WEBVTT NOTE duration:"00:51:13.6640000" NOTE language:en-us NOTE Confidence: 0.85820043 00:00:02.590 - > 00:00:04.732 Hello and welcome to the what do NOTE Confidence: 0.85820043 00:00:04.732 --> 00:00:07.117 we know about Long Cove and how NOTE Confidence: 0.85820043 00:00:07.117 -> 00:00:08.857 might a vaccine help webinar? NOTE Confidence: 0.85820043 $00:00:08.860 \rightarrow 00:00:10.455$ Please put any questions for NOTE Confidence: 0.85820043 00:00:10.455 - 00:00:12.490 the speaker in the Q&A panel, NOTE Confidence: 0.85820043 $00:00:12.490 \longrightarrow 00:00:14.470$ and Please note that this session NOTE Confidence: 0.85820043 $00{:}00{:}14.470 \dashrightarrow 00{:}00{:}16.120$ is being recorded. Thank you. NOTE Confidence: 0.8581596 $00:00:20.900 \longrightarrow 00:00:22.100$ Good morning everyone and NOTE Confidence: 0.8581596 $00:00:22.100 \longrightarrow 00:00:23.600$ thank you for joining us. NOTE Confidence: 0.8581596 $00{:}00{:}23.600 \dashrightarrow 00{:}00{:}25.115$ For Akiko of Esaki's presentation NOTE Confidence: 0.8581596 $00{:}00{:}25.115 \dashrightarrow 00{:}00{:}27.260$ on long COVID and how a vaccine NOTE Confidence: 0.8581596 00:00:27.260 --> 00:00:29.262 may help as the director of Alumni NOTE Confidence: 0.8581596 00:00:29.262 --> 00:00:31.096 Affairs at Yale School of Medicine, NOTE Confidence: 0.8581596 $00:00:31.100 \rightarrow 00:00:33.277$ it gives me great pleasure to welcome

- NOTE Confidence: 0.8581596
- $00:00:33.277 \rightarrow 00:00:35.898$ you to our first and hopefully last.

 $00:00:35.900 \longrightarrow 00:00:36.962$ Virtual reunion weekend.

NOTE Confidence: 0.8581596

 $00:00:36.962 \longrightarrow 00:00:39.440$ For those who have not had the

NOTE Confidence: 0.8581596

 $00:00:39.506 \dashrightarrow 00:00:41.844$ chance to meet or hear Akiko present NOTE Confidence: 0.8581596

 $00:00:41.844 \rightarrow 00:00:44.268$ before allow me a brief introduction,

NOTE Confidence: 0.8581596

 $00{:}00{:}44.270 \dashrightarrow 00{:}00{:}46.503$ she joined Yale as a faculty member

NOTE Confidence: 0.8581596

 $00:00:46.503 \rightarrow 00:00:48.722$ in 2000 and is currently the wall

NOTE Confidence: 0.8581596

 $00:00:48.722 \longrightarrow 00:00:51.142$ to more of an xet fits professor

NOTE Confidence: 0.8581596

00:00:51.142 --> 00:00:53.366 of Immunobiology and Molecular,

NOTE Confidence: 0.8581596

 $00:00:53.370 \longrightarrow 00:00:56.098$ cellular and developmental biology.

NOTE Confidence: 0.8581596

 $00{:}00{:}56{.}100 \dashrightarrow 00{:}00{:}58{.}565$ The genealogy and my microbial

NOTE Confidence: 0.8581596

 $00{:}00{:}58.565 \dashrightarrow 00{:}01{:}00.537$ diseases professor of molecular,

NOTE Confidence: 0.8581596

 $00{:}01{:}00{.}540$ --> $00{:}01{:}03{.}740$ cellular and developmental biology.

NOTE Confidence: 0.8581596

 $00{:}01{:}03.740 \dashrightarrow 00{:}01{:}05.710$ The Howard Hughes Medical Institute.

NOTE Confidence: 0.8581596

 $00{:}01{:}05{.}710 \dashrightarrow 00{:}01{:}07{.}675$ Her research is focused on

00:01:07.675 --> 00:01:09.247 understanding how viruses are

NOTE Confidence: 0.8581596

 $00{:}01{:}09{.}247 \dashrightarrow 00{:}01{:}10{.}974$ recognized in eight community and

NOTE Confidence: 0.8581596

 $00{:}01{:}10{.}974 \dashrightarrow 00{:}01{:}12{.}876$ how that information is used to

NOTE Confidence: 0.8581596

00:01:12.937 --> 00:01:15.169 generate protective adaptive immunity.

