

WEBVTT

NOTE duration: "00:04:14.336"

NOTE Confidence: 0.9951172

00:00:06.000 --> 00:00:08.500 The prefrontal cortex is remarkable.

NOTE Confidence: 0.99930245

00:00:09.200 --> 00:00:10.160 It is one of the

NOTE Confidence: 0.99930245

00:00:10.160 --> 00:00:10.980 most recently

NOTE Confidence: 0.98157847

00:00:11.440 --> 00:00:12.880 evolved parts of our brain,

NOTE Confidence: 0.98157847

00:00:12.880 --> 00:00:14.240 and it's right behind our

NOTE Confidence: 0.98157847

00:00:14.240 --> 00:00:14.740 forehead.

NOTE Confidence: 0.9994141

00:00:15.575 --> 00:00:18.235 It has this incredible ability

NOTE Confidence: 1

00:00:18.855 --> 00:00:19.675 to represent

NOTE Confidence: 1

00:00:20.055 --> 00:00:20.555 information

NOTE Confidence: 0.97943115

00:00:20.935 --> 00:00:22.875 that's not actually happening,

NOTE Confidence: 0.99472654

00:00:23.575 --> 00:00:24.935 allowing us to think about

NOTE Confidence: 0.99472654

00:00:24.935 --> 00:00:27.435 things that aren't actually happening.

NOTE Confidence: 0.9976562

00:00:27.975 --> 00:00:29.275 And this is the foundation

NOTE Confidence: 0.99869794

00:00:29.654 --> 00:00:30.900 of abstract thought.

NOTE Confidence: 0.98291016

00:00:33.059 --> 00:00:35.239 This cortex is remarkably
NOTE Confidence: 0.98097736

00:00:35.620 --> 00:00:37.860 vulnerable, and we've been learning
NOTE Confidence: 0.98097736

00:00:37.860 --> 00:00:39.460 that it actually has built
NOTE Confidence: 0.98097736

00:00:39.460 --> 00:00:40.360 in mechanisms
NOTE Confidence: 0.9418701

00:00:41.059 --> 00:00:42.579 to take it offline, for
NOTE Confidence: 0.9418701

00:00:42.579 --> 00:00:44.280 example, with stress or inflammation,
NOTE Confidence: 0.89334106

00:00:45.155 --> 00:00:46.755 which is probably why it
NOTE Confidence: 0.89334106

00:00:46.755 --> 00:00:48.215 dysfunction so readily.
NOTE Confidence: 0.98130965

00:00:48.675 --> 00:00:50.615 So we see prefrontal deficits
NOTE Confidence: 0.98130965

00:00:50.755 --> 00:00:52.935 in Alzheimer's disease, Parkinson's
NOTE Confidence: 0.98706055

00:00:53.555 --> 00:00:54.055 disease,
NOTE Confidence: 0.9800212

00:00:54.435 --> 00:00:55.655 something called frontotemporal
NOTE Confidence: 0.9763997

00:00:56.115 --> 00:00:57.575 dementia that particularly
NOTE Confidence: 0.95304364

00:00:57.955 --> 00:00:59.815 targets prefrontal cortex.
NOTE Confidence: 0.93277997

00:01:00.510 --> 00:01:02.510 Also in disorders that affect
NOTE Confidence: 0.93277997

00:01:02.510 --> 00:01:04.130 younger people like schizophrenia

NOTE Confidence: 0.93424475
00:01:05.069 --> 00:01:05.970 and neurodevelopmental
NOTE Confidence: 0.9897461
00:01:06.830 --> 00:01:08.209 disorders like ADHD
NOTE Confidence: 0.99157715
00:01:08.750 --> 00:01:09.650 and autism.
NOTE Confidence: 0.9926758
00:01:10.110 --> 00:01:12.190 So figuring out why these
NOTE Confidence: 0.9926758
00:01:12.190 --> 00:01:14.190 circuits are so vulnerable is
NOTE Confidence: 0.9926758
00:01:14.190 --> 00:01:15.250 key to
NOTE Confidence: 0.95170087
00:01:15.915 --> 00:01:17.835 understanding the ideology of these
NOTE Confidence: 0.95170087
00:01:17.835 --> 00:01:19.435 disorders and coming up with
NOTE Confidence: 0.95170087
00:01:19.435 --> 00:01:20.575 rational treatments.
NOTE Confidence: 0.9656779
00:01:24.875 --> 00:01:26.395 We have been studying for
NOTE Confidence: 0.9656779
00:01:26.395 --> 00:01:28.875 years what makes prefrontal neurons
NOTE Confidence: 0.9656779
00:01:28.875 --> 00:01:29.694 so vulnerable.
NOTE Confidence: 0.95887977
00:01:30.315 --> 00:01:31.470 And what we found, it's
NOTE Confidence: 0.95887977
00:01:31.630 --> 00:01:32.450 very Shakespearean.
NOTE Confidence: 0.9984131
00:01:33.390 --> 00:01:35.550 The very things these neurons
NOTE Confidence: 0.9984131

