WEBVTT

00:00:00.000 --> 00:00:02.070 It is my pleasure to introduce

00:00:02.070 --> 00:00:03.450 today's grand round speaker,

00:00:03.450 --> 00:00:04.863 Doctor David Premer.

00:00:04.863 --> 00:00:07.689 The doctor Premer got his undergraduate

00:00:07.689 --> 00:00:10.049 degree in kinesiology from the

00:00:10.049 --> 00:00:12.314 University of Illinois in Chicago.

00:00:12.320 --> 00:00:14.252 Got his MD from Saint Louis University

00:00:14.252 --> 00:00:15.811 School of Medicine where he realized

00:00:15.811 --> 00:00:17.940 early on that he wanted to do pathology.

00:00:17.940 --> 00:00:19.746 His training there included a post

00:00:19.746 --> 00:00:21.479 sophomore year in pathology and he

00:00:21.479 --> 00:00:23.145 also received while he was there the

00:00:23.145 --> 00:00:24.914 Henry J Pinkerton Award for Outstanding

00:00:24.914 --> 00:00:27.940 Achievement in the study of Pathology.

NOTE Confidence: 0.854699887

00:00:27.940 --> 00:00:30.496 He did his training in residency.

NOTE Confidence: 0.854699887

00:00:30.500 --> 00:00:31.480 Actually, he was here.

NOTE Confidence: 0.854699887

00:00:31.480 --> 00:00:32.950 The last time he was here

NOTE Confidence: 0.854699887

00:00:33.003 --> 00:00:34.275 in New Haven was in 2015,

NOTE Confidence: 0.854699887

00:00:34.280 --> 00:00:36.478 where he interviewed for a position here.

NOTE Confidence: 0.854699887

00:00:36.480 --> 00:00:38.838 But alas, he decided instead to go to the

NOTE Confidence: 0.854699887

00:00:38.838 --> 00:00:40.769 Indiana University School of Medicine,

NOTE Confidence: 0.854699887

00:00:40.770 --> 00:00:44.235 where he did atomic pathology and neuropath.

NOTE Confidence: 0.854699887

00:00:44.240 --> 00:00:46.452 His training while he was there included

NOTE Confidence: 0.854699887

00:00:46.452 --> 00:00:48.696 three months at the New York City

NOTE Confidence: 0.854699887

00:00:48.696 --> 00:00:50.556 office of the Chief Medical Examiner,

NOTE Confidence: 0.854699887

00:00:50.560 --> 00:00:51.972 and while a resident,

NOTE Confidence: 0.854699887

00:00:51.972 --> 00:00:53.737 he received the Resident Award

NOTE Confidence: 0.854699887

00:00:53.737 --> 00:00:55.610 for Excellence in teaching.

NOTE Confidence: 0.854699887

00:00:55.610 --> 00:00:59.590 Once he finished his residency,

00:00:59.590 --> 00:00:59.816 2019,

00:00:59.816 --> 00:01:01.624 he spent a year as an instructor in

00:01:01.624 --> 00:01:03.275 the division of autopsy pathology

00:01:03.275 --> 00:01:04.985 at the Johns Hopkins University

00:01:04.985 --> 00:01:06.366 School of Medicine and unique

00:01:06.366 --> 00:01:07.842 position as far as I know.

00:01:07.850 --> 00:01:09.554 And there he worked with Jody

00:01:09.554 --> 00:01:11.190 Hooper and worked very closely,

00:01:11.190 --> 00:01:12.900 among other things,

00:01:12.900 --> 00:01:15.750 on the research autopsy program.

00:01:15.750 --> 00:01:16.996 That was one of the one of

00:01:16.996 --> 00:01:18.149 the best in the country,

00:01:18.150 --> 00:01:18.834 my opinion.

00:01:18.834 --> 00:01:21.228 He's now an assistant professor of pathology

00:01:21.228 --> 00:01:23.607 at the Uniformed Services University,

00:01:23.610 --> 00:01:24.452 Edward A.

NOTE Confidence: 0.854699887

00:01:24.452 --> 00:01:26.136 Bear School of Medicine.

NOTE Confidence: 0.854699887

00:01:26.140 --> 00:01:27.940 And he's the clinical director of

NOTE Confidence: 0.854699887

00:01:27.940 --> 00:01:29.488 the Department of Defense Brain

NOTE Confidence: 0.854699887

00:01:29.488 --> 00:01:31.258 Tissue Repository and works with the

NOTE Confidence: 0.854699887

00:01:31.258 --> 00:01:33.328 Henry M Jackson Foundation for the

NOTE Confidence: 0.854699887

00:01:33.328 --> 00:01:34.840 Advancement of Military Medicine.

NOTE Confidence: 0.854699887

00:01:34.840 --> 00:01:36.520 He's an active neuropathologist

NOTE Confidence: 0.854699887

00:01:36.520 --> 00:01:37.780 and signs out.

NOTE Confidence: 0.854699887

00:01:37.780 --> 00:01:39.694 He has privileges at the Walter

NOTE Confidence: 0.854699887

00:01:39.694 --> 00:01:41.364 Reed National Medical Center and

NOTE Confidence: 0.854699887

00:01:41.364 --> 00:01:43.064 he's heavily involved with teaching

NOTE Confidence: 0.854699887

00:01:43.064 --> 00:01:44.960 pathology to the medical students.

NOTE Confidence: 0.854699887

00:01:44.960 --> 00:01:46.940 He's giving talks across the country,

NOTE Confidence: 0.854699887

00:01:46.940 --> 00:01:50.783 and in his early career he's

NOTE Confidence: 0.854699887

00:01:50.783 --> 00:01:52.889 already gotten a book chapter in

00:01:52.889 --> 00:01:55.098 28 peer reviewed publications,

00:01:55.100 --> 00:01:56.360 including a first author.

00:01:56.360 --> 00:01:58.649 Publication last year and the New England

00:01:58.649 --> 00:02:00.707 Journal of Medicine on today's topic.

00:02:02.780 --> 00:02:04.388 I've had the privilege of working

00:02:04.388 --> 00:02:06.610 with him on the autopsy committee of

00:02:06.610 --> 00:02:08.420 the College of American Pathologists

00:02:08.420 --> 00:02:10.997 where he is the editor for the

00:02:10.997 --> 00:02:12.433 autopsy continually education series.

00:02:12.440 --> 00:02:14.726 And I think David's work really

00:02:14.726 --> 00:02:17.287 demonstrates the power of applying a

00:02:17.287 --> 00:02:19.697 solid background in anatomic pathology

00:02:19.697 --> 00:02:21.959 along with information technology and

00:02:21.959 --> 00:02:24.203 and and sort of molecular technology

00:02:24.203 --> 00:02:28.420 to a large well curated tissue back.

00:02:28.420 --> 00:02:30.596 So today he's going to speak to us

NOTE Confidence: 0.868153745172414

00:02:30.596 --> 00:02:32.720 on chronic traumatic encephalopathy.

NOTE Confidence: 0.868153745172414

00:02:32.720 --> 00:02:35.920 And military service. It's all yours.

NOTE Confidence: 0.849563992222222

00:02:40.130 --> 00:02:42.174 Alrighty, thank you Harry

NOTE Confidence: 0.849563992222222

00:02:42.174 --> 00:02:44.729 for those really kind words.

NOTE Confidence: 0.849563992222222

00:02:44.730 --> 00:02:47.322 It's sounds a lot nicer than I think

NOTE Confidence: 0.849563992222222

00:02:47.322 --> 00:02:49.629 I almost deserve at this point,

NOTE Confidence: 0.849563992222222

00:02:49.630 --> 00:02:51.830 but thank you very much.

NOTE Confidence: 0.849563992222222

00:02:51.830 --> 00:02:53.470 I want to thank all of you for

NOTE Confidence: 0.849563992222222

00:02:53.470 --> 00:02:54.629 attending my talk and inviting

NOTE Confidence: 0.849563992222222

00:02:54.629 --> 00:02:56.027 me here to to speak today.

NOTE Confidence: 0.849563992222222

00:02:56.030 --> 00:02:57.650 I'm doctor David primer.

NOTE Confidence: 0.849563992222222

00:02:57.650 --> 00:02:58.865 As Harry said,

NOTE Confidence: 0.849563992222222

00:02:58.870 --> 00:03:00.652 I'm an assistant professor of pathology

NOTE Confidence: 0.849563992222222

00:03:00.652 --> 00:03:02.390 at the Uniformed Services University,

NOTE Confidence: 0.849563992222222

00:03:02.390 --> 00:03:03.886 the Human Neuropathology clinical

NOTE Confidence: 0.849563992222222

00:03:03.886 --> 00:03:06.130 director at the Department of Defense,

NOTE Confidence: 0.849563992222222

00:03:06.130 --> 00:03:08.956 USU brain Tissue repository where our.

NOTE Confidence: 0.849563992222222

00:03:08.960 --> 00:03:11.389 Primary focus is as a tissue bank

NOTE Confidence: 0.849563992222222

00:03:11.389 --> 00:03:13.950 studying a TBI or traumatic brain

NOTE Confidence: 0.849563992222222

00:03:13.950 --> 00:03:16.350 injury in the military population.

NOTE Confidence: 0.849563992222222

00:03:16.350 --> 00:03:18.166 And today I'm going to talk to you

NOTE Confidence: 0.849563992222222

00:03:18.166 --> 00:03:20.195 about our experience with chronic

NOTE Confidence: 0.849563992222222

00:03:20.195 --> 00:03:22.292 traumatic encephalopathy, or CTE,

NOTE Confidence: 0.849563992222222

00:03:22.292 --> 00:03:24.456 specifically in military personnel.

NOTE Confidence: 0.806774728888889

00:03:28.410 --> 00:03:29.830 Ohh, here we go.

NOTE Confidence: 0.806774728888889

00:03:29.830 --> 00:03:31.605 This is my required disclaimer.

NOTE Confidence: 0.806774728888889

00:03:31.610 --> 00:03:33.260 None of my opinions are are

NOTE Confidence: 0.806774728888889

00:03:33.260 --> 00:03:34.804 necessarily those of the federal

NOTE Confidence: 0.806774728888889

00:03:34.804 --> 00:03:36.368 government or its affiliates.

NOTE Confidence: 0.806774728888889

00:03:36.370 --> 00:03:38.662 I do not have any conflicts

NOTE Confidence: 0.806774728888889

00:03:38.662 --> 00:03:40.190 of interest to disclose.

NOTE Confidence: 0.806774728888889

00:03:40.190 --> 00:03:41.694 These are some objectives

NOTE Confidence: 0.806774728888889

00:03:41.694 --> 00:03:43.574 which we will cover today.

NOTE Confidence: 0.806774728888889

00:03:43.580 --> 00:03:45.080 And to begin this talk,

NOTE Confidence: 0.806774728888889

00:03:45.080 --> 00:03:48.088 I want to give a rather a comprehensive

NOTE Confidence: 0.806774728888889

00:03:48.088 --> 00:03:49.990 history of chronic traumatic

NOTE Confidence: 0.806774728888889

00:03:49.990 --> 00:03:52.126 encephalopathy from its inception

NOTE Confidence: 0.806774728888889

00:03:52.126 --> 00:03:55.398 about 100 years ago to modern day.

NOTE Confidence: 0.806774728888889

00:03:55.400 --> 00:03:58.011 And like I said the timeline of

NOTE Confidence: 0.806774728888889

00:03:58.011 --> 00:03:59.455 product traumatic encephalopathy it

NOTE Confidence: 0.806774728888889

00:03:59.455 --> 00:04:01.289 takes place or it has taken place

NOTE Confidence: 0.806774728888889

00:04:01.289 --> 00:04:03.253 now over the course of approximately

NOTE Confidence: 0.806774728888889

00:04:03.253 --> 00:04:05.719 100 years and and it's outlined in

NOTE Confidence: 0.806774728888889

00:04:05.719 --> 00:04:08.512 detail here and what we'll go over

NOTE Confidence: 0.806774728888889

00:04:08.512 --> 00:04:11.197 this timeline and it really begins in

NOTE Confidence: 0.806774728888889

00:04:11.200 --> 00:04:13.530 1928 with Doctor Harrison Martland.

8

NOTE Confidence: 0.806774728888889

00:04:13.530 --> 00:04:16.015 Who is a pathologist and

NOTE Confidence: 0.806774728888889

00:04:16.015 --> 00:04:18.003 a clinician in Newark,

NOTE Confidence: 0.806774728888889

00:04:18.010 --> 00:04:21.334 NJ who described a A syndrome

NOTE Confidence: 0.806774728888889

00:04:21.334 --> 00:04:23.550 in a professional boxers,

NOTE Confidence: 0.806774728888889

00:04:23.550 --> 00:04:25.402 particularly the brawling type,

NOTE Confidence: 0.806774728888889

00:04:25.402 --> 00:04:26.328 professional boxers,

NOTE Confidence: 0.806774728888889

00:04:26.330 --> 00:04:28.285 numerous heavy knockouts over their

NOTE Confidence: 0.806774728888889

00:04:28.285 --> 00:04:31.055 long careers that he called the Punch

NOTE Confidence: 0.806774728888889

00:04:31.055 --> 00:04:32.920 Drunk syndrome and he character,

NOTE Confidence: 0.806774728888889

00:04:32.920 --> 00:04:35.153 and this is a clinical designation he

NOTE Confidence: 0.806774728888889

00:04:35.153 --> 00:04:36.970 he characterized early symptomatology,

NOTE Confidence: 0.806774728888889

00:04:36.970 --> 00:04:39.402 those in post fight and in the weeks

NOTE Confidence: 0.806774728888889

00:04:39.402 --> 00:04:41.568 and months following a hard fight,

NOTE Confidence: 0.806774728888889

00:04:41.570 --> 00:04:44.380 symptoms of unsteady gait disequilibrium.

NOTE Confidence: 0.806774728888889

00:04:44.380 --> 00:04:46.365 And oftentimes the the patient

NOTE Confidence: 0.806774728888889

00:04:46.365 --> 00:04:48.771 would appear as though they are

NOTE Confidence: 0.806774728888889

00:04:48.771 --> 00:04:50.829 intoxicated or slug nutty as he

NOTE Confidence: 0.806774728888889

00:04:50.829 --> 00:04:53.572 referred to it in his in his paper

NOTE Confidence: 0.806774728888889

00:04:53.572 --> 00:04:55.623 OK and he characterized late stage

NOTE Confidence: 0.806774728888889

00:04:55.623 --> 00:04:57.638 symptomatology in these patients as

NOTE Confidence: 0.806774728888889

00:04:57.638 --> 00:04:59.725 well typically years after retirement

NOTE Confidence: 0.806774728888889

00:04:59.725 --> 00:05:01.800 from their long boxing careers.

NOTE Confidence: 0.806774728888889

00:05:01.800 --> 00:05:04.110 And he described a combinations

NOTE Confidence: 0.806774728888889

00:05:04.110 --> 00:05:05.958 of of various motor,

NOTE Confidence: 0.806774728888889

00:05:05.960 --> 00:05:08.292 cognitive and behavioral symptomatology.

NOTE Confidence: 0.806774728888889

00:05:08.292 --> 00:05:11.207 The motor symptomatology not infrequently

NOTE Confidence: 0.806774728888889

00:05:11.207 --> 00:05:13.777 included tremors or Frank Parkinsonism.

NOTE Confidence: 0.806774728888889

00:05:13.780 --> 00:05:14.402 The.

NOTE Confidence: 0.806774728888889

00:05:14.402 --> 00:05:16.268 Cognitive symptomatology not

NOTE Confidence: 0.806774728888889

00:05:16.268 --> 00:05:18.756 infrequently included frank dementia.

NOTE Confidence: 0.806774728888889

00:05:18.760 --> 00:05:20.454 And so he postulated at the time,

NOTE Confidence: 0.806774728888889

00:05:20.460 --> 00:05:21.416 in 1928,

NOTE Confidence: 0.806774728888889

00:05:21.416 --> 00:05:24.284 that this may actually represent a

NOTE Confidence: 0.806774728888889

00:05:24.284 --> 00:05:25.698 chronic neurodegenerative disease

NOTE Confidence: 0.806774728888889

00:05:25.698 --> 00:05:28.026 in the boxing community and that

NOTE Confidence: 0.806774728888889

00:05:28.026 --> 00:05:30.159 we should study this further.

NOTE Confidence: 0.806774728888889

00:05:30.160 --> 00:05:33.536 So moving forward into the 1930s and 40s,

NOTE Confidence: 0.806774728888889

00:05:33.540 --> 00:05:35.192 more clinicians and researchers

NOTE Confidence: 0.806774728888889

00:05:35.192 --> 00:05:37.257 came out with further clinical

NOTE Confidence: 0.806774728888889

00:05:37.257 --> 00:05:38.779 descriptions of this phenomenon,

NOTE Confidence: 0.806774728888889

00:05:38.780 --> 00:05:41.440 including now a famous doctors mill Spa,

NOTE Confidence: 0.806774728888889

00:05:41.440 --> 00:05:42.847 Harry Parker, McDonald,

NOTE Confidence: 0.806774728888889

00:05:42.847 --> 00:05:43.316 Critchley,

NOTE Confidence: 0.806774728888889

00:05:43.316 --> 00:05:45.661 who all described similar phenomenon

NOTE Confidence: 0.806774728888889

00:05:45.661 --> 00:05:47.977 in the brains of former boxers,

NOTE Confidence: 0.806774728888889

00:05:47.980 --> 00:05:50.038 however they were as a collective.

NOTE Confidence: 0.806774728888889

00:05:50.040 --> 00:05:52.716 Somewhat adverse to using the term

NOTE Confidence: 0.806774728888889

00:05:52.716 --> 00:05:55.669 punch-drunk to to describe these patients.

NOTE Confidence: 0.806774728888889

00:05:55.670 --> 00:05:57.945 And so here even doctor Millspaugh refers

NOTE Confidence: 0.806774728888889

00:05:57.945 --> 00:06:00.488 to punch drunk as a derisive connotation.

NOTE Confidence: 0.806774728888889

00:06:00.490 --> 00:06:03.367 And so new nomenclature started to emerge,

NOTE Confidence: 0.806774728888889

00:06:03.370 --> 00:06:05.530 dementia pugilistica and now as

NOTE Confidence: 0.806774728888889

00:06:05.530 --> 00:06:06.826 we know today,

NOTE Confidence: 0.806774728888889

00:06:06.830 --> 00:06:09.080 traumatic encephalopathy or

NOTE Confidence: 0.806774728888889

00:06:09.080 --> 00:06:11.330 chronic traumatic encephalopathy.

NOTE Confidence: 0.806774728888889

00:06:11.330 --> 00:06:13.922 But keep in mind at this point in time,

NOTE Confidence: 0.806774728888889

00:06:13.930 --> 00:06:16.324 all of this research is based on

NOTE Confidence: 0.806774728888889

00:06:16.324 --> 00:06:18.067 clinical assessments of current and

NOTE Confidence: 0.806774728888889

00:06:18.067 --> 00:06:20.349 former boxers at this point in time.

NOTE Confidence: 0.806774728888889

00:06:20.350 --> 00:06:22.460 No brain was actually examined

NOTE Confidence: 0.806774728888889

00:06:22.460 --> 00:06:24.148 of a former boxer,

NOTE Confidence: 0.806774728888889

00:06:24.150 --> 00:06:27.279 and it actually took almost 50 years

NOTE Confidence: 0.806774728888889

00:06:27.279 --> 00:06:29.308 since Doctor Martin's first description

NOTE Confidence: 0.806774728888889

00:06:29.308 --> 00:06:31.564 of the Punch drunk syndrome for

NOTE Confidence: 0.806774728888889

00:06:31.564 --> 00:06:34.404 there to be a definitive report that

NOTE Confidence: 0.806774728888889

00:06:34.404 --> 00:06:36.004 described relatively unique pathology

NOTE Confidence: 0.806774728888889

00:06:36.063 --> 00:06:38.709 in the brains in the brains of former boxers.

NOTE Confidence: 0.806774728888889

00:06:38.710 --> 00:06:40.761 And that is the paper by Doctor

NOTE Confidence: 0.806774728888889

00:06:40.761 --> 00:06:41.347 Nick dorsalis,

NOTE Confidence: 0.806774728888889

00:06:41.350 --> 00:06:43.182 the aftermath of boxing,

NOTE Confidence: 0.806774728888889

00:06:43.182 --> 00:06:45.930 in which he reports a constellation

NOTE Confidence: 0.806774728888889

00:06:46.014 --> 00:06:47.778 of neuropathology in the

NOTE Confidence: 0.806774728888889

00:06:47.778 --> 00:06:49.983 brains of 15 former boxers,

NOTE Confidence: 0.806774728888889

00:06:49.990 --> 00:06:51.678 most of which were.

NOTE Confidence: 0.806774728888889

00:06:51.678 --> 00:06:53.366 Professional boxers and again,

NOTE Confidence: 0.861271546

00:06:53.370 --> 00:06:55.314 it includes relatively unique

NOTE Confidence: 0.861271546

00:06:55.314 --> 00:06:57.258 gross findings coincident with

NOTE Confidence: 0.861271546

00:06:57.258 --> 00:06:59.376 microscopic findings. A grossly Dr.

