

WEBVTT

NOTE duration:"00:54:25"

NOTE recognizability:0.835

NOTE language:en-us

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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,

NOTE Confidence: 0.854699887
00:00:59.590 --> 00:00:59.816 2019,
NOTE Confidence: 0.854699887
00:00:59.816 --> 00:01:01.624 he spent a year as an instructor in
NOTE Confidence: 0.854699887
00:01:01.624 --> 00:01:03.275 the division of autopsy pathology
NOTE Confidence: 0.854699887
00:01:03.275 --> 00:01:04.985 at the Johns Hopkins University
NOTE Confidence: 0.854699887
00:01:04.985 --> 00:01:06.366 School of Medicine and unique
NOTE Confidence: 0.854699887
00:01:06.366 --> 00:01:07.842 position as far as I know.
NOTE Confidence: 0.854699887
00:01:07.850 --> 00:01:09.554 And there he worked with Jody
NOTE Confidence: 0.854699887
00:01:09.554 --> 00:01:11.190 Hooper and worked very closely,
NOTE Confidence: 0.854699887
00:01:11.190 --> 00:01:12.900 among other things,
NOTE Confidence: 0.854699887
00:01:12.900 --> 00:01:15.750 on the research autopsy program.
NOTE Confidence: 0.854699887
00:01:15.750 --> 00:01:16.996 That was one of the one of
NOTE Confidence: 0.854699887
00:01:16.996 --> 00:01:18.149 the best in the country,
NOTE Confidence: 0.854699887
00:01:18.150 --> 00:01:18.834 my opinion.
NOTE Confidence: 0.854699887
00:01:18.834 --> 00:01:21.228 He's now an assistant professor of pathology
NOTE Confidence: 0.854699887
00:01:21.228 --> 00:01:23.607 at the Uniformed Services University,
NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.854699887

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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

NOTE Confidence: 0.868153745172414

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.

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 Millsbaugh 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 soldiers,
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.
NOTE Confidence: 0.87129314

00:21:06.570 --> 00:21:06.779 OK.
NOTE Confidence: 0.87129314

00:21:06.779 --> 00:21:08.242 And this is the opinion that the
NOTE Confidence: 0.87129314

00:21:08.242 --> 00:21:10.037 the War Office committee stuck with.
NOTE Confidence: 0.87129314

00:21:10.040 --> 00:21:11.645 And so ultimately they concluded
NOTE Confidence: 0.87129314

00:21:11.645 --> 00:21:13.250 that no case of psychoneurosis
NOTE Confidence: 0.87129314

00:21:13.308 --> 00:21:15.204 or of mental breakdown even when
NOTE Confidence: 0.87129314

00:21:15.204 --> 00:21:16.790 attributed to shell explosion or
NOTE Confidence: 0.87129314

00:21:16.790 --> 00:21:18.380 the effect thereof should even be
NOTE Confidence: 0.87129314

00:21:18.380 --> 00:21:19.922 classified as a battle casualty.
NOTE Confidence: 0.87129314

00:21:19.922 --> 00:21:22.519 So they were not and that cleaned
NOTE Confidence: 0.87129314

00:21:22.519 --> 00:21:25.260 up a lot of pensioning concerns on
NOTE Confidence: 0.87129314

00:21:25.260 --> 00:21:27.300 on the prevention of shell shock.
NOTE Confidence: 0.87129314

00:21:27.300 --> 00:21:29.304 They recommended that we must simply
NOTE Confidence: 0.87129314

00:21:29.304 --> 00:21:31.480 promote more morale amongst military units,
NOTE Confidence: 0.87129314

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

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,
NOTE Confidence: 0.905656668125

00:28:33.566 --> 00:28:36.234 so both doctors have been Imola and
NOTE Confidence: 0.905656668125

00:28:36.234 --> 00:28:38.950 Ann McKee jumped on this question and
NOTE Confidence: 0.905656668125

