



Defense Health Agency

Defense and Veterans Brain Injury Center “Clinical Updates in Brain Injury Science Today [CUBIST]” Podcast

“Cortical Thickness, Age and TBI”

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Anne Bunner: The views, opinions, and findings contained in this podcast are those of the host and subject matter experts. They should not be construed as official Department of Defense positions, policies, or decisions unless designated by other official documentation.

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Hi. Welcome to Clinical Updates and Brain Injury Science Today, or CUBIST, a biweekly 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, Anne Bunner, filling in today for our regular host, Inbal Eshel. I'm a biologist and program analyst here at DVBIC. You may remember me from previous episodes of CUBIST, where I frequently join Inbal to talk about TBI research making headlines. In today's episode, I'll be talking with Dr. Don Marion. Dr. Marion is a neurosurgeon and senior clinical consultant to DVBIC. In today's episode, Don and I will discuss a study entitled, “Accelerated Changes in Cortical Thickness Measurements With Age in Military Service Members With Traumatic Brain Injury.” This article was recently published in the Journal of Neurotrauma by Savjani and colleagues. Don, welcome.

Don Marion: Thank you, Anne.

Anne Bunner: Tell us, what is this paper about?

Don Marion: This was kind of a neat study looking at a novel way to try to determine the effects of traumatic brain injury or concussion on the brain, and specifically the cortex, or the gray matter.

Anne Bunner: And who were the participants?

Don Marion: This group studied 92 service members who had served in Iraq or Afghanistan, and had suffered at least one, and often several traumatic brain injuries, usually from a blast. Most of these individuals had concussion, although three of them had more severe brain injuries. They were mostly men. Then they compared the results in that cohort with a group of 34 service members who had also served in Iraq and Afghanistan but didn't have a traumatic brain injury, and finally, they determined what the cortex, or the gray matter, the brain, should look like in terms of its thickness based on a large sample of 762 healthy control subjects obtained from open media.

Anne Bunner: Tell me about cortical thickness. What causes thinning?

Don Marion: As you age, your brain normally changes, and so by midlife, you can already begin to detect some thinning of the cortex. Thinning is actually in a fairly unique location. So typically with aging, you would expect to see thinning more in the prefrontal and frontal cortex, maybe not so much in the temporal lobes or the hippocampus.

Anne Bunner: So in terms of these locations of thinning, how do brain changes after TBI differ from brain changes during normal aging?

Don Marion: Brain changes after TBI typically are more common in the temporal gyrus and entorhinal cortex, and some of those areas, at least from previous studies, but you can also see brain changes in the frontal lobes with traumatic brain injury.

Anne Bunner: So there's some similarities, then, between the changes that were observed after TBI and during normal aging?

Don Marion: Yes, ma'am, that's right.

Anne Bunner: Tell me about the analysis they conducted on the results.

Don Marion: What they did is they used a special model, kind of similar to what's been known as FreeSurfer, but in this case, it was a model they called ANTs, that allowed them to develop a normalized degree of cortical thickness according to your age, and so they could map that out from age of 18 to, say, 65 or so, and use that model to try to predict what your age should be. They used four different logistic regression analyses models to look at this. And so basically, what they would do is they would say, "All right, we predict that you should be, say, 55," and in the patients with traumatic brain injury, or the service members with traumatic brain injuries, they actually over predicted their age by about three to five years.

Anne Bunner: These models suggest that TBI aged these service members by about three to five years.

Don Marion: Correct.

Anne Bunner: What about psychological comorbidities? Was this a group that had experienced polytrauma and might have a high prevalence of depression, or PTSD, or alcohol abuse?

Don Marion: Sure, Anne. As you know, service members are at risk for PTSD and also for substance abuse, and this group, in particular, were drinking three to four drinks per day, and so had evidence of significant substance abuse, and one of the concerning things to me about this study was that they didn't find that either PTSD, history of depression, or drinking had any impact on cortical thinning. And this is a little bit at odds with what others have found. Others have certainly found that alcohol use, for example, is associated with cortical thinning, as is long history of PTSD.

Anne Bunner: So what are the take home messages from this work for patients and providers?

Don Marion: Again, this just adds to a growing body of literature suggesting that multiple concussions or multiple TBIs may lead to degeneration of the brain or early onset changes in the brain consistent with degeneration and aging.

Anne Bunner: So just to be clear, Don, while these data do extend previous findings that measures of cortical thickness may reveal an association of accelerated changes over time with TBI, further investigation is needed to build on the current results and body of knowledge. Thank you so much, Don, for your insights. That's all we have time for today. We hope you enjoyed this quick literature update. You can stay up to date on future episodes by subscribing to CUBIST on iTunes, Stitcher, or wherever you listen to podcasts, where you can also find links to the articles we discussed and other relevant resources. Speaking of relevant resources, myself, Dr. Anne Bunner, and the deputy director of DVBIC, Ms. Kathy Helmick, will be giving a free webinar on gender differences in TBI outcomes on Tuesday, September 19th at 11 a.m., Eastern Time. This is part of a three-day continuing education summit, featuring almost 30 expert speakers, on a variety of issues related to TBI and psychological health. To register, go to dvbic.dcoe.mil and click on the banner that says, "2017 summit. Register now." That's D-V-B-I-C dot D-C-O-E dot M-I-L. If you have any questions about the podcast, or about DVBIC products or programs, or if you have feedback for us, please feel free to email us at info@dvbic.org. That's I-N-F-O at D-V-B-I-C dot O-R-G.

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CUBIST is produced and edited by Deborah Bailin and was hosted today by me, Anne Bunner. It is a product of the Defense and Veterans Brain Injury Center, led by Acting National Director Dr. Thomas DeGraba, and the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury, led by Acting Director Dr. Richard Stoltz.

Thank you for listening. We'll be back in two weeks to explore current concussion research.

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