NOTE Confidence: 0.861271546

00:06:59.376 --> 00:07:01.286 Corsellis made the observation that

NOTE Confidence: 0.861271546

00:07:01.286 --> 00:07:03.729 these former boxers frequently had a

NOTE Confidence: 0.861271546

00:07:03.729 --> 00:07:05.749 defects in their separate glycinin,

NOTE Confidence: 0.861271546

00:07:05.750 --> 00:07:07.070 whether that be cavum, septum,

NOTE Confidence: 0.861271546

00:07:07.070 --> 00:07:08.558 pellucidum, or fenestrations or

NOTE Confidence: 0.861271546

00:07:08.558 --> 00:07:10.920 tears in the septum, and so on.

NOTE Confidence: 0.861271546

00:07:10.920 --> 00:07:12.950 He additionally noted atrophy in the in

NOTE Confidence: 0.861271546

00:07:13.015 --> 00:07:15.195 the hypothalamus and mammillary bodies

NOTE Confidence: 0.861271546

00:07:15.195 --> 00:07:17.375 that not infrequently contributed to

NOTE Confidence: 0.861271546

00:07:17.434 --> 00:07:19.384 some dilatation of the third ventricle

NOTE Confidence: 0.861271546

00:07:19.384 --> 00:07:21.598 as opposed to the lateral ventricles.

NOTE Confidence: 0.861271546

00:07:21.598 --> 00:07:24.322 As well as depigmentation of the

NOTE Confidence: 0.861271546

00:07:24.322 --> 00:07:26.419 pigmented nuclei in the brainstem.

NOTE Confidence: 0.861271546

00:07:26.420 --> 00:07:27.905 And the microscopy is where

NOTE Confidence: 0.861271546

00:07:27.905 --> 00:07:29.093 it really got interesting.

NOTE Confidence: 0.861271546

00:07:29.100 --> 00:07:31.008 He noted neurofibrillary pathology,

NOTE Confidence: 0.861271546

00:07:31.008 --> 00:07:32.916 neurofibrillary tangles to high

NOTE Confidence: 0.861271546

00:07:32.916 --> 00:07:35.160 degrees in the cerebral cortex,

NOTE Confidence: 0.861271546

00:07:35.160 --> 00:07:36.744 and mesial temporal structures

NOTE Confidence: 0.861271546

00:07:36.744 --> 00:07:37.536 like hippocampus,

NOTE Confidence: 0.861271546

00:07:37.540 --> 00:07:40.235 and in the pigmented brain stem nuclei.

NOTE Confidence: 0.861271546

00:07:40.240 --> 00:07:42.116 But he noted these in the absence

NOTE Confidence: 0.861271546

00:07:42.116 --> 00:07:43.620 of evidence of senile plaques

NOTE Confidence: 0.861271546

00:07:43.620 --> 00:07:45.215 in the majority of cases,

NOTE Confidence: 0.861271546

00:07:45.220 --> 00:07:46.630 and in those cases that did

NOTE Confidence: 0.861271546

00:07:46.630 --> 00:07:47.335 have senile plaques,

NOTE Confidence: 0.861271546

00:07:47.340 --> 00:07:49.445 the tangle pathology far was

NOTE Confidence: 0.861271546

00:07:49.445 --> 00:07:52.085 far out of proportion to what

NOTE Confidence: 0.861271546

00:07:52.085 --> 00:07:54.335 the the plaque pathology was.

NOTE Confidence: 0.861271546

00:07:54.340 --> 00:07:55.870 And so ultimately he concludes

NOTE Confidence: 0.861271546

00:07:55.870 --> 00:07:56.788 that these changes.

NOTE Confidence: 0.861271546

00:07:56.790 --> 00:07:58.770 Have no particular connection

NOTE Confidence: 0.861271546

00:07:58.770 --> 00:08:00.255 with Alzheimer's disease,

NOTE Confidence: 0.861271546

00:08:00.260 --> 00:08:02.192 and in fact the alteration that links

NOTE Confidence: 0.861271546

00:08:02.192 --> 00:08:03.697 this condition with repeated head

NOTE Confidence: 0.861271546

00:08:03.697 --> 00:08:05.867 injury is the curious way in which

NOTE Confidence: 0.861271546

00:08:05.867 --> 00:08:07.160 neurofibrillary tangles develop in

NOTE Confidence: 0.861271546

00:08:07.160 --> 00:08:08.705 the absence of neuritic plaques,

NOTE Confidence: 0.861271546

00:08:08.710 --> 00:08:10.154 therefore not Alzheimer's disease.

NOTE Confidence: 0.861271546

00:08:10.154 --> 00:08:13.020 And his final statement is he knows of

NOTE Confidence: 0.861271546

00:08:13.020 --> 00:08:15.267 no other condition that has the same

NOTE Confidence: 0.861271546

00:08:15.267 --> 00:08:17.228 combination of neuropathologic findings.

NOTE Confidence: 0.861271546

00:08:17.230 --> 00:08:20.126 And so it is with this paper that

NOTE Confidence: 0.861271546

00:08:20.126 --> 00:08:21.859 the neuropathology of CTE starts

NOTE Confidence: 0.861271546

00:08:21.859 --> 00:08:24.268 to 1st emerge in the early 1970s.

NOTE Confidence: 0.861271546

00:08:24.268 --> 00:08:27.008 OK, however, at this time.

NOTE Confidence: 0.861271546

00:08:27.010 --> 00:08:28.502 A chronic traumatic encephalopathy

NOTE Confidence: 0.861271546

00:08:28.502 --> 00:08:30.367 is a rather obscure disease.

NOTE Confidence: 0.861271546

00:08:30.370 --> 00:08:31.800 It's thought to be rare,

NOTE Confidence: 0.861271546

00:08:31.800 --> 00:08:34.467 and it's thought to be more or

NOTE Confidence: 0.861271546

00:08:34.467 --> 00:08:36.890 less unique to former boxers.

NOTE Confidence: 0.861271546

00:08:36.890 --> 00:08:38.770 And from a research standpoint,

NOTE Confidence: 0.861271546

00:08:38.770 --> 00:08:40.918 this disease kind of lays low

NOTE Confidence: 0.861271546

00:08:40.918 --> 00:08:42.350 for a long time.

NOTE Confidence: 0.861271546

00:08:42.350 --> 00:08:44.786 It's dormant for for several decades.

NOTE Confidence: 0.861271546

00:08:44.790 --> 00:08:47.956 But that all changes in 2005 when

NOTE Confidence: 0.861271546

00:08:47.956 --> 00:08:51.463 CTE meets the NFL with now with

NOTE Confidence: 0.861271546

00:08:51.463 --> 00:08:53.360 the now famous case report that was

NOTE Confidence: 0.861271546

00:08:53.424 --> 00:08:55.309 published by Doctor Bennett Omalu,

NOTE Confidence: 0.861271546

00:08:55.310 --> 00:08:56.920 who is a neuropathologist and

NOTE Confidence: 0.861271546

00:08:56.920 --> 00:08:57.906 forensic pathologist. Pittsburgh.

NOTE Confidence: 0.861271546

00:08:57.906 --> 00:08:58.914 At the time,

NOTE Confidence: 0.861271546

00:08:58.914 --> 00:09:01.385 he received the brain of a former

NOTE Confidence: 0.861271546

00:09:01.385 --> 00:09:03.713 high profile NFL athlete and he

NOTE Confidence: 0.861271546

00:09:03.713 --> 00:09:05.819 diagnosed changes of chronic traumatic

NOTE Confidence: 0.861271546

00:09:05.819 --> 00:09:07.989 encephalopathy in this brain and

NOTE Confidence: 0.861271546

00:09:07.989 --> 00:09:10.323 of course urged the community to

NOTE Confidence: 0.861271546

00:09:10.323 --> 00:09:11.687 study football players further.

NOTE Confidence: 0.861271546

00:09:11.690 --> 00:09:14.147 And as many in the audience know,

NOTE Confidence: 0.861271546

00:09:14.150 --> 00:09:17.930 this resulted in a rather

NOTE Confidence: 0.861271546

00:09:17.930 --> 00:09:20.198 significant public interest.

NOTE Confidence: 0.861271546

00:09:20.200 --> 00:09:23.170 And so ultimately also in the

NOTE Confidence: 0.861271546

00:09:23.170 --> 00:09:25.788 creation in 2008 of the Boston

NOTE Confidence: 0.861271546

00:09:25.788 --> 00:09:28.230 University CTE Center and Brain Bank,

NOTE Confidence: 0.861271546

00:09:28.230 --> 00:09:29.922 which has been headed this entire

NOTE Confidence: 0.861271546

00:09:29.922 --> 00:09:31.440 time by Doctor Ann McKee,

NOTE Confidence: 0.861271546

00:09:31.440 --> 00:09:32.970 who's pictured on the left.

NOTE Confidence: 0.861271546

00:09:32.970 --> 00:09:34.290 And it's really doctor Mickey's

NOTE Confidence: 0.861271546

00:09:34.290 --> 00:09:36.037 work and the worker for colleagues

NOTE Confidence: 0.861271546

00:09:36.037 --> 00:09:37.533 and receiving numerous brains

NOTE Confidence: 0.861271546

00:09:37.533 --> 00:09:39.029 from former football players,

NOTE Confidence: 0.861271546

00:09:39.030 --> 00:09:40.582 particularly professional football players,

NOTE Confidence: 0.861271546

00:09:40.582 --> 00:09:43.870 and has found that a very high percentage,

NOTE Confidence: 0.861271546

00:09:43.870 --> 00:09:47.488 approaching 100% of former NFL players

NOTE Confidence: 0.861271546

00:09:47.490 --> 00:09:50.250 have CTE pathology. That is not.

NOTE Confidence: 0.861271546

00:09:50.250 --> 00:09:52.580 Visible in age match controls.

NOTE Confidence: 0.861271546

00:09:52.580 --> 00:09:52.844 OK.

NOTE Confidence: 0.861271546

00:09:52.844 --> 00:09:54.428 And so the result of this,

NOTE Confidence: 0.861271546

00:09:54.430 --> 00:09:56.640 as you can imagine and as many of you know,

NOTE Confidence: 0.861271546

00:09:56.640 --> 00:09:58.440 was an absolute media firestorm.

NOTE Confidence: 0.861271546

00:09:58.440 --> 00:10:00.648 Innumerable magazine articles,

NOTE Confidence: 0.861271546

00:10:00.648 --> 00:10:02.120 online articles,

NOTE Confidence: 0.861271546

00:10:02.120 --> 00:10:03.936 newspaper articles that continue

NOTE Confidence: 0.861271546

00:10:03.936 --> 00:10:06.206 to this day publish books,

NOTE Confidence: 0.787891618888889

00:10:06.210 --> 00:10:08.688 Hollywood movies and then ultimately a

NOTE Confidence: 0.787891618888889

00:10:08.688 --> 00:10:10.798 congressional hearings with NFL leadership

NOTE Confidence: 0.787891618888889

00:10:10.798 --> 00:10:13.535 in front of the House Judiciary Committee.

NOTE Confidence: 0.787891618888889

00:10:13.540 --> 00:10:15.524 So you see on the top left there's

NOTE Confidence: 0.787891618888889

00:10:15.524 --> 00:10:17.297 the NFL commissioner Roger Goodell

NOTE Confidence: 0.787891618888889

00:10:17.297 --> 00:10:19.954 speaking to the house and then

NOTE Confidence: 0.787891618888889

00:10:19.954 --> 00:10:22.539 finally the NFL concussion settlement.

NOTE Confidence: 0.787891618888889

00:10:22.540 --> 00:10:26.381 Which as of October of 2022 has officially

NOTE Confidence: 0.787891618888889

00:10:26.381 --> 00:10:30.154 paid over $1 billion to former NFL players

NOTE Confidence: 0.787891618888889

00:10:30.154 --> 00:10:33.070 and their families regarding this disease.

NOTE Confidence: 0.787891618888889

00:10:33.070 --> 00:10:35.770 However, moving forward to today,

NOTE Confidence: 0.787891618888889

00:10:35.770 --> 00:10:38.050 we have found CTE pathology not

NOTE Confidence: 0.787891618888889

00:10:38.050 --> 00:10:40.791 only in former boxers and in former

NOTE Confidence: 0.787891618888889

00:10:40.791 --> 00:10:43.083 football players of of all levels,

NOTE Confidence: 0.787891618888889

00:10:43.090 --> 00:10:45.634 but we have also found CTE and other

NOTE Confidence: 0.787891618888889

00:10:45.634 --> 00:10:47.470 combative sports to think about MMA,

NOTE Confidence: 0.787891618888889

00:10:47.470 --> 00:10:48.710 think about wrestling, and yes,

NOTE Confidence: 0.787891618888889

00:10:48.710 --> 00:10:50.960 I also mean so-called professional

NOTE Confidence: 0.787891618888889

00:10:50.960 --> 00:10:52.760 wrestling WWE type stuff.

NOTE Confidence: 0.787891618888889

00:10:52.760 --> 00:10:54.970 CTE exists in that population.

NOTE Confidence: 0.787891618888889

00:10:54.970 --> 00:10:56.410 It's been found in rugby players,

NOTE Confidence: 0.787891618888889

00:10:56.410 --> 00:10:58.706 hockey players and now more recently from

NOTE Confidence: 0.787891618888889

00:10:58.706 --> 00:11:01.329 a because of FIFA just kind of came up.

NOTE Confidence: 0.787891618888889

00:11:01.330 --> 00:11:03.382 It's been found in soccer players

NOTE Confidence: 0.787891618888889

00:11:03.382 --> 00:11:05.970 and as well as baseball players

NOTE Confidence: 0.787891618888889

00:11:05.970 --> 00:11:07.414 outside of contact sports.

NOTE Confidence: 0.787891618888889

00:11:07.414 --> 00:11:09.979 CTE pathology has been identified in the

NOTE Confidence: 0.787891618888889

00:11:09.979 --> 00:11:11.977 setting of repetitive impact head trauma

NOTE Confidence: 0.787891618888889

00:11:11.977 --> 00:11:14.240 in rare cases of domestic violence.

NOTE Confidence: 0.787891618888889

00:11:14.240 --> 00:11:17.208 And we're still learning a lot about that

NOTE Confidence: 0.787891618888889

00:11:17.208 --> 00:11:19.148 particular community with regard to CTE.

NOTE Confidence: 0.787891618888889

00:11:19.150 --> 00:11:21.430 It has emerged in epileptic patients.

NOTE Confidence: 0.787891618888889

00:11:21.430 --> 00:11:23.580 It has emerged in neurodevelopmental.

NOTE Confidence: 0.787891618888889

00:11:23.580 --> 00:11:26.356 Disabled individuals with headbanging

NOTE Confidence: 0.787891618888889

00:11:26.356 --> 00:11:28.598 behaviors and then very interestingly

NOTE Confidence: 0.787891618888889

00:11:28.598 --> 00:11:31.480 CTE or CTE like pathology has also

NOTE Confidence: 0.787891618888889

00:11:31.480 --> 00:11:33.895 been identified in circumstances and

NOTE Confidence: 0.787891618888889

00:11:33.895 --> 00:11:36.956 associated with individual as opposed to

NOTE Confidence: 0.787891618888889

00:11:36.956 --> 00:11:39.360 repetitive individual severe head trauma.

NOTE Confidence: 0.787891618888889

00:11:39.360 --> 00:11:41.790 And probably the most interesting of

NOTE Confidence: 0.787891618888889

00:11:41.790 --> 00:11:44.491 these from I guess from my perspective

NOTE Confidence: 0.787891618888889

00:11:44.491 --> 00:11:47.250 is a study that identified CTE like

NOTE Confidence: 0.787891618888889

00:11:47.250 --> 00:11:48.978 pathology immediately adjacent to

NOTE Confidence: 0.787891618888889

00:11:48.978 --> 00:11:51.874 lobotomy sites in the brains of

NOTE Confidence: 0.787891618888889

00:11:51.874 --> 00:11:53.620 formerly institutionalized individuals.

NOTE Confidence: 0.787891618888889

00:11:53.620 --> 00:11:53.971 OK.

NOTE Confidence: 0.787891618888889

00:11:53.971 --> 00:11:56.077 And so this pathology has been

NOTE Confidence: 0.787891618888889

00:11:56.077 --> 00:11:58.130 identified in many circumstances?

NOTE Confidence: 0.787891618888889

00:11:58.130 --> 00:11:58.540 And so,

NOTE Confidence: 0.787891618888889

00:11:58.540 --> 00:12:00.180 even though it started out as kind of

NOTE Confidence: 0.787891618888889

00:12:00.234 --> 00:12:01.878 this clinical phenomenon in the 20s,

NOTE Confidence: 0.787891618888889

00:12:01.880 --> 00:12:03.089 thirties and 40s,

NOTE Confidence: 0.787891618888889

00:12:03.089 --> 00:12:05.104 CTE today is a neuropathological

NOTE Confidence: 0.787891618888889

00:12:05.104 --> 00:12:07.487 entity that currently can only be

NOTE Confidence: 0.787891618888889

00:12:07.487 --> 00:12:09.749 diagnosed on the basis of postmortem

NOTE Confidence: 0.787891618888889

00:12:09.818 --> 00:12:11.249 examination of tissue.

NOTE Confidence: 0.787891618888889

00:12:11.250 --> 00:12:11.731 OK.

NOTE Confidence: 0.787891618888889

00:12:11.731 --> 00:12:14.617 And this diagnosis is achieved by

NOTE Confidence: 0.787891618888889

00:12:14.617 --> 00:12:17.336 the by discovering the presence or

NOTE Confidence: 0.787891618888889

00:12:17.336 --> 00:12:20.556 absence of what we refer to as the

NOTE Confidence: 0.787891618888889

00:12:20.556 --> 00:12:23.460 path in a monic lesion of for CTE.

NOTE Confidence: 0.787891618888889

00:12:23.460 --> 00:12:24.690 And that lesion is accomplished,

NOTE Confidence: 0.787891618888889

00:12:24.690 --> 00:12:26.994 that you find that lesion through

NOTE Confidence: 0.787891618888889

00:12:26.994 --> 00:12:28.530 immunohistochemistry for phosphorylated Tau,

NOTE Confidence: 0.787891618888889

00:12:28.530 --> 00:12:30.700 and I'll read it out.

NOTE Confidence: 0.787891618888889

00:12:30.700 --> 00:12:32.365 Tau aggregates in neurons with

NOTE Confidence: 0.787891618888889

00:12:32.365 --> 00:12:33.364 or without astrocytes,

NOTE Confidence: 0.787891618888889

00:12:33.370 --> 00:12:35.064 at the depth of a cortical sulcus,

NOTE Confidence: 0.787891618888889

00:12:35.070 --> 00:12:36.996 around a small blood vessel deep

NOTE Confidence: 0.787891618888889

00:12:36.996 --> 00:12:37.959 in the parenchyma,

NOTE Confidence: 0.787891618888889

00:12:37.960 --> 00:12:39.904 and not restricted to subpial or

NOTE Confidence: 0.787891618888889

00:12:39.904 --> 00:12:41.640 superficial readings of the sulcus.

NOTE Confidence: 0.787891618888889

00:12:41.640 --> 00:12:43.696 So Long story short,

NOTE Confidence: 0.787891618888889

00:12:43.696 --> 00:12:45.752 Perry Vascular pattern of

NOTE Confidence: 0.787891618888889

00:12:45.752 --> 00:12:47.376 neurofibrillary pathology and the

NOTE Confidence: 0.787891618888889

00:12:47.376 --> 00:12:49.462 depth of a cortical sulcus in the

NOTE Confidence: 0.787891618888889

00:12:49.462 --> 00:12:51.777 deep layers of the cerebral cortex.

NOTE Confidence: 0.787891618888889

00:12:51.780 --> 00:12:52.848 And So what you're seeing on

NOTE Confidence: 0.787891618888889

00:12:52.848 --> 00:12:54.138 the image here is a single what?

NOTE Confidence: 0.787891618888889

00:12:54.140 --> 00:12:57.410 You would call CTE lesion.

NOTE Confidence: 0.787891618888889

00:12:57.410 --> 00:12:58.830 And as it stands today,

NOTE Confidence: 0.787891618888889

00:12:58.830 --> 00:13:01.644 one lesion 1 sulcal depth with this

NOTE Confidence: 0.787891618888889

00:13:01.644 --> 00:13:04.190 pathology equals a diagnosis of CTE.

NOTE Confidence: 0.787891618888889

00:13:04.190 --> 00:13:06.737 OK and that and so it can go on

NOTE Confidence: 0.787891618888889

00:13:06.737 --> 00:13:09.250 a diagnostic report as CTE.

NOTE Confidence: 0.787891618888889

00:13:09.250 --> 00:13:12.082 And in cases where an individual may be

NOTE Confidence: 0.787891618888889

00:13:12.082 --> 00:13:14.629 or pathologist may be concerned about CTE,

NOTE Confidence: 0.787891618888889

00:13:14.630 --> 00:13:16.210 consensus sampling currently recommends

NOTE Confidence: 0.787891618888889

00:13:16.210 --> 00:13:18.580 a minimum of five sampling of

NOTE Confidence: 0.791541952727273

00:13:18.643 --> 00:13:20.315 five minimal cortical regions

NOTE Confidence: 0.791541952727273

00:13:20.315 --> 00:13:21.987 to discover CTE pathology

NOTE Confidence: 0.791541952727273

00:13:21.987 --> 00:13:23.629 including frontal frontal lobe,

NOTE Confidence: 0.791541952727273

00:13:23.630 --> 00:13:25.205 temporal lobe, mesial temporal lobe

NOTE Confidence: 0.791541952727273

00:13:25.205 --> 00:13:26.465 with hippocampus and amygdala.