00:28:38.950 --> 00:28:41.846 working separately between 2011 and 2014,
NOTE Confidence: 0.905656668125

00:28:41.846 --> 00:28:46.477 both of them reported a total of 5 cases
NOTE Confidence: 0.905656668125

00:28:46.477 --> 00:28:49.094 of CTE and former military personnel
NOTE Confidence: 0.905656668125

00:28:49.094 --> 00:28:51.830 who were blast exposed and symptomatic.
NOTE Confidence: 0.905656668125

00:28:51.830 --> 00:28:53.540 And a couple of interesting
NOTE Confidence: 0.905656668125

00:28:53.540 --> 00:28:54.908 conclusions came from this.
NOTE Confidence: 0.905656668125

00:28:54.910 --> 00:28:56.498 Repetitive TBI can sometimes
NOTE Confidence: 0.905656668125

00:28:56.498 --> 00:28:58.483 provoke the development of CTE,
NOTE Confidence: 0.905656668125

00:28:58.490 --> 00:29:00.386 as has been demonstrated in veterans
NOTE Confidence: 0.905656668125

00:29:00.386 --> 00:29:02.190 of the Iraq and Afghanistan
NOTE Confidence: 0.905656668125

00:29:02.190 --> 00:29:04.086 conflicts exposed to blast.
NOTE Confidence: 0.905656668125

00:29:04.090 --> 00:29:06.030 Although the neurobiological effects of
NOTE Confidence: 0.905656668125

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

NOTE Confidence: 0.910425421538462
00:33:34.944 --> 00:33:37.590 of our laboratory was the CTE question,
NOTE Confidence: 0.910425421538462
00:33:37.590 --> 00:33:40.404 is CTE common in military service members,
NOTE Confidence: 0.910425421538462
00:33:40.410 --> 00:33:43.168 is blast exposure risk factor for CTE,
NOTE Confidence: 0.910425421538462
00:33:43.170 --> 00:33:44.262 is shell shock,
NOTE Confidence: 0.910425421538462
00:33:44.262 --> 00:33:46.446 CTE is the invisible wound CTE.
NOTE Confidence: 0.910425421538462
00:33:46.450 --> 00:33:47.650 That's probably the biggest
NOTE Confidence: 0.910425421538462
00:33:47.650 --> 00:33:48.850 question of our laboratory.
NOTE Confidence: 0.910425421538462
00:33:48.850 --> 00:33:50.684 And after a decade of brain collection,
NOTE Confidence: 0.910425421538462
00:33:50.690 --> 00:33:53.454 it was decided that it was time to take
NOTE Confidence: 0.910425421538462
00:33:53.454 --> 00:33:55.470 the first major step in this regard.
NOTE Confidence: 0.910425421538462
00:33:55.470 --> 00:33:57.376 And so in the winter of 2021,
NOTE Confidence: 0.910425421538462
00:33:57.376 --> 00:34:00.206 we examined the 1st 225.
NOTE Confidence: 0.910425421538462
00:34:00.210 --> 00:34:02.165 Consecutive military brain donations in
NOTE Confidence: 0.910425421538462
00:34:02.165 --> 00:34:05.040 our bank for evidence of CTE pathology,
NOTE Confidence: 0.910425421538462
00:34:05.040 --> 00:34:06.643 and we were fortunate enough to be
NOTE Confidence: 0.910425421538462

