



Defense Health Agency

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

“Outcome Predictors for Blast TBI”

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**Inbal Eshel:** Hi. Welcome to Clinical Updates in 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. And I'm your host, Inbal Eshel, a speech-language pathologist here at DVBIC. As a provider myself, I know how hard it is to stay on top of the research while managing a full patient schedule. So we're doing the work for you, highlighting current TBI research that can help inform your practice in the time it takes you to walk from your clinic to the hospital.

In today's episode, I'll be talking with Dr. Anne Bunner. Dr. Bunner is a biologist and program analyst at DVBIC with broad clinical and laboratory research experience. In today's episode, Anne and I will be discussing a study entitled “Early Predictors of Five-Year Outcome after Concussive Blast Traumatic Brain Injury.” This is an article that was recently published in JAMA Neurology by Christine MacDonald and her colleagues. All right, Anne. So, what are we going to learn about today? Give me the bottom-line upfront for this MacDonald publication.

**Anne Bunner:** Sure. Thank you, Inbal. So this study included service members with combat blast mTBI and combat controls without TBI. The mTBI group in this study experienced both combat trauma and combat injury and many are still feeling the effects of it five years later. Some continue to experience symptom worsening and functional decline between one year and five years post-injury. The authors describe this as an evolution but not a resolution of symptoms. And the authors commented that the overall outcomes appear to have more to do with psychiatric factors than cognitive factors.

**Inbal Eshel:** So let's learn more about some of the participants here. Who were the researchers studying?

**Anne Bunner:** So the mTBI group was 50 service members with combat-related mild TBI from blast exposure and blunt impact. They were initially evaluated either in Afghanistan or after medical evacuation. All of the mTBI group was medically evacuated. The control group were 44 combat-deployed service members evaluated either in Afghanistan or after medical evacuation for non-combat medical issues. Participants were followed-up one year after enrollment and again at five years. By that point, many were veterans, not service members. Seventy-four percent of the mTBI group had separated from the military and 34 percent of the controls had separated.

**Inbal Eshel:** I see. Okay. And what were the key factors that the researchers were looking to learn?

**Anne Bunner:** So this was a longitudinal study and they were looking to see how participants did over time. There aren't many long-term studies of concussion and there's even less long-term data on blast-related concussion.

**Inbal Eshel:** Okay. And so this study was a relatively robust study in that sense that it was looking over a period of time.

**Anne Bunner:** Absolutely. A prospective longitudinal design is the strongest type of observational research design.

**Inbal Eshel:** And so can you share with us, so what are really the key findings of this MacDonald paper and why are they important?

**Anne Bunner:** So there were two main findings. The first is that the mild TBI group was doing worse than the control group on a number of outcomes. And the second main finding was that the mild TBI group showed decline between the one-year and five-year mark. So, at five years, the TBI group was doing worse than the control group on a measure of disability which was the main outcome that was most discussed, but also measures of PTSD symptoms, depression symptoms, anxiety symptoms, sleep problems, headaches, post-concussive symptoms and quality of life. There were no differences between the two groups on cognitive function. Now in terms of the decline between one year and five years that was mainly from this functional outcome, this disability measure that was used by the authors.

**Inbal Eshel:** What was the specific disability measure?

**Anne Bunner:** So it was called the Glasgow Outcome Scale Extended or GOS-E, and it's a very rough measure of functional ability. It's an eight point scale with one being dead and eight being good recovery. And it's not specific to TBI. So I think that the use of this outcome, the GOS-E, is a bit of a limitation of this study because we can't attribute the GOS-E scores specifically to TBI. We know that the mTBI group was medically evacuated. It's very unlikely they would have been medically evacuated solely for a blast-related concussion, so what were their other injuries? How severe were they? How did they resolve? We don't know that. We also don't know how many of the control group was medically evacuated.

**Inbal Eshel:** So that seems like a key limitation then in our interpretation of the study.

**Anne Bunner:** Absolutely. Although the main difference between the two groups was their TBI status, we can't attribute the differences between the two groups at five years primarily to TBI. And in fact, the author has acknowledged that the results appear to be driven more by psychological factors than cognitive factors. There are a few other limitations that I might mention. It was a fairly modest sample size, 50 in the mTBI group and 44 in the control group. There was a lack of comprehensive pre-injury and acute post-injury clinical data for both groups, although we do know that the participants had no prior diagnosis of mTBI or psychiatric illness. And also, the participants experienced heterogeneous treatment at different sites across the United States.

**Inbal Eshel:** I think the facts that they received heterogeneous treatment across all sorts of different sites across that period of time, and that that was necessarily a factor that was controlled for, could contribute to the way that the results were analyzed.

**Anne Bunner:** Absolutely. And in an interview, the first author, Christine MacDonald, talked about some of the limitations with regards to caring for this population. So the results showed that 80 percent of the mTBI group sought mental health treatment between the one-year and five-year mark, but only 20 percent of them reported substantial symptom resolution as a result of that care. So there were clearly some unmet needs there. Christine MacDonald talked about how multidisciplinary care could be better coordinated in the sense of bringing appointments with health care providers from different disciplines closer together in time to provide the best benefit for the patient.

**Inbal Eshel:** Right. Because that, of course, would potentially and theoretically increase the coordination between the disciplines so there could be a more cohesive plan in place for the patient. I wonder if you can think of any other potential implications for clinicians or patients.

**Anne Bunner:** So the authors looked at what factors predicted poor outcomes at five years. That is, how can we identify those who might still be doing poorly five years after injury? And a high level of post-concussive symptoms at the one-year assessment stuck out. So this could be a point for more aggressive intervention for some patients that could prevent later problems. For those not familiar, post-concussive symptoms include things like headaches, sleep problems, dizziness, irritability, and feelings of depression or anxiety.

**Inbal Eshel:** What you're saying, I think, is that if you are seeing a heightened amount of those types of post-concussive symptoms around the one-year mark, or before, that might be a potential indicator for more intensive treatment to potentially offset a decline in outcomes as time passes.

**Anne Bunner:** Absolutely. And the authors expressed a particular concern about the combination of psychiatric distress and sleep problems because of the growing literature on the long-term health implications of those two conditions. If a clinician could identify the persons who are experiencing symptoms, perhaps after most patients have already experienced symptom resolution, those people are the ones that could be targeted for more aggressive treatment for the specific symptoms that they're experiencing. And symptom resolution in and of itself might enable a more holistic recovery even if it seems like just addressing one symptom at a time might be spinning the wheels, having this data shows that having those symptoms is an indicator of doing more poorly over the long term.

**Inbal Eshel:** That's really, really helpful. Thank you so much, Anne. That is actually all we have time for today. We hope that 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. 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](mailto:info@DVbic.org). That's info@D-V-B-I-C.org.

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CUBIST is produced and edited by Deborah Bailin and is hosted by me, Inbal Eshel. It is a product of the Defense and Veterans Brain Injury Center led by acting director, Kathy Helmick, and the Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury led by acting director, Dr. Richard Stoltz. Thanks for listening. We'll be back in two weeks with Dr. Don Marion to digest current concussion research.

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