NOTE Confidence: 0.791541952727273

00:13:26.470 --> 00:13:29.518 Right lobe occipital lobe.

NOTE Confidence: 0.791541952727273

00:13:29.520 --> 00:13:31.445 And in in in efforts to discover

NOTE Confidence: 0.791541952727273

00:13:31.445 --> 00:13:33.319 a path in demonic lesion.

NOTE Confidence: 0.791541952727273

00:13:33.320 --> 00:13:35.828 However when it comes to actually

NOTE Confidence: 0.791541952727273

00:13:35.828 --> 00:13:38.286 staging the pathology for CTE we're

NOTE Confidence: 0.791541952727273

00:13:38.286 --> 00:13:40.410 still in pretty early phases in

NOTE Confidence: 0.791541952727273

00:13:40.410 --> 00:13:42.830 terms of assessing the severity.

NOTE Confidence: 0.791541952727273

00:13:42.830 --> 00:13:44.415 There have been two staging

NOTE Confidence: 0.791541952727273

00:13:44.415 --> 00:13:45.683 criteria that were proposed.

NOTE Confidence: 0.791541952727273

00:13:45.690 --> 00:13:47.090 The first proposed staging

NOTE Confidence: 0.791541952727273

00:13:47.090 --> 00:13:49.190 criteria was a four stage McKee

NOTE Confidence: 0.791541952727273

00:13:49.256 --> 00:13:51.188 staging scheme from one to four.

NOTE Confidence: 0.791541952727273

00:13:51.190 --> 00:13:53.311 This is kind of the most famous

NOTE Confidence: 0.791541952727273

00:13:53.311 --> 00:13:55.978 one that you see pop up and and

NOTE Confidence: 0.791541952727273

00:13:55.978 --> 00:13:57.663 articles and this was proposed

NOTE Confidence: 0.791541952727273

00:13:57.741 --> 00:13:59.924 in 2015 and then a more recent.

NOTE Confidence: 0.791541952727273

00:13:59.924 --> 00:14:02.060 A criteria proposal was a made

NOTE Confidence: 0.791541952727273

00:14:02.137 --> 00:14:04.316 by a consensus in 2021 which is

NOTE Confidence: 0.791541952727273

00:14:04.316 --> 00:14:06.570 a two state system which is kind

NOTE Confidence: 0.791541952727273

00:14:06.647 --> 00:14:09.125 of algorithms out to the right

NOTE Confidence: 0.791541952727273

00:14:09.125 --> 00:14:11.218 here which characterizes CTE as

NOTE Confidence: 0.791541952727273

00:14:11.218 --> 00:14:13.028 either low or high severity.

NOTE Confidence: 0.791541952727273

00:14:13.030 --> 00:14:15.534 However at this point in time it is

NOTE Confidence: 0.791541952727273

00:14:15.534 --> 00:14:17.635 very important to stress that these

NOTE Confidence: 0.791541952727273

00:14:17.635 --> 00:14:19.390 that these staging criteria for

NOTE Confidence: 0.791541952727273

00:14:19.390 --> 00:14:21.630 the severity of CTE are proposed.

NOTE Confidence: 0.791541952727273

00:14:21.630 --> 00:14:23.105 They are an experimental phases

NOTE Confidence: 0.791541952727273

00:14:23.105 --> 00:14:25.345 and I'm not sure how near they

NOTE Confidence: 0.791541952727273

00:14:25.345 --> 00:14:26.745 are to clinical validation,

NOTE Confidence: 0.791541952727273

00:14:26.750 --> 00:14:29.720 probably not too close and.

NOTE Confidence: 0.791541952727273

00:14:29.720 --> 00:14:31.538 So at this point in time,

NOTE Confidence: 0.791541952727273

00:14:31.540 --> 00:14:33.545 it remains pretty difficult to

NOTE Confidence: 0.791541952727273

00:14:33.545 --> 00:14:36.093 correlate any degree of CTE pathology

NOTE Confidence: 0.791541952727273

00:14:36.093 --> 00:14:37.973 definitively with the clinical

NOTE Confidence: 0.791541952727273

00:14:37.973 --> 00:14:41.159 phenotype or in other words to predict,

NOTE Confidence: 0.791541952727273

00:14:41.160 --> 00:14:43.008 to predict whether or not a certain

NOTE Confidence: 0.791541952727273

00:14:43.008 --> 00:14:45.042 degree of CTE pathology may even

NOTE Confidence: 0.791541952727273

00:14:45.042 --> 00:14:46.614 correspond to clinical symptoms.

NOTE Confidence: 0.791541952727273

00:14:46.620 --> 00:14:48.420 And this is very challenging

NOTE Confidence: 0.791541952727273

00:14:48.420 --> 00:14:49.500 from our perspective,

NOTE Confidence: 0.791541952727273

00:14:49.500 --> 00:14:51.635 particularly in cases where we

NOTE Confidence: 0.791541952727273

00:14:51.635 --> 00:14:53.770 have very mild pathology and

NOTE Confidence: 0.791541952727273

00:14:53.850 --> 00:14:56.105 it's very difficult to ascribe

NOTE Confidence: 0.791541952727273

00:14:56.105 --> 00:14:57.909 a symptomatology to that.

NOTE Confidence: 0.791541952727273

00:14:57.910 --> 00:14:58.323 However,

NOTE Confidence: 0.791541952727273

00:14:58.323 --> 00:15:00.801 the clinical pursuit of a diary

NOTE Confidence: 0.791541952727273

00:15:00.801 --> 00:15:03.384 of a clinical diagnosis of CTE

NOTE Confidence: 0.791541952727273

00:15:03.384 --> 00:15:05.489 has been an aggressive one,

NOTE Confidence: 0.791541952727273

00:15:05.490 --> 00:15:07.125 and probably the most notable

NOTE Confidence: 0.791541952727273

00:15:07.125 --> 00:15:09.494 aspect of this has been the the

NOTE Confidence: 0.791541952727273

00:15:09.494 --> 00:15:11.486 designation of a new clinical term,

NOTE Confidence: 0.791541952727273

00:15:11.490 --> 00:15:12.801 traumatic encephalopathy syndrome.

NOTE Confidence: 0.791541952727273

00:15:12.801 --> 00:15:15.860 This is a syndrome that is proposed

NOTE Confidence: 0.791541952727273

00:15:15.930 --> 00:15:18.294 to be the clinical syndrome that

NOTE Confidence: 0.791541952727273

00:15:18.294 --> 00:15:19.870 corresponds to underlying CTE.

NOTE Confidence: 0.791541952727273

00:15:19.870 --> 00:15:21.630 Pathology was coined in 2014,

NOTE Confidence: 0.791541952727273

00:15:21.630 --> 00:15:25.006 and in 2021 a multidisciplinary

NOTE Confidence: 0.791541952727273

00:15:25.006 --> 00:15:28.090 consensus panel met together to define.

NOTE Confidence: 0.791541952727273

00:15:28.090 --> 00:15:30.065 Experimental criteria for this syndrome

NOTE Confidence: 0.791541952727273

00:15:30.065 --> 00:15:32.580 and they characterize it as follows.

NOTE Confidence: 0.791541952727273

00:15:32.580 --> 00:15:34.895 They progressive course of cognitive

NOTE Confidence: 0.791541952727273

00:15:34.895 --> 00:15:36.747 impairment and or neurobehavioral

NOTE Confidence: 0.791541952727273

00:15:36.747 --> 00:15:38.394 dysregulation associated with a

NOTE Confidence: 0.791541952727273

00:15:38.394 --> 00:15:40.269 confirmed history of quote substantial

NOTE Confidence: 0.791541952727273

00:15:40.269 --> 00:15:42.399 exposure to repetitive head impacts.

NOTE Confidence: 0.791541952727273

00:15:42.400 --> 00:15:44.524 That is quote not fully accounted

NOTE Confidence: 0.791541952727273

00:15:44.524 --> 00:15:45.940 for by other disorders,

NOTE Confidence: 0.791541952727273

00:15:45.940 --> 00:15:47.956 but not accounted for by Alzheimer's disease,

NOTE Confidence: 0.791541952727273

00:15:47.960 --> 00:15:51.180 neuropsychiatric disease or other disorders.

NOTE Confidence: 0.791541952727273

00:15:51.180 --> 00:15:53.385 And simultaneously they proposed an

NOTE Confidence: 0.791541952727273

00:15:53.385 --> 00:15:56.476 algorithm by which they hope to be

NOTE Confidence: 0.791541952727273

00:15:56.476 --> 00:15:58.906 able to predict underlying CTE pathology.

NOTE Confidence: 0.791541952727273

00:15:58.910 --> 00:16:01.028 On the basis of clinical information,

NOTE Confidence: 0.791541952727273

00:16:01.030 --> 00:16:03.448 OK, all these are also experimental.

NOTE Confidence: 0.791541952727273

00:16:03.450 --> 00:16:06.054 Time will tell whether or not these

NOTE Confidence: 0.791541952727273

00:16:06.054 --> 00:16:08.402 criteria and whether or not this

NOTE Confidence: 0.791541952727273

00:16:08.402 --> 00:16:10.332 algorithm actually ends up being

NOTE Confidence: 0.791541952727273

00:16:10.332 --> 00:16:12.170 predictive of underlying CTE.

NOTE Confidence: 0.791541952727273

00:16:12.170 --> 00:16:12.525 OK.

NOTE Confidence: 0.791541952727273

00:16:12.525 --> 00:16:15.010 So now with all of that said,

NOTE Confidence: 0.791541952727273

00:16:15.010 --> 00:16:16.900 what does this have to do with

NOTE Confidence: 0.791541952727273

00:16:16.900 --> 00:16:17.710 military service members?

NOTE Confidence: 0.791541952727273

00:16:17.710 --> 00:16:20.080 What is the history of traumatic

NOTE Confidence: 0.791541952727273

00:16:20.080 --> 00:16:22.430 brain injury in the military?

NOTE Confidence: 0.791541952727273

00:16:22.430 --> 00:16:25.181 Well as it pertains to our current

NOTE Confidence: 0.791541952727273

00:16:25.181 --> 00:16:26.878 understanding and our current

NOTE Confidence: 0.791541952727273

00:16:26.878 --> 00:16:29.524 experience with TBI in the military?

NOTE Confidence: 0.791541952727273

00:16:29.530 --> 00:16:31.882 That history all begins in World

NOTE Confidence: 0.791541952727273

00:16:31.882 --> 00:16:33.450 War One with the

NOTE Confidence: 0.865110228095238

00:16:33.539 --> 00:16:36.185 advent of TNT and widespread use

NOTE Confidence: 0.865110228095238

00:16:36.185 --> 00:16:38.430 of high explosives and more.

NOTE Confidence: 0.865110228095238

00:16:38.430 --> 00:16:41.166 So in 18 in the 1860s TNT was was

NOTE Confidence: 0.865110228095238

00:16:41.166 --> 00:16:42.872 discovered or synthesized and it

NOTE Confidence: 0.865110228095238

00:16:42.872 --> 00:16:45.350 was first used as a drying agent.

NOTE Confidence: 0.865110228095238

00:16:45.350 --> 00:16:47.996 Nobody intended it for it to be

NOTE Confidence: 0.865110228095238

00:16:47.996 --> 00:16:50.256 explosive until in the early 1900s

NOTE Confidence: 0.865110228095238

00:16:50.256 --> 00:16:51.720 of Germans actually discovered

NOTE Confidence: 0.865110228095238

00:16:51.720 --> 00:16:54.012 that it was explosive and started

NOTE Confidence: 0.865110228095238

00:16:54.012 --> 00:16:56.027 putting it into artillery shells.

NOTE Confidence: 0.865110228095238

00:16:56.030 --> 00:16:57.787 And of course this was right before

NOTE Confidence: 0.865110228095238

00:16:57.787 --> 00:16:59.668 World War One and so World War One.

NOTE Confidence: 0.865110228095238

00:16:59.670 --> 00:17:02.232 Became the first major war in which

NOTE Confidence: 0.865110228095238

00:17:02.232 --> 00:17:05.315 we had massive or widespread use of

NOTE Confidence: 0.865110228095238

00:17:05.315 --> 00:17:08.171 millions of high explosive artillery shells.

NOTE Confidence: 0.865110228095238

00:17:08.180 --> 00:17:09.874 And kind of the culmination of this,

NOTE Confidence: 0.865110228095238

00:17:09.880 --> 00:17:11.940 or if you had to give one anecdote of this,

NOTE Confidence: 0.865110228095238

00:17:11.940 --> 00:17:13.578 would be the Battle of Verdun,

NOTE Confidence: 0.865110228095238

00:17:13.580 --> 00:17:15.974 which is the longest battle of World War One.

NOTE Confidence: 0.865110228095238

00:17:15.980 --> 00:17:21.233 Lasted 10 months talking about 306,000

NOTE Confidence: 0.865110228095238

00:17:21.233 --> 00:17:24.740 soldiers died in this battle and over

NOTE Confidence: 0.865110228095238

00:17:24.740 --> 00:17:27.260 40 million rounds of high explosive

NOTE Confidence: 0.865110228095238

00:17:27.260 --> 00:17:30.238 artillery were used in just this one battle.

NOTE Confidence: 0.865110228095238

00:17:30.240 --> 00:17:32.760 OK, and so while many soldiers,

NOTE Confidence: 0.865110228095238

00:17:32.760 --> 00:17:34.596 particularly because protective equipment

NOTE Confidence: 0.865110228095238

00:17:34.596 --> 00:17:37.852 had not evolved to manage high explosives

NOTE Confidence: 0.865110228095238

00:17:37.852 --> 00:17:40.918 while many soldiers died from this exposure,

NOTE Confidence: 0.865110228095238

00:17:40.920 --> 00:17:41.994 many socials,

NOTE Confidence: 0.865110228095238

00:17:41.994 --> 00:17:44.679 many soldiers also survived this

NOTE Confidence: 0.865110228095238

00:17:44.679 --> 00:17:47.100 high intensity blast exposure.

NOTE Confidence: 0.865110228095238

00:17:47.100 --> 00:17:50.300 And many service members who had survived the

NOTE Confidence: 0.865110228095238

00:17:50.300 --> 00:17:53.786 started to develop chronic persistent neuro

NOTE Confidence: 0.865110228095238

00:17:53.786 --> 00:17:56.394 behavioral and cognitive manifestations.

NOTE Confidence: 0.865110228095238

00:17:56.400 --> 00:17:58.132 OK, including persistent headaches,

NOTE Confidence: 0.865110228095238

00:17:58.132 --> 00:17:58.998 concentration issues,

NOTE Confidence: 0.865110228095238

00:17:59.000 --> 00:18:01.508 memory issues, sleeping.

NOTE Confidence: 0.865110228095238

00:18:01.508 --> 00:18:03.180 Issues impulsivity.

NOTE Confidence: 0.865110228095238

00:18:03.180 --> 00:18:06.080 Operative issues and even suicidality.

NOTE Confidence: 0.865110228095238

00:18:06.080 --> 00:18:07.664 And because this was a brand

NOTE Confidence: 0.865110228095238

00:18:07.664 --> 00:18:09.040 new phenomenon at the time,

NOTE Confidence: 0.865110228095238

00:18:09.040 --> 00:18:11.596 in their medical charts they were

NOTE Confidence: 0.865110228095238

00:18:11.596 --> 00:18:13.791 characterized as having quote not

NOTE Confidence: 0.865110228095238

00:18:13.791 --> 00:18:15.876 yet diagnosed comma neurologic or

NOTE Confidence: 0.865110228095238

00:18:15.880 --> 00:18:18.052 NYDN or or characterized by the

NOTE Confidence: 0.865110228095238

00:18:18.052 --> 00:18:20.875 new late term of shell shock, OK.

NOTE Confidence: 0.865110228095238

00:18:20.875 --> 00:18:24.035 And this affected a huge proportion of the

NOTE Confidence: 0.865110228095238

00:18:24.035 --> 00:18:27.018 military personnel on both sides of the war.

NOTE Confidence: 0.865110228095238

00:18:27.020 --> 00:18:28.436 And as an example of this,

NOTE Confidence: 0.865110228095238

00:18:28.440 --> 00:18:30.325 it affected over 100,000 British

NOTE Confidence: 0.865110228095238

00:18:30.325 --> 00:18:31.456 military service members,

NOTE Confidence: 0.865110228095238

00:18:31.460 --> 00:18:33.560 which amounted to about 10%.

NOTE Confidence: 0.865110228095238

00:18:33.560 --> 00:18:36.110 Of the British military force.

NOTE Confidence: 0.865110228095238

00:18:36.110 --> 00:18:38.570 And so as you can imagine,

NOTE Confidence: 0.865110228095238

00:18:38.570 --> 00:18:40.810 the British Government was actually

NOTE Confidence: 0.865110228095238

00:18:40.810 --> 00:18:42.602 quite interested in research,

NOTE Confidence: 0.865110228095238

00:18:42.610 --> 00:18:43.080 diagnosis,

NOTE Confidence: 0.865110228095238

00:18:43.080 --> 00:18:44.490 management and prevention

NOTE Confidence: 0.865110228095238

00:18:44.490 --> 00:18:47.310 of what is now shell shock.

NOTE Confidence: 0.865110228095238

00:18:47.310 --> 00:18:49.942 And So what they did is they commandeered

NOTE Confidence: 0.865110228095238

00:18:49.942 --> 00:18:52.370 the services of a number of psychiatric

NOTE Confidence: 0.865110228095238

00:18:52.370 --> 00:18:54.075 research hospitals in the UK,

NOTE Confidence: 0.865110228095238

00:18:54.080 --> 00:18:56.970 most notably the Maudsley Hospital,

NOTE Confidence: 0.865110228095238

00:18:56.970 --> 00:18:57.476 which is,

NOTE Confidence: 0.865110228095238

00:18:57.476 --> 00:18:59.247 which is in London still there today.

NOTE Confidence: 0.865110228095238

00:18:59.250 --> 00:19:01.898 Picture at the top and or that's yeah,

NOTE Confidence: 0.865110228095238

00:19:01.900 --> 00:19:03.275 that's the Mosley hospital and

NOTE Confidence: 0.865110228095238

00:19:03.275 --> 00:19:04.375 then below the Moss.

NOTE Confidence: 0.865110228095238

00:19:04.380 --> 00:19:06.662 White Hospital and Mcgall and these two

NOTE Confidence: 0.865110228095238

00:19:06.662 --> 00:19:08.989 hospitals are very interesting to look at,

NOTE Confidence: 0.865110228095238

00:19:08.990 --> 00:19:11.138 juxtaposed next to each other because

NOTE Confidence: 0.865110228095238

00:19:11.138 --> 00:19:13.538 in many ways they were competing

NOTE Confidence: 0.865110228095238

00:19:13.538 --> 00:19:15.334 institutions with incongruent views

NOTE Confidence: 0.865110228095238

00:19:15.334 --> 00:19:18.180 in regards to what is shell shock.

NOTE Confidence: 0.865110228095238

00:19:18.180 --> 00:19:19.580 So at the Maudsley Hospital,

NOTE Confidence: 0.865110228095238

00:19:19.580 --> 00:19:20.800 this hospital was directed

NOTE Confidence: 0.865110228095238

00:19:20.800 --> 00:19:22.020 by Doctor Frederick Mott,

NOTE Confidence: 0.865110228095238

00:19:22.020 --> 00:19:23.975 who was trained in neurology

NOTE Confidence: 0.865110228095238

00:19:23.975 --> 00:19:24.757 and neuropathology.

NOTE Confidence: 0.865110228095238

00:19:24.760 --> 00:19:27.539 And he and his staff largely looked

NOTE Confidence: 0.865110228095238

00:19:27.539 --> 00:19:29.882 at physicians like Charcot and

NOTE Confidence: 0.865110228095238

00:19:29.882 --> 00:19:32.038 Alzheimer for their inspiration,

NOTE Confidence: 0.865110228095238

00:19:32.040 --> 00:19:33.625 for their clinical management and

NOTE Confidence: 0.865110228095238

00:19:33.625 --> 00:19:34.893 for their diagnostic techniques.

NOTE Confidence: 0.865110228095238

00:19:34.900 --> 00:19:37.231 And it was it was largely the view of

NOTE Confidence: 0.865110228095238

00:19:37.231 --> 00:19:39.745 the Maudsley Hospital that shell shock

NOTE Confidence: 0.865110228095238

00:19:39.745 --> 00:19:41.930 was an organic neurologic disorder

NOTE Confidence: 0.865110228095238

00:19:41.993 --> 00:19:44.117 related to physical changes in the

NOTE Confidence: 0.865110228095238

00:19:44.117 --> 00:19:46.926 brain caused by blast or some other

NOTE Confidence: 0.865110228095238

00:19:46.926 --> 00:19:48.774 battlefield exposure in contrast.

