicotine then your point is very important because vaping contains much more nicotine then cigarettes. Thank you, Betsy, for your insights. That's all we have time for today. We hope you enjoyed this quick literature update.

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CUBIST is produced and edited by Vincent White and was hosted today by me, Don Marion. It is a product of the Defense and Veteran's Brain Injury Center, led by Division Chief, CAPT Scott Pyne, Medical Corps, United States Navy. Thank you for listening to this episode. Next time, we will discuss TBI research getting attention in the mainstream press.

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