00:01:35.550 --> 00:01:36.850 need to create
NOTE Confidence: 0.8440755

00:01:37.310 --> 00:01:38.930 higher cognitive operations,
NOTE Confidence: 0.9859212

00:01:39.630 --> 00:01:40.990 such as high levels of
NOTE Confidence: 0.9859212

00:01:40.990 --> 00:01:41.490 calcium,
NOTE Confidence: 0.9996338

00:01:42.190 --> 00:01:43.550 are the very things that
NOTE Confidence: 0.9996338

00:01:43.550 --> 00:01:44.610 make them vulnerable
NOTE Confidence: 0.9981445

00:01:45.505 --> 00:01:47.525 when they're not tightly regulated.
NOTE Confidence: 0.91467285

00:01:47.905 --> 00:01:49.505 So for example, stress and
NOTE Confidence: 0.91467285

00:01:49.505 --> 00:01:50.005 inflammation
NOTE Confidence: 0.9955241

00:01:50.865 --> 00:01:52.245 erode this regulation
NOTE Confidence: 0.97766113

00:01:52.625 --> 00:01:54.085 and leave us particularly
NOTE Confidence: 0.9955241

00:01:54.465 --> 00:01:56.805 vulnerable to atrophy of prefrontal
NOTE Confidence: 0.9955241

00:01:57.025 --> 00:01:57.525 neurons.
NOTE Confidence: 0.97199357

00:01:58.090 --> 00:01:59.690 So we have been studying
NOTE Confidence: 0.97199357

00:01:59.690 --> 00:02:01.310 this now for many years
NOTE Confidence: 0.97199357

00:02:01.530 --> 00:02:03.310 and use this as

NOTE Confidence: 0.9382324
00:02:03.770 --> 00:02:04.510 a guidepost
NOTE Confidence: 0.99560547
00:02:04.890 --> 00:02:07.690 for creating rational treatments to
NOTE Confidence: 0.99560547
00:02:07.690 --> 00:02:09.310 protect prefrontal function.
NOTE Confidence: 0.9782715
00:02:12.955 --> 00:02:14.735 We use a spectrum
NOTE Confidence: 0.99558514
00:02:15.035 --> 00:02:16.794 of techniques that go from
NOTE Confidence: 0.99558514
00:02:16.794 --> 00:02:18.395 the molecule all the way
NOTE Confidence: 0.99558514
00:02:18.395 --> 00:02:19.294 to behavior.
NOTE Confidence: 0.94783527
00:02:20.155 --> 00:02:22.075 So for example, one technique
NOTE Confidence: 0.94783527
00:02:22.075 --> 00:02:23.375 we use that's remarkable
NOTE Confidence: 0.97074383
00:02:23.835 --> 00:02:26.095 is something called immuno electron
NOTE Confidence: 0.97074383
00:02:26.315 --> 00:02:26.815 microscopy
NOTE Confidence: 0.9916295
00:02:27.840 --> 00:02:29.460 that lets us see molecules
NOTE Confidence: 0.9916295
00:02:29.600 --> 00:02:30.580 with nanometer
NOTE Confidence: 0.9570855
00:02:31.040 --> 00:02:32.480 resolution, so we can see
NOTE Confidence: 0.9570855
00:02:32.480 --> 00:02:34.100 where they are exactly
NOTE Confidence: 0.99858946

00:02:34.560 --> 00:02:35.540 in the synapse.
NOTE Confidence: 0.9841883

00:02:36.240 --> 00:02:38.320 It's very beautiful, very moving,
NOTE Confidence: 0.9841883

00:02:38.320 --> 00:02:39.440 and we get to see
NOTE Confidence: 0.9841883

00:02:39.440 --> 00:02:41.680 how mother nature has designed
NOTE Confidence: 0.9841883

00:02:41.680 --> 00:02:42.465 these things
NOTE Confidence: 0.9484253

00:02:46.144 --> 00:02:48.004 herself. We've already succeeded
NOTE Confidence: 0.97835284

00:02:48.544 --> 00:02:50.165 with several treatment
NOTE Confidence: 0.93359375

00:02:50.544 --> 00:02:52.245 translated to human use,
NOTE Confidence: 0.93304443