NOTE Confidence: 0.865110228095238

00:19:48.780 --> 00:19:49.356 The mall,

NOTE Confidence: 0.865110228095238

00:19:49.356 --> 00:19:50.508 the mall side hospital,

NOTE Confidence: 0.87129314

00:19:50.510 --> 00:19:52.570 was largely oriented towards psychiatry,

NOTE Confidence: 0.87129314

00:19:52.570 --> 00:19:55.050 particularly Freudian and Jungian psychiatry,

NOTE Confidence: 0.87129314

00:19:55.050 --> 00:19:57.090 for their diagnosis and management,

NOTE Confidence: 0.87129314

00:19:57.090 --> 00:19:58.430 and they largely considered shell

NOTE Confidence: 0.87129314

00:19:58.430 --> 00:20:00.240 shock to be a functional disorder,

NOTE Confidence: 0.87129314

00:20:00.240 --> 00:20:03.190 psychiatric disorder related to battlefield

NOTE Confidence: 0.87129314

00:20:03.190 --> 00:20:05.550 stresses and emotional disturbances.

NOTE Confidence: 0.87129314

00:20:05.550 --> 00:20:09.350 And so while this debate was raging on,

NOTE Confidence: 0.87129314

00:20:09.350 --> 00:20:12.422 the burden that these now 100,000

NOTE Confidence: 0.87129314

00:20:12.422 --> 00:20:14.232 plus service members was beginning

NOTE Confidence: 0.87129314

00:20:14.232 --> 00:20:16.910 to impose on the British government,

NOTE Confidence: 0.87129314

00:20:16.910 --> 00:20:19.208 particularly as it related to Pensioning.

NOTE Confidence: 0.87129314

00:20:19.210 --> 00:20:21.820 Expenses was beginning to mount.

NOTE Confidence: 0.87129314

00:20:21.820 --> 00:20:24.940 How do you deal with this this phenomenon?

NOTE Confidence: 0.87129314

00:20:24.940 --> 00:20:26.872 And so this resulted in the formation

NOTE Confidence: 0.87129314

00:20:26.872 --> 00:20:28.865 of the War Office Committee of

NOTE Confidence: 0.87129314

00:20:28.865 --> 00:20:30.705 inquiry into the causation and

NOTE Confidence: 0.87129314

00:20:30.705 --> 00:20:32.539 prevention of quote shell shock.

NOTE Confidence: 0.87129314

00:20:32.540 --> 00:20:35.319 And in this committee they heard testimony

NOTE Confidence: 0.87129314

00:20:35.319 --> 00:20:37.323 from physicians and scientists from

NOTE Confidence: 0.87129314

00:20:37.323 --> 00:20:39.913 both ends of the shell shock debate.

NOTE Confidence: 0.87129314

00:20:39.920 --> 00:20:43.259 But the opinion that tended to stick

NOTE Confidence: 0.87129314

00:20:43.260 --> 00:20:45.549 most concernedly to the to the committee

NOTE Confidence: 0.87129314

00:20:45.549 --> 00:20:48.109 was that shell shock was a sign of

NOTE Confidence: 0.87129314

00:20:48.109 --> 00:20:49.624 weakness and lack of character.

NOTE Confidence: 0.87129314

00:20:49.630 --> 00:20:50.416 And this was kind of a.

NOTE Confidence: 0.87129314

00:20:50.420 --> 00:20:52.260 Pervasive opinion about shell shock

NOTE Confidence: 0.87129314

00:20:52.260 --> 00:20:53.364 at the time,

NOTE Confidence: 0.87129314

00:20:53.370 --> 00:20:55.458 if not disguised malingering

NOTE Confidence: 0.87129314

00:20:55.458 --> 00:20:57.024 innovation of duty.

NOTE Confidence: 0.87129314

00:20:57.030 --> 00:20:58.829 When it came to the point where

NOTE Confidence: 0.87129314

00:20:58.829 --> 00:21:00.033 one neurologist who testified

NOTE Confidence: 0.87129314

00:21:00.033 --> 00:21:01.529 openly stated that frankly,

NOTE Confidence: 0.87129314

00:21:01.530 --> 00:21:04.658 he was not prepared to draw a distinction

NOTE Confidence: 0.87129314

00:21:04.658 --> 00:21:06.568 between cowardice and shell shock.

00:21:06.570 --> 00:21:06.779 OK.

00:21:06.779 --> 00:21:08.242 And this is the opinion that the

00:21:08.242 --> 00:21:10.037 the War Office committee stuck with.

00:21:10.040 --> 00:21:11.645 And so ultimately they concluded

00:21:11.645 --> 00:21:13.250 that no case of psychoneurosis

00:21:13.308 --> 00:21:15.204 or of mental breakdown even when

00:21:15.204 --> 00:21:16.790 attributed to shell explosion or

00:21:16.790 --> 00:21:18.380 the effect thereof should even be

00:21:18.380 --> 00:21:19.922 classified as a battle casualty.

00:21:19.922 --> 00:21:22.519 So they were not and that cleaned

00:21:22.519 --> 00:21:25.260 up a lot of pensioning concerns on

00:21:25.260 --> 00:21:27.300 on the prevention of shell shock.

00:21:27.300 --> 00:21:29.304 They recommended that we must simply

00:21:29.304 --> 00:21:31.480 promote more morale amongst military units,

00:21:31.480 --> 00:21:33.775 organize more recreational activities and

NOTE Confidence: 0.87129314

00:21:33.775 --> 00:21:36.589 that will prevent shell shock and as.

NOTE Confidence: 0.87129314

00:21:36.590 --> 00:21:38.078 2 military recruitment officers.

NOTE Confidence: 0.87129314

00:21:38.078 --> 00:21:39.566 They promoted a study,

NOTE Confidence: 0.87129314

00:21:39.570 --> 00:21:41.772 a more intensive study of character

NOTE Confidence: 0.87129314

00:21:41.772 --> 00:21:43.852 for potential military recruits so as

NOTE Confidence: 0.87129314

00:21:43.852 --> 00:21:46.044 to prevent the recruitment of those who may,

NOTE Confidence: 0.87129314

00:21:46.050 --> 00:21:48.297 who are weak of character and may

NOTE Confidence: 0.87129314

00:21:48.297 --> 00:21:50.080 suffer from shell shock later.

NOTE Confidence: 0.87129314

00:21:50.080 --> 00:21:51.151 More controversial statements,

NOTE Confidence: 0.87129314

00:21:51.151 --> 00:21:52.936 particularly from a modern lens,

NOTE Confidence: 0.87129314

00:21:52.940 --> 00:21:53.920 start to emerge when,

NOTE Confidence: 0.87129314

00:21:53.920 --> 00:21:55.390 as it pertains to the treatment

NOTE Confidence: 0.87129314

00:21:55.444 --> 00:21:56.140 of shell shock.

NOTE Confidence: 0.87129314

00:21:56.140 --> 00:21:56.411 Quote,

NOTE Confidence: 0.87129314

00:21:56.411 --> 00:21:58.037 No soldier should be allowed to

NOTE Confidence: 0.87129314

00:21:58.037 --> 00:22:00.124 think that loss of nervous or mental

NOTE Confidence: 0.87129314

00:22:00.124 --> 00:22:01.654 control provides an honorable Ave.

NOTE Confidence: 0.87129314

00:22:01.660 --> 00:22:03.745 to escape from the battlefield

NOTE Confidence: 0.87129314

00:22:03.745 --> 00:22:05.830 he discharged to be pensioned.

NOTE Confidence: 0.87129314

00:22:05.830 --> 00:22:07.786 Quote when evacuation of the base

NOTE Confidence: 0.87129314

00:22:07.786 --> 00:22:09.770 from Shell shock is necessary,

NOTE Confidence: 0.87129314

00:22:09.770 --> 00:22:11.792 shell shock cases should be treated

NOTE Confidence: 0.87129314

00:22:11.792 --> 00:22:14.073 in a separate hospital or in separate

NOTE Confidence: 0.87129314

00:22:14.073 --> 00:22:16.103 sections of a hospital and not with

NOTE Confidence: 0.87129314

00:22:16.170 --> 00:22:18.725 the quote ordinary sick or wounded patients.

NOTE Confidence: 0.87129314

00:22:18.730 --> 00:22:20.795 So these were not regarded as sick

NOTE Confidence: 0.87129314

00:22:20.795 --> 00:22:22.119 or wounded patients at all.

NOTE Confidence: 0.87129314

00:22:22.120 --> 00:22:23.730 And then finally nail on the coffin.

NOTE Confidence: 0.87129314

00:22:23.730 --> 00:22:26.208 The term shell shock should be eliminated

NOTE Confidence: 0.87129314

00:22:26.208 --> 00:22:28.599 from the official medical nomenclature.

NOTE Confidence: 0.87129314

00:22:28.600 --> 00:22:31.016 This is near the end of the report.

NOTE Confidence: 0.87129314

00:22:31.020 --> 00:22:32.745 And so with this war

NOTE Confidence: 0.87129314

00:22:32.745 --> 00:22:34.125 report as the foundation,

NOTE Confidence: 0.87129314

00:22:34.130 --> 00:22:36.923 the term Shellshock was in fact discontinued

NOTE Confidence: 0.87129314

00:22:36.923 --> 00:22:39.758 in use from from Western medicine.

NOTE Confidence: 0.87129314

00:22:39.760 --> 00:22:42.056 But that didn't mean the phenomenon stopped.

NOTE Confidence: 0.87129314

00:22:42.060 --> 00:22:42.372 OK,

NOTE Confidence: 0.87129314

00:22:42.372 --> 00:22:44.556 so it just kept on persisting with

NOTE Confidence: 0.87129314

00:22:44.556 --> 00:22:46.400 different names in World War Two

NOTE Confidence: 0.87129314

00:22:46.400 --> 00:22:48.134 and Korea syndrome such as battle

NOTE Confidence: 0.871254965238095

00:22:48.197 --> 00:22:49.646 fatigue, combat fatigue,

NOTE Confidence: 0.871254965238095

00:22:49.646 --> 00:22:52.604 Combat Stress reaction emerged in Vietnam.

NOTE Confidence: 0.871254965238095

00:22:52.610 --> 00:22:54.942 That Vietnam syndrome all

NOTE Confidence: 0.871254965238095

00:22:54.942 --> 00:22:57.274 very similar clinical entities

NOTE Confidence: 0.871254965238095

00:22:57.274 --> 00:23:00.476 and at that time in the 70s,

NOTE Confidence: 0.871254965238095

00:23:00.480 --> 00:23:02.850 while the fields of neurology and

NOTE Confidence: 0.871254965238095

00:23:02.850 --> 00:23:05.089 psychiatry are starting to really

NOTE Confidence: 0.871254965238095

00:23:05.089 --> 00:23:07.457 diverge as distinctive subspecialties,

NOTE Confidence: 0.871254965238095

00:23:07.460 --> 00:23:10.232 this whole issue of shell shock

NOTE Confidence: 0.871254965238095

00:23:10.232 --> 00:23:12.080 became Vietnam syndrome was

NOTE Confidence: 0.871254965238095

00:23:12.166 --> 00:23:14.438 largely delicated to schists,

NOTE Confidence: 0.871254965238095

00:23:14.440 --> 00:23:16.240 and in the DSM three put under the

NOTE Confidence: 0.871254965238095

00:23:16.240 --> 00:23:18.156 umbrella of what became post Traumatic

NOTE Confidence: 0.871254965238095

00:23:18.156 --> 00:23:20.057 stress disorder, or PTSD. OK.

NOTE Confidence: 0.871254965238095

00:23:20.057 --> 00:23:24.119 And so now going all the way until today,

NOTE Confidence: 0.871254965238095

00:23:24.120 --> 00:23:27.873 we are familiar with the fact that a TBI,

NOTE Confidence: 0.871254965238095

00:23:27.880 --> 00:23:29.376 particularly so-called mild TBI,

NOTE Confidence: 0.871254965238095

00:23:29.376 --> 00:23:31.736 which you know, if you can read this here,

NOTE Confidence: 0.871254965238095

00:23:31.740 --> 00:23:34.388 the DoD defines mild TBI to include any

NOTE Confidence: 0.871254965238095

00:23:34.388 --> 00:23:37.599 loss of consciousness less than 30 minutes.

NOTE Confidence: 0.871254965238095

00:23:37.600 --> 00:23:39.749 So I will let you decide whether

NOTE Confidence: 0.871254965238095

00:23:39.749 --> 00:23:42.371 a 29 minute loss of consciousness

NOTE Confidence: 0.871254965238095

00:23:42.371 --> 00:23:45.656 constitutes mild, but that is what it is.

NOTE Confidence: 0.871254965238095

00:23:45.660 --> 00:23:47.956 But we understand that TBI is amongst

NOTE Confidence: 0.871254965238095

00:23:47.956 --> 00:23:50.430 the most common if not the most common.

NOTE Confidence: 0.871254965238095

00:23:50.430 --> 00:23:52.046 Injury in Modern Warfare.

NOTE Confidence: 0.871254965238095

00:23:52.046 --> 00:23:54.470 And and on top of that,

NOTE Confidence: 0.871254965238095

00:23:54.470 --> 00:23:56.605 many military recruits are quite

NOTE Confidence: 0.871254965238095

00:23:56.605 --> 00:23:58.740 active people and they sustained

NOTE Confidence: 0.871254965238095

00:23:58.811 --> 00:24:01.097 significant impact type TBI in their

NOTE Confidence: 0.871254965238095

00:24:01.097 --> 00:24:03.810 civilian life at very high frequencies.

NOTE Confidence: 0.871254965238095

00:24:03.810 --> 00:24:05.146 But regardless of that,

NOTE Confidence: 0.871254965238095

00:24:05.146 --> 00:24:07.150 many service members who are exposed

NOTE Confidence: 0.871254965238095

00:24:07.208 --> 00:24:09.380 to combat and particularly to high

NOTE Confidence: 0.871254965238095

00:24:09.380 --> 00:24:10.828 explosives are still reporting

NOTE Confidence: 0.871254965238095

00:24:10.884 --> 00:24:12.508 the very similar neuropsychiatric

NOTE Confidence: 0.871254965238095

00:24:12.508 --> 00:24:14.538 symptomatology that we have been

NOTE Confidence: 0.871254965238095

00:24:14.538 --> 00:24:16.470 seeing for the last 100 years,

NOTE Confidence: 0.871254965238095

00:24:16.470 --> 00:24:17.844 combinations of physical,

NOTE Confidence: 0.871254965238095

00:24:17.844 --> 00:24:19.676 cognitive and very importantly

NOTE Confidence: 0.871254965238095

00:24:19.676 --> 00:24:21.595 behavioral and emotional symptomatology

NOTE Confidence: 0.871254965238095

00:24:21.595 --> 00:24:23.038 such as depression.

NOTE Confidence: 0.871254965238095

00:24:23.040 --> 00:24:23.422 Anxiety,

NOTE Confidence: 0.871254965238095

00:24:23.422 --> 00:24:24.950 agitation and so on.

NOTE Confidence: 0.871254965238095

00:24:24.950 --> 00:24:27.262 And so it should come as no surprise

NOTE Confidence: 0.871254965238095

00:24:27.262 --> 00:24:29.061 that psychiatric arrangements are also

NOTE Confidence: 0.871254965238095

00:24:29.061 --> 00:24:31.389 very prevalent in the military population,

NOTE Confidence: 0.871254965238095

00:24:31.390 --> 00:24:34.786 particularly now this diagnosis of PTSD.

NOTE Confidence: 0.871254965238095

00:24:34.790 --> 00:24:36.848 And sympatric disease may or may

NOTE Confidence: 0.871254965238095

00:24:36.848 --> 00:24:39.186 not be but frequently is comorbid

NOTE Confidence: 0.871254965238095

00:24:39.186 --> 00:24:41.441 or associated with TBI from

NOTE Confidence: 0.871254965238095

00:24:41.441 --> 00:24:42.343 battlefield experiences.

NOTE Confidence: 0.871254965238095

00:24:42.350 --> 00:24:45.046 And as you can see the the the

NOTE Confidence: 0.871254965238095

00:24:45.046 --> 00:24:46.421 symptomatology attributed to that

NOTE Confidence: 0.871254965238095

00:24:46.421 --> 00:24:48.654 this kind of post blast TBI syndrome

NOTE Confidence: 0.871254965238095

00:24:48.654 --> 00:24:50.190 overlaps significantly with the

NOTE Confidence: 0.871254965238095

00:24:50.190 --> 00:24:52.500 symptomatology that is now in the

NOTE Confidence: 0.871254965238095

00:24:52.500 --> 00:24:55.350 current DSM defining PTSD creating

NOTE Confidence: 0.871254965238095

00:24:55.350 --> 00:24:57.810 a rather significant diagnostic

NOTE Confidence: 0.871254965238095

00:24:57.810 --> 00:25:00.449 dilemma for these patients.

NOTE Confidence: 0.871254965238095

00:25:00.450 --> 00:25:02.760 And so collectively mild TBI and

NOTE Confidence: 0.871254965238095

00:25:02.760 --> 00:25:05.090 PTSD are now referred to as the.

NOTE Confidence: 0.871254965238095

00:25:05.090 --> 00:25:07.425 Both signature injuries of Modern

NOTE Confidence: 0.871254965238095

00:25:07.425 --> 00:25:09.293 Warfare and because service

NOTE Confidence: 0.871254965238095

00:25:09.293 --> 00:25:11.117 members who who have these,

NOTE Confidence: 0.871254965238095

00:25:11.120 --> 00:25:12.560 who have this symptomatology,

NOTE Confidence: 0.871254965238095

00:25:12.560 --> 00:25:14.028 who *** **** imaging,

NOTE Confidence: 0.871254965238095

00:25:14.028 --> 00:25:15.898 frequently have negative head imaging

NOTE Confidence: 0.871254965238095

47

00:25:15.898 --> 00:25:18.198 and no evidence of anatomic disease.

NOTE Confidence: 0.871254965238095

00:25:18.200 --> 00:25:18.930 By neuroradiology,

NOTE Confidence: 0.871254965238095

00:25:18.930 --> 00:25:20.755 these are called the Ford

NOTE Confidence: 0.871254965238095

00:25:20.755 --> 00:25:22.140 invisible wounds of war.

NOTE Confidence: 0.871254965238095

00:25:22.140 --> 00:25:24.234 So we've gone from shell shock

NOTE Confidence: 0.871254965238095

00:25:24.234 --> 00:25:26.149 to the invisible wounds of war.

NOTE Confidence: 0.871254965238095

00:25:26.150 --> 00:25:26.487 OK.

NOTE Confidence: 0.871254965238095

00:25:26.487 --> 00:25:28.846 And very quickly I wanted to also

NOTE Confidence: 0.871254965238095

00:25:28.846 --> 00:25:31.279 mention the the concern of suicide in

NOTE Confidence: 0.871254965238095

00:25:31.279 --> 00:25:34.090 the military is as many of you are

NOTE Confidence: 0.871254965238095

00:25:34.090 --> 00:25:36.196 probably also familiar with suicide is

NOTE Confidence: 0.871254965238095

00:25:36.196 --> 00:25:38.950 a major issue in the military community.

NOTE Confidence: 0.871254965238095

00:25:38.950 --> 00:25:40.280 So just as an example,

NOTE Confidence: 0.871254965238095

00:25:40.280 --> 00:25:42.362 only amongst active duty service members

NOTE Confidence: 0.871254965238095

00:25:42.362 --> 00:25:45.048 in the post 911 era every single year

NOTE Confidence: 0.871254965238095

00:25:45.048 --> 00:25:47.530 the rate of suicide has been going on.

NOTE Confidence: 0.871254965238095

00:25:47.530 --> 00:25:50.376 So for example for example 18.5 for

NOTE Confidence: 0.871254965238095

00:25:50.376 --> 00:25:53.267 100,000 and 2014 now most recently in

NOTE Confidence: 0.871254965238095

00:25:53.267 --> 00:25:56.470 the newest data from 202136 out of 100.

NOTE Confidence: 0.871254965238095

00:25:56.470 --> 00:25:57.850 Causing our committing suicide.

NOTE Confidence: 0.871254965238095

00:25:57.850 --> 00:25:59.620 So in the post 911 era,

NOTE Confidence: 0.871254965238095

00:25:59.620 --> 00:26:01.720 over 30,000 active duty service

NOTE Confidence: 0.871254965238095

00:26:01.720 --> 00:26:03.820 members have committed suicide and

NOTE Confidence: 0.905656668125

00:26:03.884 --> 00:26:05.726 this is in comparison to only

NOTE Confidence: 0.905656668125

00:26:05.730 --> 00:26:07.830 7000 who actually died in combat.

NOTE Confidence: 0.905656668125

00:26:07.830 --> 00:26:09.958 So an active duty soldiers four times

NOTE Confidence: 0.905656668125

00:26:09.958 --> 00:26:12.507 more likely to have to die from their own

NOTE Confidence: 0.905656668125

00:26:12.507 --> 00:26:14.729 hand than they are actually in combat.

NOTE Confidence: 0.905656668125

00:26:14.730 --> 00:26:15.654 Shocking number.

NOTE Confidence: 0.905656668125

00:26:15.654 --> 00:26:19.350 And this is only talking about active duty.