NOTE Confidence: 0.8581596

 $00{:}01{:}15{.}170 \dashrightarrow 00{:}01{:}17{.}265$ She has received numerous honors

NOTE Confidence: 0.8581596

 $00{:}01{:}17.265 \dashrightarrow 00{:}01{:}20.246$ during her career and most notably has NOTE Confidence: 0.8581596

 $00{:}01{:}20.246 \dashrightarrow 00{:}01{:}22.676$ been newly elected to the American

NOTE Confidence: 0.8581596

00:01:22.676 --> 00:01:24.838 Academy of Arts and Sciences.

NOTE Confidence: 0.8581596

00:01:24.840 --> 00:01:26.315 If you enjoyed her presentation

NOTE Confidence: 0.8581596

00:01:26.315 --> 00:01:28.369 and I have no doubt you will,

NOTE Confidence: 0.8581596

 $00:01:28.370 \longrightarrow 00:01:30.128$ please seek out more of her

NOTE Confidence: 0.8581596

 $00:01:30.128 \longrightarrow 00:01:31.007$ work and insights.

NOTE Confidence: 0.8581596

 $00{:}01{:}31{.}010$ --> $00{:}01{:}32{.}962$ She is very active on social media and

NOTE Confidence: 0.8581596

 $00{:}01{:}32{.}962 \dashrightarrow 00{:}01{:}35{.}198$ gained a following on Twitter for her

NOTE Confidence: 0.8581596

 $00{:}01{:}35{.}198 \dashrightarrow 00{:}01{:}36{.}888$ public health advice about COVID-19.

NOTE Confidence: 0.8581596

00:01:36.890 --> 00:01:38.070 Advocating for social distancing

- NOTE Confidence: 0.8581596
- $00{:}01{:}38.070 \dashrightarrow 00{:}01{:}39.250$ early in the pandemic.
- NOTE Confidence: 0.8581596
- 00:01:39.250 --> 00:01:41.594 I will moderate our Q&A in the end,
- NOTE Confidence: 0.8581596
- $00{:}01{:}41{.}600 \dashrightarrow 00{:}01{:}43{.}430$ so please submit any questions you
- NOTE Confidence: 0.8581596
- $00{:}01{:}43{.}430 \dashrightarrow 00{:}01{:}45{.}815$ have in the chat feature and we will
- NOTE Confidence: 0.8581596
- 00:01:45.815 --> 00:01:48.069 address as many as we have time for.
- NOTE Confidence: 0.8581596
- $00{:}01{:}48.070 \dashrightarrow 00{:}01{:}50.414$ I will now turn it over to Akiko.
- NOTE Confidence: 0.8869549
- $00:01:51.700 \longrightarrow 00:01:53.710$ Thank you Aaron for the
- NOTE Confidence: 0.8869549
- $00:01:53.710 \longrightarrow 00:01:54.916$ very kind introduction.
- NOTE Confidence: 0.8869549
- 00:01:54.920 --> 00:01:57.720 I'm happy to be here today to give
- NOTE Confidence: 0.8869549
- 00:01:57.720 --> 00:02:01.029 you a update and what we are doing
- NOTE Confidence: 0.8869549
- $00:02:01.029 \rightarrow 00:02:03.759$ to help people with long COVID.
- NOTE Confidence: 0.8869549
- $00{:}02{:}03.760 \dashrightarrow 00{:}02{:}06.567$ So I'm going to share my screen.
- NOTE Confidence: 0.83959585
- $00:02:11.370 \dashrightarrow 00:02:15.519$ OK, so today I want to tell you about
- NOTE Confidence: 0.83959585
- $00:02:15.519 \dashrightarrow 00:02:19.825$ long COVID an how might a vaccine help?
- NOTE Confidence: 0.83959585
- $00{:}02{:}19.830 \dashrightarrow 00{:}02{:}22.266$ And this is really an ongoing work
- NOTE Confidence: 0.83959585