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

NOTE Confidence: 0.850482471304348
00:40:57.368 --> 00:40:58.808 the absence of a contact.
NOTE Confidence: 0.850482471304348
00:40:58.810 --> 00:40:59.842 What's history?
NOTE Confidence: 0.850482471304348
00:40:59.842 --> 00:41:03.290 OK, and so now the question becomes,
NOTE Confidence: 0.850482471304348
00:41:03.290 --> 00:41:06.510 if all of this is not CTE?
NOTE Confidence: 0.850482471304348
00:41:06.510 --> 00:41:08.449 If the invisible wound is not CTE,
NOTE Confidence: 0.850482471304348
00:41:08.450 --> 00:41:10.679 what is it?
NOTE Confidence: 0.850482471304348
00:41:10.680 --> 00:41:13.242 And so that question is a question
NOTE Confidence: 0.850482471304348
00:41:13.242 --> 00:41:15.028 that remains unanswered and that
NOTE Confidence: 0.850482471304348
00:41:15.028 --> 00:41:16.882 is the ongoing mission of our
NOTE Confidence: 0.850482471304348
00:41:16.882 --> 00:41:18.708 brain bank to to decipher it.
NOTE Confidence: 0.850482471304348
00:41:18.710 --> 00:41:18.985 However,
NOTE Confidence: 0.850482471304348
00:41:18.985 --> 00:41:21.185 we do feel that we have made some
NOTE Confidence: 0.850482471304348
00:41:21.185 --> 00:41:23.290 pretty important discoveries in the
NOTE Confidence: 0.850482471304348
00:41:23.290 --> 00:41:25.505 particularly as it concerns chronic
NOTE Confidence: 0.850482471304348
00:41:25.505 --> 00:41:26.909 neuropathology following blast.
NOTE Confidence: 0.850482471304348

00:41:26.910 --> 00:41:28.896 And probably the most notable of
NOTE Confidence: 0.850482471304348

00:41:28.896 --> 00:41:30.977 these is our description of an
NOTE Confidence: 0.850482471304348

00:41:30.977 --> 00:41:33.065 entity which we've referred to as
NOTE Confidence: 0.850482471304348

00:41:33.065 --> 00:41:34.350 interface astroglial scarring.
NOTE Confidence: 0.850482471304348

00:41:34.350 --> 00:41:37.024 This is a pattern of glial scarring
NOTE Confidence: 0.850482471304348

00:41:37.024 --> 00:41:40.018 detectable by just a simple GFP that occurs.
NOTE Confidence: 0.850482471304348

00:41:40.020 --> 00:41:42.030 Long Junction points or interfaces between
NOTE Confidence: 0.850482471304348

00:41:42.030 --> 00:41:43.710 heterologous elements of the brain,
NOTE Confidence: 0.850482471304348

00:41:43.710 --> 00:41:45.390 so greater white matter junction,
NOTE Confidence: 0.850482471304348

00:41:45.390 --> 00:41:46.840 perivascular spaces,
NOTE Confidence: 0.850482471304348

00:41:46.840 --> 00:41:48.290 periventricular spaces,
NOTE Confidence: 0.850482471304348

00:41:48.290 --> 00:41:51.190 the PO parenchymal interface,
NOTE Confidence: 0.877774192857143

00:41:51.190 --> 00:41:54.725 and so on. And we noticed this.
NOTE Confidence: 0.877774192857143

00:41:54.730 --> 00:41:56.970 And we continue to note that most
NOTE Confidence: 0.877774192857143

00:41:56.970 --> 00:41:58.695 prominently in individuals who are
NOTE Confidence: 0.877774192857143

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 jryi,
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.

NOTE Confidence: 0.877774192857143

00:44:09.230 --> 00:44:11.678 Slomo footage you can almost visualize

NOTE Confidence: 0.877774192857143

00:44:11.678 --> 00:44:14.299 where the strain is most maximum.

NOTE Confidence: 0.877774192857143

00:44:14.300 --> 00:44:16.172 So this is over the course of a very

NOTE Confidence: 0.877774192857143

00:44:16.172 --> 00:44:17.776 small duration of time and you can

NOTE Confidence: 0.877774192857143

00:44:17.776 --> 00:44:19.575 see right at the Gray white matter

NOTE Confidence: 0.877774192857143

00:44:19.575 --> 00:44:21.273 junctions you're you're seeing a lot

NOTE Confidence: 0.877774192857143

00:44:21.273 --> 00:44:23.858 of those forces take place and they

NOTE Confidence: 0.877774192857143

00:44:23.858 --> 00:44:25.891 actually calculated that the physical

NOTE Confidence: 0.877774192857143

00:44:25.891 --> 00:44:28.477 strain was highest at brain interfaces.