NOTE Confidence: 0.905656668125

00:26:19.350 --> 00:26:21.444 When you include veterans who in

NOTE Confidence: 0.905656668125

00:26:21.444 --> 00:26:24.363 the post 911 era have had an annual

NOTE Confidence: 0.905656668125

00:26:24.363 --> 00:26:26.970 average suicide rate of 6000 per year,

NOTE Confidence: 0.905656668125

00:26:26.970 --> 00:26:29.675 we're talking about anywhere between

NOTE Confidence: 0.905656668125

00:26:29.675 --> 00:26:32.134 150,000 and 200,000 military suicides

NOTE Confidence: 0.905656668125

00:26:32.134 --> 00:26:35.570 that have occurred since 2001.

NOTE Confidence: 0.905656668125

00:26:35.570 --> 00:26:36.560 And ultimately,

NOTE Confidence: 0.905656668125

00:26:36.560 --> 00:26:39.530 as as as one could think,

NOTE Confidence: 0.905656668125

00:26:39.530 --> 00:26:43.178 the reasons behind this are very

NOTE Confidence: 0.905656668125

00:26:43.178 --> 00:26:45.002 likely multifactorial pre-existing

NOTE Confidence: 0.905656668125

00:26:45.002 --> 00:26:46.796 psychiatric disease readjusting

NOTE Confidence: 0.905656668125

00:26:46.796 --> 00:26:49.546 to civilian life after combat.

NOTE Confidence: 0.905656668125

00:26:49.550 --> 00:26:52.022 Depression or other or other issues

NOTE Confidence: 0.905656668125

00:26:52.022 --> 00:26:54.036 related to public opinions about

NOTE Confidence: 0.905656668125

00:26:54.036 --> 00:26:56.129 the wars they're in and so on.

NOTE Confidence: 0.905656668125

00:26:56.130 --> 00:26:56.544 However,

NOTE Confidence: 0.905656668125

00:26:56.544 --> 00:27:00.270 despite a lot of the recent interest in TBI,

NOTE Confidence: 0.905656668125

00:27:00.270 --> 00:27:02.294 and particularly military TBI,

NOTE Confidence: 0.905656668125

00:27:02.294 --> 00:27:05.824 the issue of military suicide has largely

NOTE Confidence: 0.905656668125

00:27:05.824 --> 00:27:08.729 been one of a mental health issue,

NOTE Confidence: 0.905656668125

00:27:08.730 --> 00:27:11.530 and most of the money has been dedicated

NOTE Confidence: 0.905656668125

00:27:11.530 --> 00:27:14.470 to mental health research in this regard.

NOTE Confidence: 0.905656668125

00:27:14.470 --> 00:27:14.814 However,

NOTE Confidence: 0.905656668125

00:27:14.814 --> 00:27:16.878 with all of the stuff we've

NOTE Confidence: 0.905656668125

00:27:16.878 --> 00:27:18.310 talked about in mind,

NOTE Confidence: 0.905656668125

00:27:18.310 --> 00:27:20.560 a question may come here.

NOTE Confidence: 0.905656668125

00:27:20.560 --> 00:27:22.666 Have we actually been missing an

NOTE Confidence: 0.905656668125

00:27:22.666 --> 00:27:24.400 underlying pathology this entire time,

NOTE Confidence: 0.905656668125

00:27:24.400 --> 00:27:26.720 or an underlying pathobiology?

NOTE Confidence: 0.905656668125

00:27:26.720 --> 00:27:29.620 Do these soldiers have CTE?

NOTE Confidence: 0.905656668125

00:27:29.620 --> 00:27:31.860 Is that the invisible wound?

NOTE Confidence: 0.905656668125

00:27:31.860 --> 00:27:33.894 It's a legitimate question because if

NOTE Confidence: 0.905656668125

00:27:33.894 --> 00:27:36.780 you look at the symptomatology of combat

NOTE Confidence: 0.905656668125

00:27:36.780 --> 00:27:39.220 and blast exposed military personnel

NOTE Confidence: 0.905656668125

00:27:39.220 --> 00:27:41.540 juxtaposed next to the symptomatology

NOTE Confidence: 0.905656668125

00:27:41.540 --> 00:27:44.220 that has been described with CTE,

NOTE Confidence: 0.905656668125

00:27:44.220 --> 00:27:46.978 there is a lot of overlap between

NOTE Confidence: 0.905656668125

00:27:46.978 --> 00:27:49.000 these two clinical syndromes.

NOTE Confidence: 0.905656668125

00:27:49.000 --> 00:27:51.124 There is one major difference that

NOTE Confidence: 0.905656668125

00:27:51.124 --> 00:27:53.720 exists between the two and that is the

NOTE Confidence: 0.905656668125

00:27:53.720 --> 00:27:55.803 the subject of latency or the topic

NOTE Confidence: 0.905656668125

00:27:55.803 --> 00:27:58.531 of latency or the time of onset to

NOTE Confidence: 0.905656668125

00:27:58.531 --> 00:28:00.075 symptomatology is kind of the classic

NOTE Confidence: 0.905656668125

00:28:00.075 --> 00:28:01.910 history of CTE that an individual.

NOTE Confidence: 0.905656668125

00:28:01.910 --> 00:28:03.140 Develop symptomatology usually

NOTE Confidence: 0.905656668125

00:28:03.140 --> 00:28:04.780 in their retirement years.

NOTE Confidence: 0.905656668125

00:28:04.780 --> 00:28:06.455 So classically an NFL player

NOTE Confidence: 0.905656668125

00:28:06.455 --> 00:28:08.966 retires and then starts to develop

NOTE Confidence: 0.905656668125

00:28:08.966 --> 00:28:10.510 neurocognitive symptomatology,

NOTE Confidence: 0.905656668125

00:28:10.510 --> 00:28:12.260 whereas in the combat and

NOTE Confidence: 0.905656668125

00:28:12.260 --> 00:28:14.010 blast exposed a service member.

NOTE Confidence: 0.905656668125

00:28:14.010 --> 00:28:16.032 That symptomatology tends to develop right

NOTE Confidence: 0.905656668125

00:28:16.032 --> 00:28:18.549 away with very little of any latent period,

NOTE Confidence: 0.905656668125

00:28:18.550 --> 00:28:18.832 OK.

NOTE Confidence: 0.905656668125

00:28:18.832 --> 00:28:19.396 However, nonetheless,

NOTE Confidence: 0.905656668125

00:28:19.396 --> 00:28:21.088 there is a lot of overlap

NOTE Confidence: 0.905656668125

00:28:21.088 --> 00:28:22.429 between these two phenomenon.

NOTE Confidence: 0.905656668125

00:28:22.430 --> 00:28:24.554 The question remains and as we

NOTE Confidence: 0.905656668125

00:28:24.554 --> 00:28:26.730 start to answer these questions,

NOTE Confidence: 0.905656668125

00:28:26.730 --> 00:28:28.277 or we begin to and we begin

NOTE Confidence: 0.905656668125

00:28:28.277 --> 00:28:29.510 to answer these questions,

NOTE Confidence: 0.905656668125

00:28:29.510 --> 00:28:32.090 some familiar faces begin to emerge.

NOTE Confidence: 0.905656668125

00:28:32.090 --> 00:28:33.197 In this conversation,

NOTE Confidence: 0.905656668125

00:28:33.197 --> 00:28:33.566 OK,

00:28:33.566 --> 00:28:36.234 so both doctors have been Imola and

00:28:36.234 --> 00:28:38.950 Ann McKee jumped on this question and

00:28:38.950 --> 00:28:41.846 working separately between 2011 and 2014,

00:28:41.846 --> 00:28:46.477 both of them reported a total of 5 cases

00:28:46.477 --> 00:28:49.094 of CTE and former military personnel

00:28:49.094 --> 00:28:51.830 who were blast exposed and symptomatic.

00:28:51.830 --> 00:28:53.540 And a couple of interesting

00:28:53.540 --> 00:28:54.908 conclusions came from this.

00:28:54.910 --> 00:28:56.498 Repetitive TBI can sometimes

00:28:56.498 --> 00:28:58.483 provoke the development of CTE,

00:28:58.490 --> 00:29:00.386 as has been demonstrated in veterans

00:29:00.386 --> 00:29:02.190 of the Iraq and Afghanistan

00:29:02.190 --> 00:29:04.086 conflicts exposed to blast.

00:29:04.090 --> 00:29:06.030 Although the neurobiological effects of

00:29:06.030 --> 00:29:08.339 blast neurotrauma are complex or more

NOTE Confidence: 0.905656668125

00:29:08.339 --> 00:29:10.187 complex than TBI from other causes,

NOTE Confidence: 0.905656668125

00:29:10.190 --> 00:29:12.290 such as a boxing punch for example,

NOTE Confidence: 0.905656668125

00:29:12.290 --> 00:29:14.640 the mechanisms involved put these

NOTE Confidence: 0.905656668125

00:29:14.640 --> 00:29:16.990 individuals at risk for CTE.

NOTE Confidence: 0.905656668125

00:29:16.990 --> 00:29:17.331 However,

NOTE Confidence: 0.905656668125

00:29:17.331 --> 00:29:19.377 the fine print of these five

NOTE Confidence: 0.905656668125

00:29:19.377 --> 00:29:21.902 cases is that four of these five

NOTE Confidence: 0.905656668125

00:29:21.902 --> 00:29:23.687 cases were of contact sports,

NOTE Confidence: 0.872604462857143

00:29:23.690 --> 00:29:25.796 athletes and or individuals who had

NOTE Confidence: 0.872604462857143

00:29:25.796 --> 00:29:28.890 some sort of a major impact TBI event.

NOTE Confidence: 0.872604462857143

00:29:28.890 --> 00:29:30.983 At least one, but oftentimes multiple in

NOTE Confidence: 0.872604462857143

00:29:30.983 --> 00:29:32.928 their civilian life unrelated to sports.

NOTE Confidence: 0.872604462857143

00:29:32.930 --> 00:29:34.508 They would get into bar fights.

NOTE Confidence: 0.872604462857143

00:29:34.510 --> 00:29:36.526 And things like that with orbital fractures,

NOTE Confidence: 0.872604462857143

00:29:36.530 --> 00:29:38.090 and that's in their history.

NOTE Confidence: 0.872604462857143

00:29:38.090 --> 00:29:40.925 And the remaining case simply neglected to

NOTE Confidence: 0.872604462857143

00:29:40.925 --> 00:29:43.989 affirm or deny that type of information.

NOTE Confidence: 0.872604462857143

00:29:43.990 --> 00:29:46.000 But nonetheless, these five cases

NOTE Confidence: 0.872604462857143

00:29:46.000 --> 00:29:48.010 were lumped together with roughly

NOTE Confidence: 0.872604462857143

00:29:48.070 --> 00:29:49.978 about a dozen and 1/2 pre-existing

NOTE Confidence: 0.872604462857143

00:29:49.978 --> 00:29:52.546 cases that were in the literature of

NOTE Confidence: 0.872604462857143

00:29:52.546 --> 00:29:54.606 athletes who were military personnel,

NOTE Confidence: 0.872604462857143

00:29:54.610 --> 00:29:56.488 who were included in athlete studies.

NOTE Confidence: 0.872604462857143

00:29:56.490 --> 00:29:58.996 But ultimately all to start building the

NOTE Confidence: 0.872604462857143

00:29:58.996 --> 00:30:01.898 case that I that a military career and

NOTE Confidence: 0.872604462857143

00:30:01.898 --> 00:30:04.758 blast exposure is a risk factor for CTE.

NOTE Confidence: 0.872604462857143

00:30:04.760 --> 00:30:07.160 OK, and so what's the result of this?

NOTE Confidence: 0.872604462857143

00:30:07.160 --> 00:30:09.570 We get another media firestorm,

NOTE Confidence: 0.872604462857143

00:30:09.570 --> 00:30:11.160 not directed toward the NFL,

NOTE Confidence: 0.872604462857143

00:30:11.160 --> 00:30:14.198 but now with regard to the military,

NOTE Confidence: 0.872604462857143

00:30:14.200 --> 00:30:16.730 that ultimately culminates in a

NOTE Confidence: 0.872604462857143

00:30:16.730 --> 00:30:19.260 60 minutes piece entitled Combat

NOTE Confidence: 0.872604462857143

00:30:19.341 --> 00:30:22.029 Veterans are coming home with CTE.

NOTE Confidence: 0.872604462857143

00:30:22.030 --> 00:30:24.890 And so we begin to see that the lay media,

NOTE Confidence: 0.872604462857143

00:30:24.890 --> 00:30:27.254 the public and then eventually the

NOTE Confidence: 0.872604462857143

00:30:27.254 --> 00:30:29.267 medical community and military community

NOTE Confidence: 0.872604462857143

00:30:29.267 --> 00:30:31.864 begin to accept that a military career,

NOTE Confidence: 0.872604462857143

00:30:31.870 --> 00:30:33.382 particularly blast exposure,

NOTE Confidence: 0.872604462857143

00:30:33.382 --> 00:30:36.910 actually represents a risk factor for CTE.

NOTE Confidence: 0.872604462857143

00:30:36.910 --> 00:30:38.849 And this got to the point where

NOTE Confidence: 0.872604462857143

00:30:38.849 --> 00:30:40.833 the new criteria for traumatic

NOTE Confidence: 0.872604462857143

00:30:40.833 --> 00:30:41.929 encephalopathy syndrome,

NOTE Confidence: 0.872604462857143

00:30:41.930 --> 00:30:44.310 remember the clinical syndrome that's

NOTE Confidence: 0.872604462857143

00:30:44.310 --> 00:30:47.238 supposed to correspond to CTE includes

NOTE Confidence: 0.872604462857143

00:30:47.238 --> 00:30:49.583 military service with multiple blast

NOTE Confidence: 0.872604462857143

00:30:49.583 --> 00:30:52.957 exposures as a known risk factor for CTE.

NOTE Confidence: 0.872604462857143

00:30:52.960 --> 00:30:55.678 And so at this point I will remind you

NOTE Confidence: 0.872604462857143

00:30:55.678 --> 00:30:58.435 that all of this is based on five cases

NOTE Confidence: 0.872604462857143

00:30:58.440 --> 00:31:01.037 and and five imperfect cases from what

NOTE Confidence: 0.872604462857143

00:31:01.037 --> 00:31:03.750 I would from what I would surmise.

NOTE Confidence: 0.872604462857143

00:31:03.750 --> 00:31:05.862 And so the question becomes have

NOTE Confidence: 0.872604462857143

00:31:05.862 --> 00:31:08.010 we actually done our diligence?

NOTE Confidence: 0.872604462857143

00:31:08.010 --> 00:31:10.254 Where is the large scale data

NOTE Confidence: 0.872604462857143

00:31:10.254 --> 00:31:12.079 that supports military service as

NOTE Confidence: 0.872604462857143

00:31:12.079 --> 00:31:13.379 a risk factor for CTE,

NOTE Confidence: 0.872604462857143

00:31:13.380 --> 00:31:15.336 whereas the large scale and experimental

NOTE Confidence: 0.872604462857143

00:31:15.336 --> 00:31:17.459 data that supports that blast exposure,

NOTE Confidence: 0.872604462857143

00:31:17.460 --> 00:31:18.765 which is a totally different

NOTE Confidence: 0.872604462857143

00:31:18.765 --> 00:31:20.510 type of TBI than an impact,

NOTE Confidence: 0.872604462857143

00:31:20.510 --> 00:31:22.586 is a risk factor for CTE.

NOTE Confidence: 0.872604462857143

00:31:22.590 --> 00:31:25.428 It's not there at this point.

NOTE Confidence: 0.872604462857143

00:31:25.430 --> 00:31:28.118 And so in comes the DoD USU

NOTE Confidence: 0.872604462857143

00:31:28.118 --> 00:31:29.270 brain tissue repository.

NOTE Confidence: 0.872604462857143

00:31:29.270 --> 00:31:31.454 We were started in 2012 and we're

NOTE Confidence: 0.872604462857143

00:31:31.454 --> 00:31:33.317 now in a state-of-the-art lab space.

NOTE Confidence: 0.872604462857143

00:31:33.317 --> 00:31:35.835 We are the only brain bank in the

NOTE Confidence: 0.872604462857143

00:31:35.835 --> 00:31:37.325 world that is exclusively dedicated

NOTE Confidence: 0.872604462857143

00:31:37.325 --> 00:31:39.770 to the study of military brain health,

NOTE Confidence: 0.872604462857143

00:31:39.770 --> 00:31:42.710 primarily TBI military service members.

NOTE Confidence: 0.872604462857143

00:31:42.710 --> 00:31:44.475 We accept postmortem brain donations

NOTE Confidence: 0.872604462857143

00:31:44.475 --> 00:31:46.240 from anyone who is actually

NOTE Confidence: 0.872604462857143

00:31:46.299 --> 00:31:47.789 who served in the military,

NOTE Confidence: 0.872604462857143

00:31:47.790 --> 00:31:49.038 regardless of branch,

NOTE Confidence: 0.872604462857143

00:31:49.038 --> 00:31:50.286 regardless of symptomatology,

NOTE Confidence: 0.872604462857143

00:31:50.290 --> 00:31:51.914 regardless of of exposures,

NOTE Confidence: 0.872604462857143

00:31:51.914 --> 00:31:55.010 and regardless of cause and manner of death,

NOTE Confidence: 0.872604462857143

00:31:55.010 --> 00:31:55.409 OK.

NOTE Confidence: 0.872604462857143

00:31:55.409 --> 00:31:57.404 Each brain receives a comprehensive

NOTE Confidence: 0.872604462857143

00:31:57.404 --> 00:31:58.202 neuropathologic examination

NOTE Confidence: 0.872604462857143

00:31:58.202 --> 00:32:00.388 by a trainer of pathologists,

NOTE Confidence: 0.872604462857143

00:32:00.390 --> 00:32:03.162 including myself and my team and

NOTE Confidence: 0.872604462857143

00:32:03.162 --> 00:32:05.154 ultimately towards our goal of studying

NOTE Confidence: 0.872604462857143

00:32:05.154 --> 00:32:07.668 the the brain health of the warfighter.

NOTE Confidence: 0.872604462857143

00:32:07.670 --> 00:32:07.977 OK.

NOTE Confidence: 0.872604462857143

00:32:07.977 --> 00:32:10.126 And so at this point in time,

NOTE Confidence: 0.872604462857143

00:32:10.130 --> 00:32:11.642 as of this month,

NOTE Confidence: 0.872604462857143

00:32:11.642 --> 00:32:14.760 we have 315 brains in our repository

NOTE Confidence: 0.872604462857143

00:32:14.760 --> 00:32:17.120 with a rather unique collection

NOTE Confidence: 0.872604462857143

00:32:17.204 --> 00:32:19.626 in regards to age or average age

NOTE Confidence: 0.872604462857143

00:32:19.626 --> 00:32:22.075 is 48 years across a very broad

NOTE Confidence: 0.872604462857143

00:32:22.075 --> 00:32:26.063 age range of 18 to 103 years 98.

NOTE Confidence: 0.872604462857143

00:32:26.063 --> 00:32:27.581 Percent of our our our brain

NOTE Confidence: 0.872604462857143

00:32:27.581 --> 00:32:28.840 donations are from military.

NOTE Confidence: 0.872604462857143

00:32:28.840 --> 00:32:31.464 We have a small number of civilian controls,

NOTE Confidence: 0.910425421538462

00:32:31.470 --> 00:32:33.645 pretty even distribution of active

NOTE Confidence: 0.910425421538462

00:32:33.645 --> 00:32:35.385 duty and retired distribution

NOTE Confidence: 0.910425421538462

00:32:35.385 --> 00:32:37.229 across all military branches,

NOTE Confidence: 0.910425421538462

00:32:37.230 --> 00:32:39.920 and as you can imagine a diversity

NOTE Confidence: 0.910425421538462

00:32:39.920 --> 00:32:42.195 of various exposures and factors.

NOTE Confidence: 0.910425421538462

00:32:42.200 --> 00:32:44.356 So 10% of our brain donations are

NOTE Confidence: 0.910425421538462

00:32:44.356 --> 00:32:45.930 from special forces operators.

NOTE Confidence: 0.910425421538462

00:32:45.930 --> 00:32:46.868 Very importantly,

NOTE Confidence: 0.910425421538462

00:32:46.868 --> 00:32:50.151 this is a critical subgroup because these

NOTE Confidence: 0.910425421538462

00:32:50.151 --> 00:32:52.470 individuals are heavily combat exposed,

NOTE Confidence: 0.910425421538462

00:32:52.470 --> 00:32:56.250 heavily blast exposed, a subgroup 27.

NOTE Confidence: 0.910425421538462

00:32:56.250 --> 00:32:58.380 Percent have a history of

NOTE Confidence: 0.910425421538462

00:32:58.380 --> 00:32:59.658 contact sports participation,

NOTE Confidence: 0.910425421538462

00:32:59.660 --> 00:33:02.509 23% of a history of known or

NOTE Confidence: 0.910425421538462

00:33:02.509 --> 00:33:04.500 otherwise reported blast exposure,

NOTE Confidence: 0.910425421538462

00:33:04.500 --> 00:33:06.320 22% of our donations, unfortunately,

NOTE Confidence: 0.910425421538462

00:33:06.320 --> 00:33:09.140 our deaths by suicide.