 $00:02:22.266 \longrightarrow 00:02:24.538$ that involves a large number of NOTE Confidence: 0.83959585 $00{:}02{:}24.538 \dashrightarrow 00{:}02{:}26.854$ people here at Yale and elsewhere. NOTE Confidence: 0.8740169 $00:02:29.620 \rightarrow 00:02:32.500$ So my laboratory has been collaborating NOTE Confidence: 0.8740169 $00:02:32.500 \rightarrow 00:02:36.652$ with a large group at Yale to try to NOTE Confidence: 0.8740169 00:02:36.652 --> 00:02:39.550 understand the outcome of COVID-19 disease, NOTE Confidence: 0.8740169 $00:02:39.550 \rightarrow 00:02:41.742$ particularly from the standpoint NOTE Confidence: 0.8740169 $00:02:41.742 \longrightarrow 00:02:43.934$ of the immune response. NOTE Confidence: 0.8740169 $00:02:43.940 \longrightarrow 00:02:48.165$ We know that COVID-19 can NOTE Confidence: 0.8740169 $00{:}02{:}48.165 \dashrightarrow 00{:}02{:}50.700$ cause asymptomatic infection. NOTE Confidence: 0.8740169 00:02:50.700 --> 00:02:53.738 And all the way to fatal infection, NOTE Confidence: 0.8740169 $00:02:53.740 \longrightarrow 00:02:57.556$ and this really did depends on the host NOTE Confidence: 0.8740169 $00:02:57.556 \rightarrow 00:03:00.677$ immune status as well as age and sex. NOTE Confidence: 0.8740169 $00{:}03{:}00{.}680 \dashrightarrow 00{:}03{:}03{.}824$ So we know that the outcome of Cobett NOTE Confidence: 0.8740169 $00:03:03.824 \rightarrow 00:03:06.524$ 19 disease really differ between the NOTE Confidence: 0.8740169 $00:03:06.524 \rightarrow 00:03:10.228$ different age group as well as sex as NOTE Confidence: 0.8740169 $00:03:10.228 \rightarrow 00:03:12.832$ well as core mobility and pregnancy

- NOTE Confidence: 0.8740169
- $00:03:12.832 \longrightarrow 00:03:15.436$ status and many other things that

 $00:03:15.436 \longrightarrow 00:03:18.040$ could affect the host immune response.

NOTE Confidence: 0.8740169

00:03:18.040 --> 00:03:20.172 And so, for instance,

NOTE Confidence: 0.8740169

 $00:03:20.172 \longrightarrow 00:03:22.304$ we've been looking at.

NOTE Confidence: 0.8740169

 $00{:}03{:}22{.}310 \dashrightarrow 00{:}03{:}24{.}845$ Hospitalised patients immune response to

NOTE Confidence: 0.8740169

 $00{:}03{:}24.845 \dashrightarrow 00{:}03{:}27.959$ COVID-19 from moderate to fatal disease

NOTE Confidence: 0.8740169

 $00:03:27.959 \rightarrow 00:03:30.977$ and discovered so many different insights.

NOTE Confidence: 0.8740169

 $00:03:30.980 \rightarrow 00:03:31.944$ For example,

NOTE Confidence: 0.8740169

 $00:03:31.944 \rightarrow 00:03:35.318$ the severe COVID is really a company

NOTE Confidence: 0.8740169

 $00:03:35.318 \rightarrow 00:03:39.135$ by a misfiring of the immune response,

NOTE Confidence: 0.8740169

 $00:03:39.140 \longrightarrow 00:03:41.690$ meaning that different parts of

NOTE Confidence: 0.8740169

 $00:03:41.690 \dashrightarrow 00:03:44.240$ the immune system are engaged,

NOTE Confidence: 0.8740169

 $00:03:44.240 \rightarrow 00:03:46.440$ normally reserved for fighting

NOTE Confidence: 0.8740169

 $00{:}03{:}46{.}440 \dashrightarrow 00{:}03{:}49{.}740$ fungal or parasite infection are all

NOTE Confidence: 0.8740169

 $00:03:49.827 \rightarrow 00:03:52.617$ being engaged in the severe COVID.

 $00{:}03{:}52{.}620 \dashrightarrow 00{:}03{:}55{.}884$ And this becomes a maladapted immune

NOTE Confidence: 0.8740169

 $00{:}03{:}55{.}884 \dashrightarrow 00{:}03{:}59{.}630$ response to fighting a viral infection.

NOTE Confidence: 0.8740169

00:03:59.630 --> 00:04:03.694 We also know that in fatal COVID cases. NOTE Confidence: 0.8740169

 $00:04:03.700 \rightarrow 00:04:06.592$ Things that should have happened earlier NOTE Confidence: 0.8740169

00:04:06.592 --> 00:04:09.080 during immune response didn't happen,

NOTE Confidence: 0.8740169

 $00{:}04{:}09{.}080$ --> $00{:}04{:}12{.}559$ and that really results in uncontrolled viral NOTE Confidence: 0.8740169

 $00:04:12.559 \rightarrow 00:04:15.438$ replication and severe to lethal disease,

NOTE Confidence: 0.8740169

 $00:04:15.440 \longrightarrow 00:04:18.584$ and that is really seen for both the

NOTE Confidence: 0.8740169

00:04:18.584 --> 00:04:20.871 innate immune response which should

NOTE Confidence: 0.8740169

 $00:04:20.871 \rightarrow 00:04:24.175$ happen within hours to days of primary NOTE Confidence: 0.8740169

 $00:04:24.257 \rightarrow 00:04:27.169$ infection to neutralizing antibodies.