NOTE Confidence: 0.877774192857143

00:44:28.480 --> 00:44:30.760 Again compatible with what we

NOTE Confidence: 0.877774192857143

00:44:30.760 --> 00:44:33.800 were seeing in the human tissues.

NOTE Confidence: 0.877774192857143

00:44:33.800 --> 00:44:36.520 OK and more recently they have done they

NOTE Confidence: 0.877774192857143

00:44:36.520 --> 00:44:39.316 have used the same exact head model and.

NOTE Confidence: 0.877774192857143

00:44:39.320 --> 00:44:42.239 Impact TBI study or they they drop,

NOTE Confidence: 0.877774192857143

00:44:42.240 --> 00:44:44.249 they drop the head from the ceiling

NOTE Confidence: 0.877774192857143

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: 0.5450297033333333

00:49:18.790 --> 00:49:19.684 Quick question,

NOTE Confidence: 0.5450297033333333

00:49:19.684 --> 00:49:22.813 what is correctly if I mentioned that?

NOTE Confidence: 0.5450297033333333

00:49:22.820 --> 00:49:26.450 But it seemed like a rainbow.

NOTE Confidence: 0.5450297033333333

00:49:26.450 --> 00:49:28.765 Their military subset that have

NOTE Confidence: 0.5450297033333333

00:49:28.765 --> 00:49:31.043 played confidence force, yeah,
NOTE Confidence: 0.5450297033333333

00:49:31.043 --> 00:49:35.458 lower than grade in context.
NOTE Confidence: 0.5450297033333333

00:49:35.460 --> 00:49:38.563 Previously reported. In other words,
NOTE Confidence: 0.5450297033333333

00:49:38.563 --> 00:49:40.120 if you have that occur in the NFL,
NOTE Confidence: 0.5450297033333333

00:49:40.120 --> 00:49:42.660 should do, then go into.
NOTE Confidence: 0.5450297033333333

00:49:42.660 --> 00:49:47.960 Protect your head. So.
NOTE Confidence: 0.5450297033333333

00:49:47.960 --> 00:49:50.456 So yeah, so the question was,
NOTE Confidence: 0.5450297033333333

00:49:50.460 --> 00:49:51.890 we had 60 contact sports
NOTE Confidence: 0.5450297033333333

00:49:51.890 --> 00:49:53.034 athletes in this study.
NOTE Confidence: 0.5450297033333333

00:49:53.040 --> 00:49:55.007 Only ten of them had CTE and
NOTE Confidence: 0.5450297033333333

00:49:55.007 --> 00:49:57.473 this rate is lower than what has
NOTE Confidence: 0.5450297033333333

00:49:57.473 --> 00:49:59.413 been reported in other studies.
NOTE Confidence: 0.5450297033333333

00:49:59.420 --> 00:50:01.560 That is some somewhat true.
NOTE Confidence: 0.5450297033333333

00:50:01.560 --> 00:50:03.702 It really depends on what level of
NOTE Confidence: 0.5450297033333333

00:50:03.702 --> 00:50:05.469 contact sports athletes you're looking.
NOTE Confidence: 0.5450297033333333