NOTE Confidence: 0.910425421538462

00:33:09.140 --> 00:33:11.632 38% of our donations involve individuals with

NOTE Confidence: 0.910425421538462

00:33:11.632 --> 00:33:14.100 the diagnosed with a psychiatric diagnosis,

NOTE Confidence: 0.910425421538462

00:33:14.100 --> 00:33:17.156 PTSD being the most common and in addition,

NOTE Confidence: 0.910425421538462

00:33:17.160 --> 00:33:20.064 10% of our bank had a firm psychiatric

NOTE Confidence: 0.910425421538462

00:33:20.064 --> 00:33:21.660 symptomatology according to interviews,

NOTE Confidence: 0.910425421538462

00:33:21.660 --> 00:33:24.750 but never actually sought psychiatric care.

NOTE Confidence: 0.910425421538462

00:33:24.750 --> 00:33:26.478 And then finally 41% of our.

NOTE Confidence: 0.910425421538462

00:33:26.480 --> 00:33:28.465 Donations involve a history of

NOTE Confidence: 0.910425421538462

00:33:28.465 --> 00:33:30.053 alcohol or substance abuse.

NOTE Confidence: 0.910425421538462

00:33:30.060 --> 00:33:30.262 OK.

NOTE Confidence: 0.910425421538462

00:33:30.262 --> 00:33:31.474 And so as you can imagine,

NOTE Confidence: 0.910425421538462

00:33:31.480 --> 00:33:32.670 one of the founding questions,

NOTE Confidence: 0.910425421538462

00:33:32.670 --> 00:33:34.944 if not the preeminent founding question

00:33:34.944 --> 00:33:37.590 of our laboratory was the CTE question,

00:33:37.590 --> 00:33:40.404 is CTE common in military service members,

00:33:40.410 --> 00:33:43.168 is blast exposure risk factor for CTE,

00:33:43.170 --> 00:33:44.262 is shell shock,

00:33:44.262 --> 00:33:46.446 CTE is the invisible wound CTE.

00:33:46.450 --> 00:33:47.650 That's probably the biggest

00:33:47.650 --> 00:33:48.850 question of our laboratory.

00:33:48.850 --> 00:33:50.684 And after a decade of brain collection,

00:33:50.690 --> 00:33:53.454 it was decided that it was time to take

00:33:53.454 --> 00:33:55.470 the first major step in this regard.

00:33:55.470 --> 00:33:57.376 And so in the winter of 2021,

00:33:57.376 --> 00:34:00.206 we examined the 1st 225.

00:34:00.210 --> 00:34:02.165 Consecutive military brain donations in

00:34:02.165 --> 00:34:05.040 our bank for evidence of CTE pathology,

00:34:05.040 --> 00:34:06.643 and we were fortunate enough to be

00:34:06.643 --> 00:34:08.065 able to report these findings in

NOTE Confidence: 0.910425421538462

00:34:08.065 --> 00:34:09.668 a in a summer edition last June

NOTE Confidence: 0.910425421538462

00:34:09.716 --> 00:34:11.508 of of the New England in the New

NOTE Confidence: 0.910425421538462

00:34:11.508 --> 00:34:12.468 England Journal of Medicine.

NOTE Confidence: 0.910425421538462

00:34:12.468 --> 00:34:14.750 That's what I'm going to be going over now.

NOTE Confidence: 0.910425421538462

00:34:14.750 --> 00:34:15.113 OK.

NOTE Confidence: 0.910425421538462

00:34:15.113 --> 00:34:18.017 And so as far as methodology is concerned,

NOTE Confidence: 0.910425421538462

00:34:18.020 --> 00:34:19.748 each brain in our bank as I have

NOTE Confidence: 0.910425421538462

00:34:19.748 --> 00:34:21.497 said is extensively sampled and

NOTE Confidence: 0.910425421538462

00:34:21.497 --> 00:34:23.169 examined including with towel,

NOTE Confidence: 0.910425421538462

00:34:23.170 --> 00:34:24.734 towel immunostains for CTE.

NOTE Confidence: 0.910425421538462

00:34:24.734 --> 00:34:26.298 All slides are digitized.

NOTE Confidence: 0.910425421538462

00:34:26.300 --> 00:34:28.040 We're able to view them virtually

NOTE Confidence: 0.910425421538462

00:34:28.040 --> 00:34:29.640 or conventionally and we gather

NOTE Confidence: 0.910425421538462

00:34:29.640 --> 00:34:31.200 our histories retrospectively with

NOTE Confidence: 0.910425421538462

00:34:31.200 --> 00:34:32.760 semi structured interviews with

NOTE Confidence: 0.910425421538462

00:34:32.760 --> 00:34:34.675 next of kin and with available

NOTE Confidence: 0.910425421538462

00:34:34.675 --> 00:34:36.150 medical records including but not

NOTE Confidence: 0.910425421538462

00:34:36.150 --> 00:34:37.614 limited to autopsy reports,

NOTE Confidence: 0.910425421538462

00:34:37.614 --> 00:34:39.444 death certificates and so on.

NOTE Confidence: 0.910425421538462

00:34:39.450 --> 00:34:40.802 And so for this,

NOTE Confidence: 0.910425421538462

00:34:40.802 --> 00:34:43.340 for this study we reviewed all Tao

NOTE Confidence: 0.910425421538462

00:34:43.340 --> 00:34:45.514 Immunostain slides for all 225.

NOTE Confidence: 0.910425421538462

00:34:45.514 --> 00:34:47.734 Cases for CTE pathology according

NOTE Confidence: 0.910425421538462

00:34:47.734 --> 00:34:49.510 to the current criteria,

NOTE Confidence: 0.910425421538462

00:34:49.510 --> 00:34:51.862 that is one path that demonic lesion

NOTE Confidence: 0.910425421538462

00:34:51.862 --> 00:34:54.681 equals CTE and we did this completely

NOTE Confidence: 0.910425421538462

00:34:54.681 --> 00:34:56.425 blind to clinical information.

NOTE Confidence: 0.910425421538462

00:34:56.430 --> 00:34:57.870 We looked at the slides blind.

NOTE Confidence: 0.910425421538462

00:34:57.870 --> 00:34:59.832 We did not know prior neuropathology

NOTE Confidence: 0.910425421538462

00:34:59.832 --> 00:35:01.770 reports or any information about that.

NOTE Confidence: 0.910425421538462

00:35:01.770 --> 00:35:03.600 And only after we made diagnosis

NOTE Confidence: 0.910425421538462

00:35:03.600 --> 00:35:06.245 of CTE and non CTE cases did we

NOTE Confidence: 0.910425421538462

00:35:06.245 --> 00:35:07.935 unblind ourselves and begin to

NOTE Confidence: 0.910425421538462

00:35:07.935 --> 00:35:09.925 make comparisons between the CE

NOTE Confidence: 0.910425421538462

00:35:09.925 --> 00:35:12.301 and non CE population with regards

NOTE Confidence: 0.910425421538462

00:35:12.310 --> 00:35:14.030 to various clinical factors and

NOTE Confidence: 0.910425421538462

00:35:14.030 --> 00:35:15.750 with regards to various TBI.

NOTE Confidence: 0.910425421538462

00:35:15.750 --> 00:35:17.610 Exposures.

NOTE Confidence: 0.910425421538462

00:35:17.610 --> 00:35:19.566 So in this group 217 men,

NOTE Confidence: 0.910425421538462

00:35:19.570 --> 00:35:20.154 eight women,

NOTE Confidence: 0.910425421538462

00:35:20.154 --> 00:35:21.906 this kind of reflects the general

NOTE Confidence: 0.910425421538462

00:35:21.906 --> 00:35:23.250 distribution of our brain bank,

NOTE Confidence: 0.910425421538462

00:35:23.250 --> 00:35:25.050 average age of 48 years,

NOTE Confidence: 0.910425421538462

00:35:25.050 --> 00:35:28.308 active duty and retired military personnel,

NOTE Confidence: 0.910425421538462

00:35:28.310 --> 00:35:30.398 9.2% special forces again

NOTE Confidence: 0.910425421538462

00:35:30.398 --> 00:35:31.964 important exposed subgroup,

NOTE Confidence: 0.910425421538462

00:35:31.970 --> 00:35:36.174 a 60 or 25% or 26.7% were former

NOTE Confidence: 0.910425421538462

00:35:36.174 --> 00:35:38.862 contact sports athletes of some kind

NOTE Confidence: 0.810012911904762

00:35:38.870 --> 00:35:42.230 44 or 19.6%. Additionally at some sort of

NOTE Confidence: 0.810012911904762

00:35:42.230 --> 00:35:44.806 a significant non sports related civilian

NOTE Confidence: 0.810012911904762

00:35:44.806 --> 00:35:48.050 impact TBI such as a skull fracture.

NOTE Confidence: 0.810012911904762

00:35:48.050 --> 00:35:49.301 From physical assault,

NOTE Confidence: 0.810012911904762

00:35:49.301 --> 00:35:50.969 intracranial bleeding from a

NOTE Confidence: 0.810012911904762

00:35:50.969 --> 00:35:53.798 motor vehicle accident, and so on.

NOTE Confidence: 0.810012911904762

00:35:53.798 --> 00:35:57.734 And then 21 or or or 45 or 20%

NOTE Confidence: 0.810012911904762

00:35:57.740 --> 00:35:59.720 had a reported history or known

NOTE Confidence: 0.810012911904762

00:35:59.720 --> 00:36:01.620 history of military blast exposure.

NOTE Confidence: 0.810012911904762

00:36:01.620 --> 00:36:04.060 So now as it pertains to psychiatric disease,

NOTE Confidence: 0.810012911904762

00:36:04.060 --> 00:36:06.980 alcohol, substance abuse and suicidality,

NOTE Confidence: 0.810012911904762

00:36:06.980 --> 00:36:08.810 39.1% of the cohort had diagnosed

NOTE Confidence: 0.810012911904762

00:36:08.810 --> 00:36:09.420 psychiatric disease,

NOTE Confidence: 0.810012911904762

00:36:09.420 --> 00:36:12.336 most commonly PTSD,

NOTE Confidence: 0.810012911904762

00:36:12.336 --> 00:36:14.968 43.1% had alcohol or substance abuse and

NOTE Confidence: 0.810012911904762

00:36:14.968 --> 00:36:18.378 then a 22.7 per a percent or 49% or 49.

NOTE Confidence: 0.810012911904762

00:36:18.378 --> 00:36:20.662 Total in the cohort had a history of

NOTE Confidence: 0.810012911904762

00:36:20.662 --> 00:36:22.834 suicide and these are very important

NOTE Confidence: 0.810012911904762

00:36:22.834 --> 00:36:24.869 numbers because they compare rather

NOTE Confidence: 0.810012911904762

00:36:24.869 --> 00:36:27.515 favorably or rather similarly to large

NOTE Confidence: 0.810012911904762

00:36:27.515 --> 00:36:30.092 scale epidemiologic data of of both

NOTE Confidence: 0.810012911904762

00:36:30.092 --> 00:36:32.630 active duty and retired military personnel.

NOTE Confidence: 0.810012911904762

00:36:32.630 --> 00:36:34.317 And so we thought that we really

NOTE Confidence: 0.810012911904762

00:36:34.317 --> 00:36:36.232 had a nice snapshot of military

NOTE Confidence: 0.810012911904762

00:36:36.232 --> 00:36:38.090 community with this group, OK.

NOTE Confidence: 0.810012911904762

00:36:38.090 --> 00:36:40.540 And so I'll remind you that the

NOTE Confidence: 0.810012911904762

00:36:40.540 --> 00:36:42.080 minimum consensus sampling protocol

NOTE Confidence: 0.810012911904762

00:36:42.080 --> 00:36:44.378 for CTE includes again a minimum

NOTE Confidence: 0.810012911904762

00:36:44.378 --> 00:36:46.938 of five cortex containing samples.

NOTE Confidence: 0.810012911904762

00:36:46.940 --> 00:36:49.100 We analyzed an average of 13.

NOTE Confidence: 0.810012911904762

00:36:49.100 --> 00:36:51.290 Cortex containing samples per case,

NOTE Confidence: 0.810012911904762

00:36:51.290 --> 00:36:54.370 and so we really oversampled looking for CTE,

NOTE Confidence: 0.810012911904762

00:36:54.370 --> 00:36:56.650 and we found CTE pathology to be an

NOTE Confidence: 0.810012911904762

00:36:56.650 --> 00:37:00.470 only ten of these 225 cases or 4.4% OK,

NOTE Confidence: 0.810012911904762

00:37:00.470 --> 00:37:03.026 and here's some examples of that.

NOTE Confidence: 0.810012911904762

00:37:03.030 --> 00:37:05.686 And this is a table that summarizes those

NOTE Confidence: 0.810012911904762

00:37:05.686 --> 00:37:07.460 10 cases. Don't worry about reading it.

NOTE Confidence: 0.810012911904762

00:37:07.460 --> 00:37:08.706 We are going to go over it.

NOTE Confidence: 0.810012911904762

00:37:08.710 --> 00:37:10.908 First thing I want to talk about

NOTE Confidence: 0.810012911904762

00:37:10.908 --> 00:37:12.930 is severity of those 10 cases.

NOTE Confidence: 0.810012911904762

00:37:12.930 --> 00:37:16.241 5 cases or half had only barely

NOTE Confidence: 0.810012911904762

00:37:16.241 --> 00:37:17.187 diagnostic pathology,

NOTE Confidence: 0.810012911904762

00:37:17.190 --> 00:37:18.890 that is one single lesion.

NOTE Confidence: 0.810012911904762

00:37:18.890 --> 00:37:19.859 So here's one,

NOTE Confidence: 0.810012911904762

00:37:19.859 --> 00:37:21.797 here's an example of that single

NOTE Confidence: 0.810012911904762

00:37:21.797 --> 00:37:23.798 sulcal depth with one tile lesion.

NOTE Confidence: 0.810012911904762

00:37:23.800 --> 00:37:26.624 That's the only town in the entire case.

NOTE Confidence: 0.810012911904762

00:37:26.630 --> 00:37:29.108 So minimally diagnostic and that's a very

NOTE Confidence: 0.810012911904762

00:37:29.108 --> 00:37:30.880 highly questionable clinical significance,

NOTE Confidence: 0.810012911904762

00:37:30.880 --> 00:37:32.908 at least from the early perspective.

NOTE Confidence: 0.810012911904762

00:37:32.910 --> 00:37:34.824 2 cases were observed and more

NOTE Confidence: 0.810012911904762

00:37:34.824 --> 00:37:36.949 elderly a service members who had

NOTE Confidence: 0.810012911904762

00:37:36.949 --> 00:37:38.914 a background of severe Alzheimer's

NOTE Confidence: 0.810012911904762

00:37:38.914 --> 00:37:41.108 disease neuropathology and so kind of

NOTE Confidence: 0.810012911904762

00:37:41.108 --> 00:37:43.010 assessing CTE severity in that context.

NOTE Confidence: 0.810012911904762

00:37:43.010 --> 00:37:45.964 It's very difficult and we kind of

NOTE Confidence: 0.810012911904762

00:37:45.964 --> 00:37:48.589 abstain from doing that and then

NOTE Confidence: 0.810012911904762

00:37:48.589 --> 00:37:51.139 finally the remaining 2 cases had.

NOTE Confidence: 0.810012911904762

00:37:51.140 --> 00:37:53.128 They had more than one CTE lesion,

NOTE Confidence: 0.810012911904762

00:37:53.130 --> 00:37:55.730 but to our perspective still

NOTE Confidence: 0.810012911904762

00:37:55.730 --> 00:37:57.290 relatively mild pathology.

NOTE Confidence: 0.810012911904762

00:37:57.290 --> 00:37:57.613 Again,

NOTE Confidence: 0.810012911904762

00:37:57.613 --> 00:37:59.551 this is admittedly in the absence

NOTE Confidence: 0.810012911904762

00:37:59.551 --> 00:38:01.030 of clinically validated criteria.

NOTE Confidence: 0.810012911904762

00:38:01.030 --> 00:38:03.790 So I don't exactly know what mild is,

NOTE Confidence: 0.810012911904762

00:38:03.790 --> 00:38:06.832 but more or less this is what we felt.

NOTE Confidence: 0.810012911904762

00:38:06.840 --> 00:38:08.300 As far as psychiatric disease,

NOTE Confidence: 0.810012911904762

00:38:08.300 --> 00:38:09.650 alcohol substance abuse,

NOTE Confidence: 0.810012911904762

00:38:09.650 --> 00:38:11.000 manner of death,

NOTE Confidence: 0.810012911904762

00:38:11.000 --> 00:38:13.658 despite our very large brain cohort,

NOTE Confidence: 0.810012911904762

00:38:13.660 --> 00:38:16.320 despite high rates of these clinical factors,

NOTE Confidence: 0.810012911904762

00:38:16.320 --> 00:38:18.357 it is precisely because we have so

NOTE Confidence: 0.810012911904762

00:38:18.357 --> 00:38:20.439 few CTE cases amongst all of this

NOTE Confidence: 0.810012911904762

00:38:20.439 --> 00:38:22.400 that we were we were unable to.

NOTE Confidence: 0.810012911904762

00:38:22.400 --> 00:38:24.250 Our study was underpowered to

NOTE Confidence: 0.810012911904762

00:38:24.250 --> 00:38:26.100 draw conclusions relating to these

NOTE Confidence: 0.810012911904762

00:38:26.162 --> 00:38:27.318 factors and and CTE.

NOTE Confidence: 0.810012911904762

00:38:27.320 --> 00:38:28.700 However, it was obvious to us,

NOTE Confidence: 0.810012911904762

00:38:28.700 --> 00:38:29.876 and I hope it's obvious to you,

NOTE Confidence: 0.810012911904762

00:38:29.880 --> 00:38:32.034 that CTE pathology did not correspond

NOTE Confidence: 0.810012911904762

00:38:32.034 --> 00:38:34.618 or coincide with the large majority of

NOTE Confidence: 0.810012911904762

00:38:34.618 --> 00:38:37.131 patients who suffered from any of these.

NOTE Confidence: 0.810012911904762

00:38:37.140 --> 00:38:38.982 Various factors. OK.

NOTE Confidence: 0.810012911904762

00:38:38.982 --> 00:38:40.210 Now finally,

NOTE Confidence: 0.810012911904762

00:38:40.210 --> 00:38:42.070 as it relates to traumatic brain

NOTE Confidence: 0.810012911904762

00:38:42.070 --> 00:38:43.310 injury and contact sports,

NOTE Confidence: 0.850482471304348

00:38:43.310 --> 00:38:45.190 probably the most significant finding

NOTE Confidence: 0.850482471304348

00:38:45.190 --> 00:38:48.147 in our study is that all 10 cases

NOTE Confidence: 0.850482471304348

00:38:48.147 --> 00:38:50.169 of CTE that we identified were

NOTE Confidence: 0.850482471304348

00:38:50.169 --> 00:38:52.128 informer contact sports athletes.

NOTE Confidence: 0.850482471304348

00:38:52.130 --> 00:38:53.842 So in other words,

NOTE Confidence: 0.850482471304348

00:38:53.842 --> 00:38:57.170 10 of 60 contact sports athletes had CTE,

NOTE Confidence: 0.850482471304348

00:38:57.170 --> 00:39:00.134 0 of 165 without a contact

NOTE Confidence: 0.850482471304348

00:39:00.134 --> 00:39:02.110 sports history had CTE,

NOTE Confidence: 0.850482471304348

00:39:02.110 --> 00:39:04.147 and most of these also had an

NOTE Confidence: 0.850482471304348

00:39:04.147 --> 00:39:05.464 additional history of severe

NOTE Confidence: 0.850482471304348

00:39:05.464 --> 00:39:07.369 civilian impact TBI unrelated to.

NOTE Confidence: 0.850482471304348

00:39:07.370 --> 00:39:09.680 Sports again like motor vehicle accidents,

NOTE Confidence: 0.850482471304348

00:39:09.680 --> 00:39:12.100 physical assaults and so on.

NOTE Confidence: 0.850482471304348

00:39:12.100 --> 00:39:13.618 So as it pertains to blast,

NOTE Confidence: 0.850482471304348

00:39:13.620 --> 00:39:15.336 even though we had high amounts

NOTE Confidence: 0.850482471304348

00:39:15.336 --> 00:39:16.880 of exposure in our study,

NOTE Confidence: 0.850482471304348

00:39:16.880 --> 00:39:18.230 again our study was because

NOTE Confidence: 0.850482471304348

00:39:18.230 --> 00:39:20.010 it had so few CT cases,

NOTE Confidence: 0.850482471304348

00:39:20.010 --> 00:39:22.374 it was under power to draw

NOTE Confidence: 0.850482471304348

00:39:22.374 --> 00:39:23.556 definitive conclusions with

NOTE Confidence: 0.850482471304348

00:39:23.556 --> 00:39:25.699 regard to blast exposure and CTE.

NOTE Confidence: 0.850482471304348

00:39:25.700 --> 00:39:28.620 However, upon relative risk analysis,

NOTE Confidence: 0.850482471304348

00:39:28.620 --> 00:39:31.511 it became very clear to us that

NOTE Confidence: 0.850482471304348

00:39:31.511 --> 00:39:33.608 civilian impact TBI exposures

NOTE Confidence: 0.850482471304348

00:39:33.608 --> 00:39:35.918 particularly contact sports,

NOTE Confidence: 0.850482471304348

00:39:35.920 --> 00:39:38.490 new world numerically substantially more.