NOTE Confidence: 0.8740169

00:04:27.170 --> 00:04:31.538 We found that people who don't develop

NOTE Confidence: 0.8740169

 $00{:}04{:}31{.}538 \dashrightarrow 00{:}04{:}33{.}410$ neutralizing antibodies within

NOTE Confidence: 0.8740169

 $00:04:33.504 \rightarrow 00:04:36.486$ the 1st 14 days of symptom onset.

NOTE Confidence: 0.8740169

 $00:04:36.490 \dashrightarrow 00:04:39.367$ Are enriched in the lethal COVID group,

NOTE Confidence: 0.8740169

 $00{:}04{:}39{.}370 \dashrightarrow 00{:}04{:}42{.}658$ so this kind of delay in the onset

- NOTE Confidence: 0.8740169
- $00:04:42.658 \rightarrow 00:04:44.904$ of appropriate immune response is
- NOTE Confidence: 0.8740169
- $00:04:44.904 \rightarrow 00:04:48.600$ really at the basis of our failure to
- NOTE Confidence: 0.8740169
- $00:04:48.600 \rightarrow 00:04:51.570$ cope with this virus and therefore
- NOTE Confidence: 0.8740169
- $00{:}04{:}51{.}570 \dashrightarrow 00{:}04{:}53{.}055$ succumb to infection.
- NOTE Confidence: 0.8740169
- $00{:}04{:}53{.}060 \dashrightarrow 00{:}04{:}56{.}588$ We've also done a lot of work on comparing
- NOTE Confidence: 0.8740169
- $00{:}04{:}56.588 \dashrightarrow 00{:}04{:}59.717$ sex differences in immune response,
- NOTE Confidence: 0.8740169
- $00:04:59.720 \longrightarrow 00:05:03.052$ and this was really initiated by the
- NOTE Confidence: 0.8740169
- $00:05:03.052 \rightarrow 00:05:05.488$ support of Women's Health research
- NOTE Confidence: 0.8740169
- $00{:}05{:}05{.}488 \dashrightarrow 00{:}05{:}08{.}701$ at Yale here and has really taken
- NOTE Confidence: 0.8740169
- $00:05:08.701 \longrightarrow 00:05:10.199$ off since then.
- NOTE Confidence: 0.8740169
- $00{:}05{:}10{.}200 \dashrightarrow 00{:}05{:}13{.}584$ Now there are numerous reports showing
- NOTE Confidence: 0.8740169
- $00{:}05{:}13.584 \dashrightarrow 00{:}05{:}17.004$ differences in male and female immune
- NOTE Confidence: 0.8740169
- $00:05:17.004 \rightarrow 00:05:21.292$ response to COVID and how that might explain.
- NOTE Confidence: 0.8740169
- $00:05:21.300 \dashrightarrow 00:05:24.786$ The risk factor for males being having
- NOTE Confidence: 0.8740169
- $00:05:24.786 \longrightarrow 00:05:28.793$ a higher risk factor for lethal and
- NOTE Confidence: 0.8740169

00:05:28.793 --> 00:05:32.411 severe COVID compared to female patients.

NOTE Confidence: 0.8740169

 $00:05:32.420 \longrightarrow 00:05:35.871$ And we've also been looking at the

NOTE Confidence: 0.8740169

00:05:35.871 --> 00:05:38.659 impact of COVID-19 in pregnancy,

NOTE Confidence: 0.8740169

 $00:05:38.660 \dashrightarrow 00:05:42.139$ and have seen both subtle to severe

NOTE Confidence: 0.8740169

 $00{:}05{:}42.139 \dashrightarrow 00{:}05{:}44.626$ consequences of kovit infection in

NOTE Confidence: 0.8740169

 $00{:}05{:}44.626 \dashrightarrow 00{:}05{:}48.250$ pregnant women as well as impact on the

NOTE Confidence: 0.8740169

 $00:05:48.345 \rightarrow 00:05:51.660$ placenta from a respiratory infection.

NOTE Confidence: 0.8740169

00:05:51.660 - 00:05:53.740 Really highlighting that this

NOTE Confidence: 0.8740169

00:05:53.740 --> 00:05:54.780 particular virus,

NOTE Confidence: 0.8740169

 $00:05:54.780 \rightarrow 00:05:58.420$ even though it's just a respiratory virus,

NOTE Confidence: 0.8740169

 $00{:}05{:}58{.}420 \dashrightarrow 00{:}06{:}01{.}055$ has a huge impact throughout

NOTE Confidence: 0.8740169

 $00:06:01.055 \rightarrow 00:06:02.636$ the body without.