00:02:52.625 --> 00:02:53.745 but we're now at a
NOTE Confidence: 0.93304443

00:02:53.745 --> 00:02:54.885 point where there's
NOTE Confidence: 0.9576009

00:02:55.409 --> 00:02:57.569 other potential treatments that I'm
NOTE Confidence: 0.9576009

00:02:57.569 --> 00:02:58.069 particularly
NOTE Confidence: 0.9909668

00:02:58.609 --> 00:02:59.590 excited about.
NOTE Confidence: 0.9893329

00:02:59.969 --> 00:03:01.989 For example, we've been learning
NOTE Confidence: 0.9893329

00:03:02.049 --> 00:03:03.969 why prefrontal neurons are so
NOTE Confidence: 0.9893329

00:03:03.969 --> 00:03:05.269 vulnerable with age

NOTE Confidence: 0.94949776
00:03:05.730 --> 00:03:07.090 and how to protect them
NOTE Confidence: 0.94949776
00:03:07.090 --> 00:03:07.909 from Alzheimer's
NOTE Confidence: 0.9916992
00:03:08.405 --> 00:03:08.905 pathology.
NOTE Confidence: 0.95576173
00:03:09.444 --> 00:03:10.885 So for example, right now
NOTE Confidence: 0.95576173
00:03:10.885 --> 00:03:12.325 we're looking for funding to
NOTE Confidence: 0.95576173
00:03:12.325 --> 00:03:14.665 test a really promising treatment
NOTE Confidence: 0.99780273
00:03:14.965 --> 00:03:16.584 that might actually prevent
NOTE Confidence: 0.99560547
00:03:16.965 --> 00:03:17.465 Alzheimer's
NOTE Confidence: 0.9951172
00:03:17.764 --> 00:03:18.264 disease.
NOTE Confidence: 0.8808594
00:03:18.885 --> 00:03:19.625 We're also,
NOTE Confidence: 0.9970703
00:03:20.530 --> 00:03:21.030 exploring
NOTE Confidence: 0.99902344
00:03:21.330 --> 00:03:23.590 new stress related pathways
NOTE Confidence: 0.98742676
00:03:24.049 --> 00:03:25.750 and ways to protect
NOTE Confidence: 0.9560547
00:03:26.209 --> 00:03:28.150 the brain and especially prefrontal
NOTE Confidence: 0.9560547
00:03:28.290 --> 00:03:29.349 cortex from
NOTE Confidence: 0.9423828

00:03:29.650 --> 00:03:30.629 stress exposure,
NOTE Confidence: 0.96777344

00:03:31.250 --> 00:03:32.129 which may be,
NOTE Confidence: 0.9970006

00:03:32.530 --> 00:03:34.209 very useful in treating things
NOTE Confidence: 0.9970006

00:03:34.209 --> 00:03:35.030 like PTSD.
NOTE Confidence: 0.99609375

00:03:36.615 --> 00:03:37.515 By understanding
NOTE Confidence: 0.97546387

00:03:37.895 --> 00:03:38.715 the mechanism,
NOTE Confidence: 0.99375

00:03:39.095 --> 00:03:40.635 we hope we can intervene
NOTE Confidence: 0.99261475

00:03:41.415 --> 00:03:43.095 and correct the things that
NOTE Confidence: 0.99261475

00:03:43.095 --> 00:03:44.555 are actively weakening
NOTE Confidence: 0.9477539

00:03:45.095 --> 00:03:45.915 these circuits.
NOTE Confidence: 0.9729614

00:03:46.615 --> 00:03:47.970 What makes it so tricky
NOTE Confidence: 0.9729614

00:03:48.370 --> 00:03:50.470 is these recently evolved neurons
NOTE Confidence: 0.9729614

00:03:50.690 --> 00:03:52.950 are totally different from classic
NOTE Confidence: 0.9729614

00:03:53.010 --> 00:03:53.510 neurons.
NOTE Confidence: 0.9726679

00:03:54.050 --> 00:03:55.330 Many of their needs are
NOTE Confidence: 0.9726679

00:03:55.330 --> 00:03:57.490 even opposite to those in,

NOTE Confidence: 0.9726679

00:03:57.490 --> 00:03:59.110 like, our sensory cortices.

NOTE Confidence: 0.95529515

00:03:59.970 --> 00:04:01.730 And so you need to

NOTE Confidence: 0.95529515

00:04:01.730 --> 00:04:03.830 respect these very unique

NOTE Confidence: 0.9995117

00:04:04.265 --> 00:04:06.125 mechanisms to have a rational

NOTE Confidence: 0.9995117

00:04:06.265 --> 00:04:06.765 strategy

NOTE Confidence: 0.99934894

00:04:07.305 --> 00:04:08.745 of how to protect these

NOTE Confidence: 0.99934894

00:04:08.745 --> 00:04:09.245 neurons.