NOTE Confidence: 0.850482471304348

00:39:38.490 --> 00:39:40.242 Associated with CTE pathology

NOTE Confidence: 0.850482471304348

00:39:40.242 --> 00:39:41.556 than military exposures,

NOTE Confidence: 0.850482471304348

00:39:41.560 --> 00:39:42.667 especially blast exposure,

NOTE Confidence: 0.850482471304348

00:39:42.667 --> 00:39:44.881 which by far had the lowest

NOTE Confidence: 0.850482471304348

00:39:44.881 --> 00:39:46.420 association with CTE pathology

NOTE Confidence: 0.850482471304348

00:39:46.420 --> 00:39:48.265 and whose confidence interval for

NOTE Confidence: 0.850482471304348

00:39:48.265 --> 00:39:50.126 relative risk was on the low end,

NOTE Confidence: 0.850482471304348

00:39:50.130 --> 00:39:52.098 was the only one to dip below one.

NOTE Confidence: 0.850482471304348

00:39:52.100 --> 00:39:53.976 OK, so they wouldn't let us write.

NOTE Confidence: 0.850482471304348

00:39:53.980 --> 00:39:55.132 Statistically insignificant in the

NOTE Confidence: 0.850482471304348

00:39:55.132 --> 00:39:56.572 New England Journal of Medicine,

NOTE Confidence: 0.850482471304348

00:39:56.580 --> 00:39:58.965 but that's how I feel. OK.

NOTE Confidence: 0.850482471304348

00:39:58.965 --> 00:40:00.890 And So what does this all mean?

NOTE Confidence: 0.850482471304348

00:40:00.890 --> 00:40:03.398 We don't deny that certain perhaps

NOTE Confidence: 0.850482471304348

00:40:03.398 --> 00:40:04.652 unique military circumstances

NOTE Confidence: 0.850482471304348

00:40:04.652 --> 00:40:06.208 could predispose to CTE,

NOTE Confidence: 0.850482471304348

00:40:06.210 --> 00:40:08.514 but we demonstrate that CTE is

NOTE Confidence: 0.850482471304348

00:40:08.514 --> 00:40:11.309 uncommon and in large military cohort,

NOTE Confidence: 0.850482471304348

00:40:11.310 --> 00:40:13.730 despite high rates of exposures,

NOTE Confidence: 0.850482471304348

00:40:13.730 --> 00:40:15.734 CT does not coincide with the

NOTE Confidence: 0.850482471304348

00:40:15.734 --> 00:40:17.070 majority of psychiatric disease,

NOTE Confidence: 0.850482471304348

00:40:17.070 --> 00:40:20.430 suicidality and and and substance abuse.

NOTE Confidence: 0.850482471304348

00:40:20.430 --> 00:40:21.930 In the military context,

NOTE Confidence: 0.850482471304348

00:40:21.930 --> 00:40:23.430 when we identify CTE,

NOTE Confidence: 0.850482471304348

00:40:23.430 --> 00:40:25.014 it's oftentimes only minimally

NOTE Confidence: 0.850482471304348

00:40:25.014 --> 00:40:26.994 diagnostic and thus currently of

NOTE Confidence: 0.850482471304348

00:40:26.994 --> 00:40:28.589 questionable clinical significance.

NOTE Confidence: 0.850482471304348

00:40:28.590 --> 00:40:30.319 And we have only identified it in

NOTE Confidence: 0.850482471304348

00:40:30.319 --> 00:40:32.263 the setting of a history of contact

NOTE Confidence: 0.850482471304348

00:40:32.263 --> 00:40:33.991 sports and has the lowest numerical

NOTE Confidence: 0.850482471304348

00:40:34.044 --> 00:40:36.078 and blast has the lowest numerical

NOTE Confidence: 0.850482471304348

00:40:36.078 --> 00:40:37.434 association with CTE pathology.

NOTE Confidence: 0.850482471304348

00:40:37.440 --> 00:40:40.016 And so we actually don't believe that

NOTE Confidence: 0.850482471304348

00:40:40.016 --> 00:40:42.658 blast exposure is a risk factor for CTE.

NOTE Confidence: 0.850482471304348

00:40:42.660 --> 00:40:44.140 And just as an update,

NOTE Confidence: 0.850482471304348

00:40:44.140 --> 00:40:46.700 we now have 315 brains and we have

NOTE Confidence: 0.850482471304348

00:40:46.700 --> 00:40:49.278 13 cases of CTE in our repository,

NOTE Confidence: 0.850482471304348

00:40:49.280 --> 00:40:51.380 so that that rate has held true.

NOTE Confidence: 0.850482471304348

00:40:51.380 --> 00:40:53.960 And after now approaching 12 years,

NOTE Confidence: 0.850482471304348

00:40:53.960 --> 00:40:55.493 we have yet to see a single

NOTE Confidence: 0.850482471304348

00:40:55.493 --> 00:40:57.368 case of CTE in our repository in

00:40:57.368 --> 00:40:58.808 the absence of a contact.

00:40:58.810 --> 00:40:59.842 What's history?

00:40:59.842 --> 00:41:03.290 OK, and so now the question becomes,

00:41:03.290 --> 00:41:06.510 if all of this is not CTE?

00:41:06.510 --> 00:41:08.449 If the invisible wound is not CTE,

00:41:08.450 --> 00:41:10.679 what is it?

00:41:10.680 --> 00:41:13.242 And so that question is a question

00:41:13.242 --> 00:41:15.028 that remains unanswered and that

00:41:15.028 --> 00:41:16.882 is the ongoing mission of our

00:41:16.882 --> 00:41:18.708 brain bank to to decipher it.

00:41:18.710 --> 00:41:18.985 However,

00:41:18.985 --> 00:41:21.185 we do feel that we have made some

00:41:21.185 --> 00:41:23.290 pretty important discoveries in the

00:41:23.290 --> 00:41:25.505 particularly as it concerns chronic

00:41:25.505 --> 00:41:26.909 neuropathology following blast.

00:41:26.910 --> 00:41:28.896 And probably the most notable of

00:41:28.896 --> 00:41:30.977 these is our description of an

00:41:30.977 --> 00:41:33.065 entity which we've referred to as

00:41:33.065 --> 00:41:34.350 interface astroglial scarring.

00:41:34.350 --> 00:41:37.024 This is a pattern of glial scarring

00:41:37.024 --> 00:41:40.018 detectable by just a simple GFP that occurs.

00:41:40.020 --> 00:41:42.030 Long Junction points or interfaces between

00:41:42.030 --> 00:41:43.710 heterologous elements of the brain,

00:41:43.710 --> 00:41:45.390 so greater white matter junction,

00:41:45.390 --> 00:41:46.840 perivascular spaces,

00:41:46.840 --> 00:41:48.290 periventricular spaces,

00:41:48.290 --> 00:41:51.190 the PO parenchymal interface,

00:41:51.190 --> 00:41:54.725 and so on. And we noticed this.

00:41:54.730 --> 00:41:56.970 And we continue to note that most

00:41:56.970 --> 00:41:58.695 prominently in individuals who are

00:41:58.695 --> 00:42:00.115 symptomatic and heavily blastic,

NOTE Confidence: 0.877774192857143

00:42:00.120 --> 00:42:02.600 exposed and tend to not see it and

NOTE Confidence: 0.877774192857143

00:42:02.600 --> 00:42:04.199 controls without blast exposure.

NOTE Confidence: 0.877774192857143

00:42:04.200 --> 00:42:05.406 And when we do see it,

NOTE Confidence: 0.877774192857143

00:42:05.410 --> 00:42:07.990 this scarring pattern is widespread,

NOTE Confidence: 0.877774192857143

00:42:07.990 --> 00:42:09.409 certainly involves many.

NOTE Confidence: 0.877774192857143

00:42:09.409 --> 00:42:11.774 Brain regions and neural circuits

NOTE Confidence: 0.877774192857143

00:42:11.774 --> 00:42:13.789 that can implicate symptomatology

NOTE Confidence: 0.877774192857143

00:42:13.789 --> 00:42:16.759 in the war fighter after blast,

NOTE Confidence: 0.877774192857143

00:42:16.760 --> 00:42:19.476 and at the time we described it,

NOTE Confidence: 0.877774192857143

00:42:19.480 --> 00:42:22.260 it was certainly compatible with

NOTE Confidence: 0.877774192857143

00:42:22.260 --> 00:42:25.548 pre-existing a tissue data and other

NOTE Confidence: 0.877774192857143

00:42:25.548 --> 00:42:28.103 organs with how blast waves propagate

NOTE Confidence: 0.877774192857143

00:42:28.103 --> 00:42:29.909 and cause injury in those tissues.

NOTE Confidence: 0.877774192857143

00:42:29.910 --> 00:42:31.980 So it was compatible with the

NOTE Confidence: 0.877774192857143

00:42:31.980 --> 00:42:33.360 biodynamics of blast wave.

NOTE Confidence: 0.877774192857143

00:42:33.360 --> 00:42:34.884 However, nonetheless this diagnosis

NOTE Confidence: 0.877774192857143

00:42:34.884 --> 00:42:36.789 was understandably met with a

NOTE Confidence: 0.877774192857143

00:42:36.789 --> 00:42:38.990 lot of criticism in regards to

NOTE Confidence: 0.877774192857143

00:42:38.990 --> 00:42:40.046 its definitive relation.

NOTE Confidence: 0.877774192857143

00:42:40.050 --> 00:42:41.370 With blast, however,

NOTE Confidence: 0.877774192857143

00:42:41.370 --> 00:42:44.010 in the last year or so,

NOTE Confidence: 0.877774192857143

00:42:44.010 --> 00:42:45.182 or two years now,

NOTE Confidence: 0.877774192857143

00:42:45.182 --> 00:42:46.940 a couple of important studies have

NOTE Confidence: 0.877774192857143

00:42:47.000 --> 00:42:49.130 emerged supporting the fact that this

NOTE Confidence: 0.877774192857143

00:42:49.130 --> 00:42:51.568 pathology may actually be induced by blast.

NOTE Confidence: 0.877774192857143

00:42:51.570 --> 00:42:53.614 The first of which is this study

NOTE Confidence: 0.877774192857143

00:42:53.614 --> 00:42:55.530 that was published in the Journal of

NOTE Confidence: 0.877774192857143

00:42:55.530 --> 00:42:57.826 Neuropathology and Experimental Neurology,

NOTE Confidence: 0.877774192857143

00:42:57.826 --> 00:43:00.696 wherein a prospective blast model

NOTE Confidence: 0.877774192857143

00:43:00.696 --> 00:43:02.890 using ferrets was developed.

NOTE Confidence: 0.877774192857143

00:43:02.890 --> 00:43:06.170 And ferrets are a very important animal

NOTE Confidence: 0.877774192857143

00:43:06.170 --> 00:43:09.170 to consider here because unlike rodents,

NOTE Confidence: 0.877774192857143

00:43:09.170 --> 00:43:10.229 ferrets have gyros.

NOTE Confidence: 0.877774192857143

00:43:10.229 --> 00:43:12.700 Cephalic brains they have gyri and sulci.

NOTE Confidence: 0.877774192857143

00:43:12.700 --> 00:43:14.388 Ferrets have well delineated

NOTE Confidence: 0.877774192857143

00:43:14.388 --> 00:43:16.076 Gray white matter junction.

NOTE Confidence: 0.877774192857143

00:43:16.080 --> 00:43:17.560 Ferrets have anatomic complexity

NOTE Confidence: 0.877774192857143

00:43:17.560 --> 00:43:20.128 that is far closer to that of

NOTE Confidence: 0.877774192857143

00:43:20.128 --> 00:43:21.538 the human than a rodent,

NOTE Confidence: 0.877774192857143

00:43:21.540 --> 00:43:24.084 which has a license to phallic brain and

NOTE Confidence: 0.877774192857143

00:43:24.084 --> 00:43:26.378 an indistinct Gray white matter junction.

NOTE Confidence: 0.877774192857143

00:43:26.380 --> 00:43:28.462 And when ferrets were blasted and

NOTE Confidence: 0.877774192857143

00:43:28.462 --> 00:43:31.035 and and sacrificed and same for GFP

NOTE Confidence: 0.877774192857143

00:43:31.035 --> 00:43:32.895 and identical pattern of interface,

NOTE Confidence: 0.877774192857143

00:43:32.900 --> 00:43:34.580 glial staining was identified

NOTE Confidence: 0.877774192857143

00:43:34.580 --> 00:43:35.840 in those ferrets,

NOTE Confidence: 0.877774192857143

00:43:35.840 --> 00:43:38.264 as we have seen in our

NOTE Confidence: 0.877774192857143

00:43:38.264 --> 00:43:39.476 postmortem human tissues.

NOTE Confidence: 0.877774192857143

00:43:39.480 --> 00:43:41.232 Further pause this further,

NOTE Confidence: 0.877774192857143

00:43:41.232 --> 00:43:44.422 a study out of Michigan State and

NOTE Confidence: 0.877774192857143

00:43:44.422 --> 00:43:46.842 the Air Force actually engineered

NOTE Confidence: 0.877774192857143

00:43:46.842 --> 00:43:48.778 an artificial head model,

NOTE Confidence: 0.877774192857143

00:43:48.780 --> 00:43:50.580 polymer based model where polymers

NOTE Confidence: 0.877774192857143

00:43:50.580 --> 00:43:52.380 of different densities were used

NOTE Confidence: 0.877774192857143

00:43:52.434 --> 00:43:54.096 to construct a brain with jyri,

NOTE Confidence: 0.877774192857143

00:43:54.100 --> 00:43:55.600 with sulci, with Gray matter,

NOTE Confidence: 0.877774192857143

00:43:55.600 --> 00:43:57.980 with white matter encased in

NOTE Confidence: 0.877774192857143

00:43:57.980 --> 00:44:00.360 dura with CSF and ultimately

NOTE Confidence: 0.877774192857143

00:44:00.444 --> 00:44:03.198 encased in the skull and blasted.

NOTE Confidence: 0.877774192857143

00:44:03.200 --> 00:44:05.798 And they recorded the blast wave

NOTE Confidence: 0.877774192857143

00:44:05.798 --> 00:44:07.530 passing through this artificial

NOTE Confidence: 0.877774192857143

00:44:07.604 --> 00:44:09.229 brain and in this ultra.

00:44:09.230 --> 00:44:11.678 Slomo footage you can almost visualize

00:44:11.678 --> 00:44:14.299 where the strain is most maximum.

00:44:14.300 --> 00:44:16.172 So this is over the course of a very

00:44:16.172 --> 00:44:17.776 small duration of time and you can

00:44:17.776 --> 00:44:19.575 see right at the Gray white matter

00:44:19.575 --> 00:44:21.273 junctions you're you're seeing a lot

00:44:21.273 --> 00:44:23.858 of those forces take place and they

00:44:23.858 --> 00:44:25.891 actually calculated that the physical

00:44:25.891 --> 00:44:28.477 strain was highest at brain interfaces.

00:44:28.480 --> 00:44:30.760 Again compatible with what we

00:44:30.760 --> 00:44:33.800 were seeing in the human tissues.

00:44:33.800 --> 00:44:36.520 OK and more recently they have done they

00:44:36.520 --> 00:44:39.316 have used the same exact head model and.

00:44:39.320 --> 00:44:42.239 Impact TBI study or they they drop,

00:44:42.240 --> 00:44:44.249 they drop the head from the ceiling

00:44:44.249 --> 00:44:45.780 and they record it impacting

NOTE Confidence: 0.877774192857143

00:44:45.780 --> 00:44:47.598 with the floor and this video,

NOTE Confidence: 0.877774192857143

00:44:47.600 --> 00:44:49.796 I wish I could show it to you is

NOTE Confidence: 0.877774192857143

00:44:49.796 --> 00:44:51.656 completely different in terms of how

NOTE Confidence: 0.877774192857143

00:44:51.656 --> 00:44:53.717 that how that traumatic brain injury

NOTE Confidence: 0.877774192857143

00:44:53.717 --> 00:44:55.937 transfers through that artificial brain.

NOTE Confidence: 0.877774192857143

00:44:55.940 --> 00:44:56.162 OK.

NOTE Confidence: 0.877774192857143

00:44:56.162 --> 00:44:57.716 And so at this point in time,

NOTE Confidence: 0.877774192857143

00:44:57.720 --> 00:44:59.615 we are encountering this pattern

NOTE Confidence: 0.877774192857143

00:44:59.615 --> 00:45:01.510 of IS at increasing proportions

NOTE Confidence: 0.807270841428571

00:45:01.572 --> 00:45:03.884 in our brain bank and we believe that

NOTE Confidence: 0.807270841428571

00:45:03.884 --> 00:45:06.781 we have identified at least a subset of

NOTE Confidence: 0.807270841428571

00:45:06.781 --> 00:45:09.379 military personnel who may be predisposed

NOTE Confidence: 0.807270841428571

00:45:09.379 --> 00:45:11.198 or vulnerable to neuropsychiatric

NOTE Confidence: 0.807270841428571

00:45:11.198 --> 00:45:13.398 sequelae based on physical damage

NOTE Confidence: 0.807270841428571

00:45:13.398 --> 00:45:16.384 to the brain from the blast, OK.

NOTE Confidence: 0.807270841428571

00:45:16.384 --> 00:45:17.988 However, at this point,

NOTE Confidence: 0.807270841428571

00:45:17.988 --> 00:45:19.572 we definitely emphasize that

NOTE Confidence: 0.807270841428571

00:45:19.572 --> 00:45:22.340 this is a brand new diagnosis.

NOTE Confidence: 0.807270841428571

00:45:22.340 --> 00:45:24.476 We do not currently have an

NOTE Confidence: 0.807270841428571

00:45:24.476 --> 00:45:26.241 objective way to diagnose. Diagnosis.

NOTE Confidence: 0.807270841428571

00:45:26.241 --> 00:45:28.287 Therefore, at this point in time,

NOTE Confidence: 0.807270841428571

00:45:28.290 --> 00:45:30.026 it's difficult to quantify,

NOTE Confidence: 0.807270841428571

00:45:30.026 --> 00:45:32.196 even more difficult to associate

NOTE Confidence: 0.807270841428571

00:45:32.196 --> 00:45:34.109 with a clinical phenotype.

NOTE Confidence: 0.807270841428571

00:45:34.110 --> 00:45:36.630 And so a lot of work needs to be done here.

NOTE Confidence: 0.807270841428571

00:45:36.630 --> 00:45:38.190 Some of that work is ongoing,

NOTE Confidence: 0.807270841428571

00:45:38.190 --> 00:45:40.422 of course with aggression in a in a

NOTE Confidence: 0.807270841428571

00:45:40.422 --> 00:45:42.528 very recent paper published in Brain,

NOTE Confidence: 0.807270841428571

00:45:42.530 --> 00:45:44.230 along with our NEURORADIOLOGY

NOTE Confidence: 0.807270841428571

00:45:44.230 --> 00:45:45.505 colleagues at NIH,

NOTE Confidence: 0.807270841428571

00:45:45.510 --> 00:45:47.407 they have used a new imaging modality,

NOTE Confidence: 0.807270841428571

00:45:47.410 --> 00:45:49.950 AI based imaging modality and

NOTE Confidence: 0.807270841428571

00:45:49.950 --> 00:45:52.840 they have actually been able to.

NOTE Confidence: 0.807270841428571

00:45:52.840 --> 00:45:54.835 Discover a neuro radiologic signature

NOTE Confidence: 0.807270841428571

00:45:54.835 --> 00:45:57.441 using our ex vivo tissues for

NOTE Confidence: 0.807270841428571

00:45:57.441 --> 00:45:59.058 interface astroglial scarring.

NOTE Confidence: 0.807270841428571

00:45:59.060 --> 00:46:00.100 So they took our blocks,

NOTE Confidence: 0.807270841428571

00:46:00.100 --> 00:46:02.071 image them and you can almost do a heat

NOTE Confidence: 0.807270841428571

00:46:02.071 --> 00:46:04.336 map with the GFP saying and it's identical,

NOTE Confidence: 0.807270841428571

00:46:04.340 --> 00:46:04.629 OK?

NOTE Confidence: 0.807270841428571

00:46:04.629 --> 00:46:06.941 And so we are we are sooner rather

NOTE Confidence: 0.807270841428571

00:46:06.941 --> 00:46:09.564 than later going to be able to assess

NOTE Confidence: 0.807270841428571

00:46:09.564 --> 00:46:11.679 this disease in living patients.

NOTE Confidence: 0.807270841428571

00:46:11.680 --> 00:46:12.448 And so in closing,

NOTE Confidence: 0.807270841428571

00:46:12.448 --> 00:46:14.080 just as a way to close this out,

NOTE Confidence: 0.807270841428571

00:46:14.080 --> 00:46:15.704 I want to emphasize that our brain

NOTE Confidence: 0.807270841428571

00:46:15.704 --> 00:46:17.723 bank is the only one in the world

NOTE Confidence: 0.807270841428571

00:46:17.723 --> 00:46:19.383 that is studying the biology of

NOTE Confidence: 0.807270841428571

00:46:19.383 --> 00:46:20.759 last exposure and exclusively

NOTE Confidence: 0.807270841428571

00:46:20.759 --> 00:46:22.479 dedicated to military brain health.