NOTE Confidence: 0.8740169

 $00{:}06{:}02.640 \dashrightarrow 00{:}06{:}04.878$ Infecting the Oregon it can have

NOTE Confidence: 0.8740169

 $00{:}06{:}04.878 \dashrightarrow 00{:}06{:}07.167$ affect remote effect because of the

NOTE Confidence: 0.8740169

 $00:06:07.167 \dashrightarrow 00:06:09.369$ information that's happening in the lung.

NOTE Confidence: 0.8601153

 $00:06:11.640 \rightarrow 00:06:15.416$ There are others that Yale who are really

 $00:06:15.416 \rightarrow 00:06:18.020$ investigating what happens in children.

NOTE Confidence: 0.8601153

00:06:18.020 --> 00:06:20.966 Doctor Kevin Harreld's group, for example,

NOTE Confidence: 0.8601153

 $00{:}06{:}20{.}970 \dashrightarrow 00{:}06{:}23{.}622$ reported that there is a robust

NOTE Confidence: 0.8601153

 $00{:}06{:}23.622 \dashrightarrow 00{:}06{:}26.496$ immune response that can control the

NOTE Confidence: 0.8601153

 $00{:}06{:}26{.}496 \dashrightarrow 00{:}06{:}29{.}574$ virus in children and therefore most

NOTE Confidence: 0.8601153

 $00:06:29.574 \rightarrow 00:06:32.259$ children recover with mild infection,

NOTE Confidence: 0.8601153

 $00{:}06{:}32.260 \dashrightarrow 00{:}06{:}35.305$ whereas there are a handful of children

NOTE Confidence: 0.8601153

 $00:06:35.305 \dashrightarrow 00:06:38.150$ who have multi organ involvement.

NOTE Confidence: 0.8601153

 $00:06:38.150 \longrightarrow 00:06:39.156$ Inflammatory diseases,

NOTE Confidence: 0.8601153

 $00:06:39.156 \longrightarrow 00:06:42.677$ which also is a mystery right now.

NOTE Confidence: 0.8601153

 $00:06:42.680 \longrightarrow 00:06:45.020$ Why do these handful of children

NOTE Confidence: 0.8601153

00:06:45.020 --> 00:06:47.439 become so severely ill from COVID?

NOTE Confidence: 0.8601153

00:06:47.440 --> 00:06:50.219 And that's a work of a doctor?

NOTE Confidence: 0.8601153

00:06:50.220 --> 00:06:52.205 Carrie Lucas in the same

NOTE Confidence: 0.8601153

 $00:06:52.205 \rightarrow 00:06:54.190$ department looking at these issues,

- $00:06:54.190 \rightarrow 00:06:56.446$ but today I really want to
- NOTE Confidence: 0.8601153
- $00:06:56.446 \longrightarrow 00:06:58.959$ focus on long haul or disease.
- NOTE Confidence: 0.8601153
- 00:06:58.960 --> 00:06:59.953 First of all,
- NOTE Confidence: 0.8601153
- $00:06:59.953 \longrightarrow 00:07:01.939$ what is long COVID and what
- NOTE Confidence: 0.8601153
- $00:07:01.939 \longrightarrow 00:07:04.118$ are the symptoms associated?
- NOTE Confidence: 0.8601153
- $00:07:04.120 \longrightarrow 00:07:06.100$ How long do they last?
- NOTE Confidence: 0.8601153
- 00:07:06.100 -> 00:07:08.090 What are the people affected?
- NOTE Confidence: 0.8601153
- 00:07:08.090 --> 00:07:08.914 And finally,
- NOTE Confidence: 0.8601153
- 00:07:08.914 --> 00:07:11.386 I want to start talking about
- NOTE Confidence: 0.8601153
- $00:07:11.386 \rightarrow 00:07:13.250$ potential therapy for lung COVID
- NOTE Confidence: 0.867002
- 00:07:16.370 --> 00:07:19.184 so long COVID was already detected
- NOTE Confidence: 0.867002
- $00:07:19.184 \rightarrow 00:07:22.388$ last summer as people were experiencing
- NOTE Confidence: 0.867002
- $00{:}07{:}22.388 \dashrightarrow 00{:}07{:}25.498$ very extended symptoms from COVID.
- NOTE Confidence: 0.867002
- 00:07:25.500 --> 00:07:28.860 And you know, some people even had very
- NOTE Confidence: 0.867002
- $00{:}07{:}28.860 \dashrightarrow 00{:}07{:}32.156$ mild to asymptomatic infection but are
- NOTE Confidence: 0.867002
- $00:07:32.156 \rightarrow 00:07:35.696$ beginning to develop very long term

- NOTE Confidence: 0.867002
- $00{:}07{:}35{.}792 \dashrightarrow 00{:}07{:}39{.}278$ symptoms afterwards and so long COVID

 $00:07:39.278 \longrightarrow 00:07:42.253$ patients experience a large number

NOTE Confidence: 0.867002

00:07:42.253 --> 00:07:46.754 of symptoms which I will go into.