00:50:05.470 --> 00:50:08.214 So if you go to the the study

NOTE Confidence: 0.5450297033333333
00:50:08.214 --> 00:50:11.363 out of the BU group which is 101
NOTE Confidence: 0.5450297033333333
00:50:11.363 --> 00:50:13.128 NFL brain something like that,
NOTE Confidence: 0.5450297033333333
00:50:13.130 --> 00:50:14.930 they report CTE neuropathology
NOTE Confidence: 0.5450297033333333
00:50:14.930 --> 00:50:16.730 at three different levels.
NOTE Confidence: 0.5450297033333333
00:50:16.730 --> 00:50:18.706 NFL players, college players,
NOTE Confidence: 0.5450297033333333
00:50:18.706 --> 00:50:20.188 high school athletes,
NOTE Confidence: 0.5450297033333333
00:50:20.190 --> 00:50:22.825 they find that close to 100% of NFL players,
NOTE Confidence: 0.5450297033333333
00:50:22.825 --> 00:50:25.183 if not 100% have CTE pathology,
NOTE Confidence: 0.5450297033333333
00:50:25.183 --> 00:50:28.249 88% of college athletes have CTE
NOTE Confidence: 0.5450297033333333
00:50:28.249 --> 00:50:31.034 pathology and then only 20% of high
NOTE Confidence: 0.5450297033333333
00:50:31.034 --> 00:50:33.386 school football players have CTE pathology.
NOTE Confidence: 0.5450297033333333
00:50:33.390 --> 00:50:34.248 OK and so.
NOTE Confidence: 0.5450297033333333
00:50:34.248 --> 00:50:36.250 If you if you didn't have a
NOTE Confidence: 0.5450297033333333
00:50:36.332 --> 00:50:38.517 very long career in football,
NOTE Confidence: 0.5450297033333333
00:50:38.520 --> 00:50:40.326 your chances of having CD appear to
NOTE Confidence: 0.5450297033333333

00:50:40.326 --> 00:50:42.474 be far lower than that and then we
NOTE Confidence: 0.5450297033333333

00:50:42.474 --> 00:50:44.432 don't know what those rates are in
NOTE Confidence: 0.5450297033333333

00:50:44.432 --> 00:50:46.462 other contact sports or what we are
NOTE Confidence: 0.5450297033333333

00:50:46.462 --> 00:50:48.020 considering other contact sports now.
NOTE Confidence: 0.5450297033333333

00:50:48.020 --> 00:50:50.237 And so I wasn't surprised to see
NOTE Confidence: 0.5450297033333333

00:50:50.237 --> 00:50:52.341 this 10 of 60 because we have this
NOTE Confidence: 0.5450297033333333

00:50:52.341 --> 00:50:54.375 myriad of different contact sports
NOTE Confidence: 0.5450297033333333

00:50:54.375 --> 00:50:56.515 and different levels of participation.
NOTE Confidence: 0.5450297033333333

00:50:56.520 --> 00:50:56.853 OK.
NOTE Confidence: 0.5450297033333333

00:50:56.853 --> 00:50:58.851 And then and so considering that
NOTE Confidence: 0.5450297033333333

00:50:58.851 --> 00:51:01.550 this is an active an active male
NOTE Confidence: 0.5450297033333333

00:51:01.550 --> 00:51:03.980 population on that non active duty,
NOTE Confidence: 0.5450297033333333

00:51:03.980 --> 00:51:06.300 I mean physically active population.
NOTE Confidence: 0.5450297033333333

00:51:06.300 --> 00:51:08.687 This may actually be a as close
NOTE Confidence: 0.5450297033333333

00:51:08.687 --> 00:51:11.009 of a representation of of the rate
NOTE Confidence: 0.5450297033333333

00:51:11.009 --> 00:51:12.851 of CTE pathology and the active

NOTE Confidence: 0.5450297033333333

00:51:12.927 --> 00:51:15.270 male community overall as we have.

NOTE Confidence: 0.5450297033333333

00:51:15.270 --> 00:51:17.747 So I think that's that that kind of

NOTE Confidence: 0.5450297033333333

00:51:17.747 --> 00:51:20.009 fits my perspective on that question.

NOTE Confidence: 0.5450297033333333

00:51:20.010 --> 00:51:21.414 It really depends on duration of

NOTE Confidence: 0.5450297033333333

00:51:21.414 --> 00:51:22.910 play and and and level you've

NOTE Confidence: 0.5450297033333333

00:51:22.910 --> 00:51:24.428 reached in contact sports and so

NOTE Confidence: 0.5450297033333333

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.

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.