NOTE Confidence: 0.807270841428571

00:46:22.480 --> 00:46:23.521 And of course,

NOTE Confidence: 0.807270841428571

00:46:23.521 --> 00:46:25.256 the availability of this collection

NOTE Confidence: 0.807270841428571

00:46:25.256 --> 00:46:27.193 provides for us a unique opportunity

NOTE Confidence: 0.807270841428571

00:46:27.193 --> 00:46:29.409 not only for this research but more

NOTE Confidence: 0.807270841428571

00:46:29.409 --> 00:46:31.279 broadly speaking toward an improved

NOTE Confidence: 0.807270841428571

00:46:31.279 --> 00:46:33.257 understanding of biology or the

NOTE Confidence: 0.807270841428571

00:46:33.257 --> 00:46:36.119 biologic underpinnings of of military TBI,

NOTE Confidence: 0.807270841428571

00:46:36.120 --> 00:46:37.482 particularly blast exposure.

NOTE Confidence: 0.807270841428571

00:46:37.482 --> 00:46:40.660 So I want to thank of course

NOTE Confidence: 0.807270841428571

00:46:40.660 --> 00:46:42.280 service Members and their families.

NOTE Confidence: 0.807270841428571

00:46:42.280 --> 00:46:43.156 Not for their donations.

NOTE Confidence: 0.807270841428571

00:46:43.156 --> 00:46:44.734 We wouldn't be able to do any

NOTE Confidence: 0.807270841428571

00:46:44.734 --> 00:46:45.610 of this without them.

NOTE Confidence: 0.807270841428571

00:46:45.610 --> 00:46:47.754 I want to give a special thanks to

NOTE Confidence: 0.807270841428571

00:46:47.754 --> 00:46:49.264 the special forces who recently

NOTE Confidence: 0.807270841428571

00:46:49.264 --> 00:46:51.385 had us visit Fort Bragg for kind

NOTE Confidence: 0.807270841428571

00:46:51.451 --> 00:46:53.809 of a day in the life of what they

NOTE Confidence: 0.807270841428571

00:46:53.809 --> 00:46:55.271 experienced just during training.

NOTE Confidence: 0.807270841428571

00:46:55.271 --> 00:46:57.653 And the amount of blast exposure

NOTE Confidence: 0.807270841428571

00:46:57.653 --> 00:47:00.103 that they sustained just during

NOTE Confidence: 0.807270841428571

00:47:00.103 --> 00:47:02.087 training operations is dramatic.

NOTE Confidence: 0.807270841428571

00:47:02.090 --> 00:47:03.866 And they do this day in and day

NOTE Confidence: 0.807270841428571

00:47:03.866 --> 00:47:05.806 out when they are not deployed and

NOTE Confidence: 0.807270841428571

00:47:05.806 --> 00:47:07.626 doing the and and blasting things

NOTE Confidence: 0.807270841428571

00:47:07.626 --> 00:47:09.528 and shooting things in real life.

NOTE Confidence: 0.807270841428571

00:47:09.530 --> 00:47:10.810 So I want to thank the team and

NOTE Confidence: 0.807270841428571

00:47:10.810 --> 00:47:11.939 all of our collaborators.

NOTE Confidence: 0.807270841428571

00:47:11.940 --> 00:47:13.375 I want to thank all of you

NOTE Confidence: 0.807270841428571

00:47:13.375 --> 00:47:14.310 for your attention today.

NOTE Confidence: 0.807270841428571

00:47:14.310 --> 00:47:15.630 These are my references.

NOTE Confidence: 0.807270841428571

00:47:15.630 --> 00:47:18.910 This is my dog, Peppa.

NOTE Confidence: 0.807270841428571

00:47:18.910 --> 00:47:20.678 And I'll I'm happy to take any questions.

NOTE Confidence: 0.603168462

00:47:26.430 --> 00:47:28.850 Questions from the audience mangine.

NOTE Confidence: 0.72758424

00:47:52.310 --> 00:47:53.570 We repeat the question for.

NOTE Confidence: 0.90564089125

00:47:55.580 --> 00:47:58.093 OK. So the question was whether or

NOTE Confidence: 0.90564089125

00:47:58.093 --> 00:48:00.219 not military helmets have protection

NOTE Confidence: 0.90564089125

00:48:00.219 --> 00:48:02.179 against against blast injury.

NOTE Confidence: 0.90564089125

00:48:02.180 --> 00:48:04.268 And the second question was whether or not

NOTE Confidence: 0.90564089125

00:48:04.268 --> 00:48:06.592 we've had ferrets wear helmets when and not

NOTE Confidence: 0.90564089125

00:48:06.592 --> 00:48:08.720 wear helmets with regard to blast exposure.

NOTE Confidence: 0.90564089125

00:48:08.720 --> 00:48:10.316 I'll answer the second question first.

NOTE Confidence: 0.90564089125

00:48:10.320 --> 00:48:12.350 No, that hasn't happened yet.

NOTE Confidence: 0.90564089125

00:48:12.350 --> 00:48:14.096 It may. But the first question

NOTE Confidence: 0.90564089125

00:48:14.096 --> 00:48:16.478 is kind of a more complex one.

NOTE Confidence: 0.90564089125

00:48:16.480 --> 00:48:17.120 But interestingly,

NOTE Confidence: 0.90564089125

00:48:17.120 --> 00:48:19.680 the answer to that question is also no.

NOTE Confidence: 0.90564089125

00:48:19.680 --> 00:48:23.988 OK, the most recent helmet that has

NOTE Confidence: 0.90564089125

00:48:23.988 --> 00:48:26.928 just been deployed to the US military.

NOTE Confidence: 0.90564089125

00:48:26.930 --> 00:48:29.666 They spent something like $9 billion

NOTE Confidence: 0.90564089125

00:48:29.670 --> 00:48:31.600 in development of this helmet.

NOTE Confidence: 0.90564089125

00:48:31.600 --> 00:48:34.225 But the principal focus in the development

NOTE Confidence: 0.90564089125

00:48:34.225 --> 00:48:36.929 of this helmet was to deflect bullets.

NOTE Confidence: 0.90564089125

00:48:36.930 --> 00:48:39.184 They did not concern themselves largely with

NOTE Confidence: 0.90564089125

00:48:39.184 --> 00:48:41.530 blast exposure and mitigating blast exposure.

NOTE Confidence: 0.90564089125

00:48:41.530 --> 00:48:43.954 So even the most modern helmet of today

NOTE Confidence: 0.90564089125

00:48:43.954 --> 00:48:46.869 is not designed to protect against blast.

NOTE Confidence: 0.90564089125

00:48:46.870 --> 00:48:49.810 And so we're still a ways away

NOTE Confidence: 0.90564089125

00:48:49.810 --> 00:48:51.892 from protective head equipment

NOTE Confidence: 0.90564089125

00:48:51.892 --> 00:48:54.108 mitigating a blast exposure.

NOTE Confidence: 0.90564089125

00:48:54.110 --> 00:48:56.690 Certainly our body armor has has

NOTE Confidence: 0.90564089125

00:48:56.690 --> 00:48:59.482 resulted in far fewer deaths from

NOTE Confidence: 0.90564089125

00:48:59.482 --> 00:49:02.086 blast exposure over time. And so on.

NOTE Confidence: 0.90564089125

00:49:02.086 --> 00:49:03.570 World War One people were dying left

NOTE Confidence: 0.90564089125

00:49:03.624 --> 00:49:05.388 and right from high explosive exposure.

NOTE Confidence: 0.90564089125

00:49:05.390 --> 00:49:07.120 Now there are far less.

NOTE Confidence: 0.90564089125

00:49:07.120 --> 00:49:09.370 Because of more modernized body armor,

NOTE Confidence: 0.90564089125

00:49:09.370 --> 00:49:10.828 as far as helmets are concerned,

NOTE Confidence: 0.90564089125

00:49:10.830 --> 00:49:15.750 we haven't gotten. Unfortunately.

NOTE Confidence: 0.90564089125

00:49:15.750 --> 00:49:16.030 Work.

NOTE Confidence: 0.545029703333333

00:49:18.790 --> 00:49:19.684 Quick question,

NOTE Confidence: 0.545029703333333

00:49:19.684 --> 00:49:22.813 what is correctly if I mentioned that?

NOTE Confidence: 0.545029703333333

00:49:22.820 --> 00:49:26.450 But it seemed like a rainbow.

NOTE Confidence: 0.545029703333333

00:49:26.450 --> 00:49:28.765 Their military subset that have

NOTE Confidence: 0.545029703333333

00:49:28.765 --> 00:49:31.043 played confidence force, yeah,

NOTE Confidence: 0.545029703333333

00:49:31.043 --> 00:49:35.458 lower than grade in context.

NOTE Confidence: 0.545029703333333

00:49:35.460 --> 00:49:38.563 Previously reported. In other words,

NOTE Confidence: 0.545029703333333

00:49:38.563 --> 00:49:40.120 if you have that occur in the NFL,

NOTE Confidence: 0.545029703333333

00:49:40.120 --> 00:49:42.660 should do, then go into.

NOTE Confidence: 0.545029703333333

00:49:42.660 --> 00:49:47.960 Protect your head. So.

NOTE Confidence: 0.545029703333333

00:49:47.960 --> 00:49:50.456 So yeah, so the question was,

NOTE Confidence: 0.545029703333333

00:49:50.460 --> 00:49:51.890 we had 60 contact sports

NOTE Confidence: 0.545029703333333

00:49:51.890 --> 00:49:53.034 athletes in this study.

NOTE Confidence: 0.545029703333333

00:49:53.040 --> 00:49:55.007 Only ten of them had CTE and

NOTE Confidence: 0.545029703333333

00:49:55.007 --> 00:49:57.473 this rate is lower than what has

NOTE Confidence: 0.545029703333333

00:49:57.473 --> 00:49:59.413 been reported in other studies.

NOTE Confidence: 0.545029703333333

00:49:59.420 --> 00:50:01.560 That is some somewhat true.

NOTE Confidence: 0.545029703333333

00:50:01.560 --> 00:50:03.702 It really depends on what level of

NOTE Confidence: 0.545029703333333

00:50:03.702 --> 00:50:05.469 contact sports athletes you're looking.

NOTE Confidence: 0.545029703333333

00:50:05.470 --> 00:50:08.214 So if you go to the the study

NOTE Confidence: 0.545029703333333

00:50:08.214 --> 00:50:11.363 out of the BU group which is 101

NOTE Confidence: 0.545029703333333

00:50:11.363 --> 00:50:13.128 NFL brain something like that,

NOTE Confidence: 0.545029703333333

00:50:13.130 --> 00:50:14.930 they report CTE neuropathology

NOTE Confidence: 0.545029703333333

00:50:14.930 --> 00:50:16.730 at three different levels.

NOTE Confidence: 0.545029703333333

00:50:16.730 --> 00:50:18.706 NFL players, college players,

NOTE Confidence: 0.545029703333333

00:50:18.706 --> 00:50:20.188 high school athletes,

NOTE Confidence: 0.545029703333333

00:50:20.190 --> 00:50:22.825 they find that close to 100% of NFL players,

NOTE Confidence: 0.545029703333333

00:50:22.825 --> 00:50:25.183 if not 100% have CTE pathology,

NOTE Confidence: 0.545029703333333

00:50:25.183 --> 00:50:28.249 88% of college athletes have CTE

NOTE Confidence: 0.545029703333333

00:50:28.249 --> 00:50:31.034 pathology and then only 20% of high

NOTE Confidence: 0.545029703333333

00:50:31.034 --> 00:50:33.386 school football players have CTE pathology.

NOTE Confidence: 0.545029703333333

00:50:33.390 --> 00:50:34.248 OK and so.

NOTE Confidence: 0.545029703333333

00:50:34.248 --> 00:50:36.250 If you if you didn't have a

NOTE Confidence: 0.545029703333333

00:50:36.332 --> 00:50:38.517 very long career in football,

NOTE Confidence: 0.545029703333333

00:50:38.520 --> 00:50:40.326 your chances of having CD appear to

NOTE Confidence: 0.545029703333333

00:50:40.326 --> 00:50:42.474 be far lower than that and then we

NOTE Confidence: 0.545029703333333

00:50:42.474 --> 00:50:44.432 don't know what those rates are in

NOTE Confidence: 0.545029703333333

00:50:44.432 --> 00:50:46.462 other contact sports or what we are

NOTE Confidence: 0.545029703333333

00:50:46.462 --> 00:50:48.020 considering other contact sports now.

NOTE Confidence: 0.545029703333333

00:50:48.020 --> 00:50:50.237 And so I wasn't surprised to see

NOTE Confidence: 0.545029703333333

00:50:50.237 --> 00:50:52.341 this 10 of 60 because we have this

NOTE Confidence: 0.545029703333333

00:50:52.341 --> 00:50:54.375 myriad of different contact sports

NOTE Confidence: 0.545029703333333

00:50:54.375 --> 00:50:56.515 and different levels of participation.

NOTE Confidence: 0.545029703333333

00:50:56.520 --> 00:50:56.853 OK.

NOTE Confidence: 0.545029703333333

00:50:56.853 --> 00:50:58.851 And then and so considering that

NOTE Confidence: 0.545029703333333

00:50:58.851 --> 00:51:01.550 this is an active an active male

NOTE Confidence: 0.545029703333333

00:51:01.550 --> 00:51:03.980 population on that non active duty,

NOTE Confidence: 0.545029703333333

00:51:03.980 --> 00:51:06.300 I mean physically active population.

NOTE Confidence: 0.545029703333333

00:51:06.300 --> 00:51:08.687 This may actually be a as close

NOTE Confidence: 0.545029703333333

00:51:08.687 --> 00:51:11.009 of a representation of of the rate

NOTE Confidence: 0.545029703333333

00:51:11.009 --> 00:51:12.851 of CTE pathology and the active

NOTE Confidence: 0.545029703333333

00:51:12.927 --> 00:51:15.270 male community overall as we have.

NOTE Confidence: 0.545029703333333

00:51:15.270 --> 00:51:17.747 So I think that's that that kind of

NOTE Confidence: 0.545029703333333

00:51:17.747 --> 00:51:20.009 fits my perspective on that question.

NOTE Confidence: 0.545029703333333

00:51:20.010 --> 00:51:21.414 It really depends on duration of

NOTE Confidence: 0.545029703333333

00:51:21.414 --> 00:51:22.910 play and and and level you've

NOTE Confidence: 0.545029703333333

00:51:22.910 --> 00:51:24.428 reached in contact sports and so

NOTE Confidence: 0.545029703333333

00:51:24.428 --> 00:51:26.089 I'm not surprised by this rate.

NOTE Confidence: 0.6335743325

00:51:29.240 --> 00:51:32.940 Yeah, we're, I think.

NOTE Confidence: 0.6335743325

00:51:32.940 --> 00:51:35.278 I think you know, military for the

NOTE Confidence: 0.6335743325

00:51:35.278 --> 00:51:37.684 most part it's it's an occupation and

NOTE Confidence: 0.6335743325

00:51:37.684 --> 00:51:40.213 a lot of people don't have combat

NOTE Confidence: 0.6335743325

00:51:40.213 --> 00:51:42.955 exposure or it's relatively minimal and.

NOTE Confidence: 0.6335743325

00:51:42.960 --> 00:51:44.950 Uh, so we're dealing again,

NOTE Confidence: 0.6335743325

00:51:44.950 --> 00:51:47.008 I think we're, we're as close as,

NOTE Confidence: 0.6335743325

00:51:47.010 --> 00:51:49.140 as the literature has gotten to

NOTE Confidence: 0.6335743325

00:51:49.140 --> 00:51:51.484 assessing CTE frequency in an active

NOTE Confidence: 0.6335743325

00:51:51.484 --> 00:51:53.629 male population regardless of military.

NOTE Confidence: 0.6335743325

00:51:53.630 --> 00:51:54.626 One other question.

NOTE Confidence: 0.6335743325

00:51:54.626 --> 00:51:57.960 So the distribution.

NOTE Confidence: 0.6335743325

00:51:57.960 --> 00:52:00.792 Change is fairly similar.

NOTE Confidence: 0.6335743325

00:52:00.792 --> 00:52:03.620 And you know that that depth of

NOTE Confidence: 0.6335743325

00:52:03.706 --> 00:52:06.090 salt patient you know as suggested

NOTE Confidence: 0.6335743325

00:52:06.090 --> 00:52:08.132 by the biophysical model as

NOTE Confidence: 0.6335743325

00:52:08.132 --> 00:52:10.092 suggested by the distribution of

NOTE Confidence: 0.6335743325

00:52:10.092 --> 00:52:14.040 all IS and the distribution of.

NOTE Confidence: 0.6335743325

00:52:14.040 --> 00:52:16.240 Tall.

NOTE Confidence: 0.6335743325

00:52:16.240 --> 00:52:17.488 All sort of anatomically

NOTE Confidence: 0.6335743325

00:52:17.488 --> 00:52:19.048 as some of the addition.

NOTE Confidence: 0.787675642857143

00:52:21.370 --> 00:52:25.346 Yeah, this is a spectrum of change.

NOTE Confidence: 0.787675642857143

00:52:25.350 --> 00:52:28.070 This perceived that this is sort of the

NOTE Confidence: 0.787675642857143

00:52:28.070 --> 00:52:31.424 the acute vision which compounded multiple

NOTE Confidence: 0.787675642857143

00:52:31.424 --> 00:52:35.816 times eventually leads to, you know.

NOTE Confidence: 0.787675642857143

00:52:35.816 --> 00:52:39.944 We also into. Maybe. I think.

NOTE Confidence: 0.787675642857143

00:52:39.944 --> 00:52:42.450 I think that the the jury is still

NOTE Confidence: 0.787675642857143

00:52:42.450 --> 00:52:44.914 out with regard to whether CTE cases

NOTE Confidence: 0.787675642857143

00:52:44.914 --> 00:52:47.110 have this background pathology.

NOTE Confidence: 0.787675642857143

00:52:47.110 --> 00:52:49.370 That hasn't been reliably demonstrated,

NOTE Confidence: 0.787675642857143

00:52:49.370 --> 00:52:51.379 at least to to me just yet.

NOTE Confidence: 0.787675642857143

00:52:51.380 --> 00:52:55.756 I will say in these IRS cases that.

NOTE Confidence: 0.787675642857143

00:52:55.760 --> 00:52:58.035 Negative. There is no topology in them,

NOTE Confidence: 0.787675642857143

00:52:58.040 --> 00:53:00.165 and the scarring does not

NOTE Confidence: 0.787675642857143

00:53:00.165 --> 00:53:01.440 favor soulful depth.

NOTE Confidence: 0.787675642857143

00:53:01.440 --> 00:53:04.716 It's more of a diffuse interface pattern,

NOTE Confidence: 0.787675642857143

00:53:04.720 --> 00:53:07.416 and so I think that question is reasonable.

NOTE Confidence: 0.787675642857143

00:53:07.420 --> 00:53:08.986 I think it's something that still

NOTE Confidence: 0.787675642857143

00:53:08.986 --> 00:53:11.260 may end up being the case, not sure,

NOTE Confidence: 0.787675642857143

00:53:11.260 --> 00:53:14.622 but at this point in time we are not

NOTE Confidence: 0.787675642857143

00:53:14.622 --> 00:53:17.240 seeing them coexist or at least match up,

NOTE Confidence: 0.787675642857143

00:53:17.240 --> 00:53:19.720 or at least match up.

NOTE Confidence: 0.787675642857143

00:53:19.720 --> 00:53:21.589 And so in that kind of vein,

NOTE Confidence: 0.787675642857143

00:53:21.590 --> 00:53:24.425 I also oftentimes get the question of,

NOTE Confidence: 0.787675642857143

00:53:24.430 --> 00:53:27.126 you know, you have a very young cohort.

NOTE Confidence: 0.787675642857143

00:53:27.130 --> 00:53:29.461 Could they just be developing CTE later

NOTE Confidence: 0.787675642857143

00:53:29.461 --> 00:53:32.129 and you're not getting that snapshot now?

NOTE Confidence: 0.787675642857143

00:53:32.130 --> 00:53:33.978 That's a frequent question I get.

NOTE Confidence: 0.787675642857143

00:53:33.980 --> 00:53:36.654 And my answer to that is that

NOTE Confidence: 0.787675642857143

00:53:36.654 --> 00:53:39.219 these people are symptomatic now.

NOTE Confidence: 0.787675642857143

00:53:39.220 --> 00:53:41.560 OK. And so their symptomatology,

NOTE Confidence: 0.787675642857143

00:53:41.560 --> 00:53:43.195 this invisible wound that they

NOTE Confidence: 0.787675642857143

00:53:43.195 --> 00:53:44.830 have now is not explainable?

NOTE Confidence: 0.806731645

00:53:49.590 --> 00:53:51.452 Ohh there are some check questions but

NOTE Confidence: 0.806731645

00:53:51.452 --> 00:53:54.600 they were popping up earlier. Oh, text no.

98

NOTE Confidence: 0.80315516

00:53:57.080 --> 00:53:58.370 Somebody's talking about an autopsy case.

NOTE Confidence: 0.54160823

00:54:01.770 --> 00:54:02.570 Any questions?

NOTE Confidence: 0.9260463825

00:54:05.240 --> 00:54:06.640 Thank you very much.