NOTE Confidence: 0.867002

 $00{:}07{:}46.760 \dashrightarrow 00{:}07{:}49.365$ Weeks or months after infection

NOTE Confidence: 0.867002

 $00:07:49.365 \longrightarrow 00:07:51.449$ for extended time period.

NOTE Confidence: 0.867002

 $00{:}07{:}51{.}450 \dashrightarrow 00{:}07{:}55{.}160$ So most common symptom is fatigue and

NOTE Confidence: 0.867002

 $00:07:55.160 \dashrightarrow 00:07:59.257$ this isn't just a little bit of fatigue,

NOTE Confidence: 0.867002

 $00:07:59.260 \longrightarrow 00:08:02.272$ it's a severe fatigue that people

NOTE Confidence: 0.867002

 $00{:}08{:}02{.}272 \dashrightarrow 00{:}08{:}04{.}815$ become debilitated from this this

NOTE Confidence: 0.867002

 $00{:}08{:}04{.}815 \dashrightarrow 00{:}08{:}07{.}533$ disease and post exertional malaise is

NOTE Confidence: 0.867002

 $00:08:07.533 \rightarrow 00:08:11.342$ a second top symptom that long COVID

NOTE Confidence: 0.867002

 $00:08:11.342 \longrightarrow 00:08:13.706$ patients experienced and cognitive

NOTE Confidence: 0.867002

 $00:08:13.706 \dashrightarrow 00:08:18.090$ dys function is also a large symptom.

NOTE Confidence: 0.867002

 $00:08:18.090 \rightarrow 00:08:22.090$ That longer population experience and.

NOTE Confidence: 0.867002

 $00:08:22.090 \rightarrow 00:08:23.940$ Majority have evidence of multiple

 $00:08:23.940 \rightarrow 00:08:27.180$ organ disease, which I will get into.

NOTE Confidence: 0.867002

00:08:27.180 --> 00:08:28.587 The long COVID,

NOTE Confidence: 0.867002

 $00{:}08{:}28{.}587 \dashrightarrow 00{:}08{:}31{.}401$ unlike the severe COVID that we

NOTE Confidence: 0.867002

 $00:08:31.401 \rightarrow 00:08:33.379$ study in the hospital,

NOTE Confidence: 0.867002

 $00{:}08{:}33{.}380 \dashrightarrow 00{:}08{:}36{.}242$ the long COVID patients are more

NOTE Confidence: 0.867002

 $00:08:36.242 \rightarrow 00:08:38.150$ dominated by younger female,

NOTE Confidence: 0.867002

 $00{:}08{:}38{.}150 \dashrightarrow 00{:}08{:}41{.}198$ so the Middle Age Group 30 to 50

NOTE Confidence: 0.867002

 $00:08:41.198 \longrightarrow 00:08:44.468$ year old and that is really the

NOTE Confidence: 0.867002

 $00{:}08{:}44{.}468 \dashrightarrow 00{:}08{:}47{.}526$ most affected from long COVID and

NOTE Confidence: 0.867002

 $00{:}08{:}47.526 \dashrightarrow 00{:}08{:}50.814$ that also happens to coincide with

NOTE Confidence: 0.867002

 $00{:}08{:}50{.}814 \dashrightarrow 00{:}08{:}52{.}941$ the demographic most affected

NOTE Confidence: 0.867002

 $00:08:52.941 \longrightarrow 00:08:54.384$ by autoimmune diseases.

NOTE Confidence: 0.867002

 $00:08:54.384 \rightarrow 00:08:58.540$ So the estimates of how many people develop.

NOTE Confidence: 0.867002

00:08:58.540 --> 00:09:00.720 COVID vary between different studies,

NOTE Confidence: 0.867002

 $00:09:00.720 \longrightarrow 00:09:02.890$ some of them say 5%.

NOTE Confidence: 0.867002

 $00:09:02.890 \longrightarrow 00:09:05.070$ Some of them say 70%,

- NOTE Confidence: 0.867002
- $00:09:05.070 \rightarrow 00:09:08.550$ but roughly about 10 to 20% of the

00:09:08.550 --> 00:09:11.160 COVID survivors develop Long Cove in,

NOTE Confidence: 0.867002

 $00:09:11.160 \rightarrow 00:09:13.860$ and this you know estimates about

NOTE Confidence: 0.867002

 $00:09:13.860 \longrightarrow 00:09:16.143$ 5,000,000 cases of expected long

NOTE Confidence: 0.867002

00:09:16.143 --> 00:09:18.549 COVID in the United States alone,

NOTE Confidence: 0.867002

 $00{:}09{:}18.550 \dashrightarrow 00{:}09{:}20.896$ which is a huge problem because

NOTE Confidence: 0.867002

 $00:09:20.896 \dashrightarrow 00:09:23.739$ these people are no longer able to

NOTE Confidence: 0.867002

 $00:09:23.739 \longrightarrow 00:09:26.532$ function as they did before and would

NOTE Confidence: 0.867002

 $00:09:26.610 \dashrightarrow 00:09:28.990$ have a significant consequence,

NOTE Confidence: 0.867002

 $00:09:28.990 \longrightarrow 00:09:29.894$ both economical.

NOTE Confidence: 0.867002

 $00:09:29.894 \longrightarrow 00:09:32.606$ As well as health care costs

NOTE Confidence: 0.867002

 $00:09:32.606 \dashrightarrow 00:09:34.330$ associated with one COVID.

NOTE Confidence: 0.867002

 $00:09:34.330 \dashrightarrow 00:09:37.361$ And another study showed that the loan

NOTE Confidence: 0.867002

00:09:37.361 --> 00:09:39.340 COVID percentages decline overtime,

NOTE Confidence: 0.867002

 $00:09:39.340 \dashrightarrow 00:09:42.245$ so it's not that every one who has

 $00:09:42.245 \rightarrow 00:09:45.707$ long COVID is going to suffer forever.

NOTE Confidence: 0.867002

 $00:09:45.710 \dashrightarrow 00:09:48.440$ The numbers and percentage decline overtime.

NOTE Confidence: 0.867002

 $00:09:48.440 \longrightarrow 00:09:49.877$ So for example,

NOTE Confidence: 0.867002

 $00:09:49.877 \longrightarrow 00:09:52.272$ 13% of the participants had

NOTE Confidence: 0.867002

00:09:52.272 --> 00:09:54.350 symptoms lasting over 28 days,

NOTE Confidence: 0.867002

 $00:09:54.350 \rightarrow 00:09:57.535$ but then that percentage drop after weeks.

NOTE Confidence: 0.867002

 $00:09:57.540 \longrightarrow 00:10:00.264$ So after 12 weeks the percentage

NOTE Confidence: 0.867002

 $00:10:00.264 \rightarrow 00:10:01.626$ dropped about 2%.

NOTE Confidence: 0.867002

 $00{:}10{:}01{.}630 \dashrightarrow 00{:}10{:}04{.}899$ But there are people who are suffering.

NOTE Confidence: 0.867002

 $00{:}10{:}04{.}900 \dashrightarrow 00{:}10{:}06{.}508$ Suffering for more than

NOTE Confidence: 0.867002

 $00{:}10{:}06{.}508 \dashrightarrow 00{:}10{:}08{.}518$ a year with long COVID.

NOTE Confidence: 0.867002

 $00{:}10{:}08.520 \dashrightarrow 00{:}10{:}10{.}192$ And as I mentioned,

NOTE Confidence: 0.867002

 $00:10:10.192 \dashrightarrow 00:10:12.282$ it's a really debilitating disease.

NOTE Confidence: 0.867002

 $00{:}10{:}12{.}290 \dashrightarrow 00{:}10{:}15{.}216$ 40% of cases require reduction in workload

NOTE Confidence: 0.867002

 $00{:}10{:}15{.}216$ --> $00{:}10{:}18{.}580$ and 22% are unable to return to work,

NOTE Confidence: 0.867002

 $00:10:18.580 \rightarrow 00:10:21.804$ so this is a major crisis going forward

 $00:10:21.804 \rightarrow 00:10:25.277$ even after we contain COVID with a vaccine,

NOTE Confidence: 0.867002

 $00:10:25.280 \longrightarrow 00:10:27.500$ there will be millions of people

NOTE Confidence: 0.867002

 $00:10:27.500 \rightarrow 00:10:29.890$ suffering from long term consequences.

NOTE Confidence: 0.81534874

00:10:32.150 --> 00:10:35.181 And as I mentioned, long COVID is

NOTE Confidence: 0.81534874

00:10:35.181 - 00:10:38.060 not just one organ, one symptom.

NOTE Confidence: 0.81534874

 $00{:}10{:}38.060 \dashrightarrow 00{:}10{:}41.280$ It really has over 120 different symptoms

NOTE Confidence: 0.81534874

 $00{:}10{:}41.280 \dashrightarrow 00{:}10{:}44.301$ that have been reported and that appear

NOTE Confidence: 0.81534874

 $00{:}10{:}44{.}301 \dashrightarrow 00{:}10{:}47{.}129$ to involve so many organ systems.

NOTE Confidence: 0.81534874

 $00{:}10{:}47.130 \dashrightarrow 00{:}10{:}49.400$ Systemic effects such as fever,

NOTE Confidence: 0.81534874

 $00:10:49.400 \longrightarrow 00:10:53.260$ fatigue, and post exertional malaise.

NOTE Confidence: 0.81534874

 $00:10:53.260 \longrightarrow 00:10:55.168$ Other symptoms that appear

NOTE Confidence: 0.81534874

 $00{:}10{:}55{.}168 \dashrightarrow 00{:}10{:}58{.}030$ to just kind of be systemic,

NOTE Confidence: 0.81534874

 $00{:}10{:}58{.}030 \dashrightarrow 00{:}11{:}00{.}410$ whereas there are distinct neuro

NOTE Confidence: 0.81534874

 $00{:}11{:}00{.}410 \dashrightarrow 00{:}11{:}02{.}314$ psychiatric impact memory deficit,

NOTE Confidence: 0.81534874

 $00:11:02.320 \longrightarrow 00:11:04.710$ loss of ability to concentrate,

- $00{:}11{:}04{.}710 \dashrightarrow 00{:}11{:}06{.}138$ and mood disorders.
- NOTE Confidence: 0.81534874
- 00:11:06.138 --> 00:11:08.998 This is really, really severe in
- NOTE Confidence: 0.81534874
- $00:11:08.998 \rightarrow 00:11:11.854$ some people and there is dizziness,
- NOTE Confidence: 0.81534874
- 00:11:11.860 --> 00:11:14.458 headache, blurry vision.
- NOTE Confidence: 0.81534874
- 00:11:14.460 --> 00:11:16.692 Many different endocrine cardiovascular,
- NOTE Confidence: 0.81534874
- NOTE Confidence: 0.81534874
- $00:11:17.806 \rightarrow 00:11:21.698$ and GI tract symptoms have been reported.
- NOTE Confidence: 0.86920714
- 00:11:24.310 --> 00:11:26.878 And just to kind of reiterate,
- NOTE Confidence: 0.86920714
- 00:11:26.880 --> 00:11:29.030 the demographic data being quite
- NOTE Confidence: 0.86920714
- $00{:}11{:}29{.}030 \dashrightarrow 00{:}11{:}30{.}750$ different from severe COVID.
- NOTE Confidence: 0.86920714
- $00{:}11{:}30{.}750 \dashrightarrow 00{:}11{:}33{.}614$ This is a study from a Mount Sinai
- NOTE Confidence: 0.86920714
- 00:11:33.614 --> 00:11:35.888 group of Precision Recovery program
- NOTE Confidence: 0.86920714
- $00:11:35.888 \rightarrow 00:11:39.325$ that they have in in this group.
- NOTE Confidence: 0.86920714
- 00:11:39.330 --> 00:11:41.470 Again, women are dominant at
- NOTE Confidence: 0.86920714
- $00:11:41.470 \longrightarrow 00:11:44.060 69\%$ of the their patients are
- NOTE Confidence: 0.86920714
- $00:11:44.060 \rightarrow 00:11:47.050$ women and mean age is only 44,

- NOTE Confidence: 0.86920714
- $00{:}11{:}47.050 \dashrightarrow 00{:}11{:}49.618$ so 12 to 81. It varies,
- NOTE Confidence: 0.86920714
- $00:11:49.620 \rightarrow 00:11:53.616$ but mean is really is around 30 to 50.
- NOTE Confidence: 0.86920714
- $00:11:53.620 \longrightarrow 00:11:55.528$ No, that range group.
- NOTE Confidence: 0.86920714
- $00{:}11{:}55{.}528 \dashrightarrow 00{:}11{:}57{.}913$ And the BMI it again.
- NOTE Confidence: 0.86920714
- $00{:}11{:}57{.}920 \dashrightarrow 00{:}12{:}01{.}790$ The BMI high BMI is a risk factor for
- NOTE Confidence: 0.86920714
- 00:12:01.790 --> 00:12:04.966 severe COVID and for Long Cove it,
- NOTE Confidence: 0.86920714
- $00:12:04.970 \longrightarrow 00:12:08.327$ it appears that the mean BMI is normal and
- NOTE Confidence: 0.86920714
- $00{:}12{:}08{.}327 \dashrightarrow 00{:}12{:}11.744$ then there are other sort of comorbidities
- NOTE Confidence: 0.86920714
- $00:12:11.744 \rightarrow 00:12:14.669$ that are associated with long COVID,
- NOTE Confidence: 0.86920714
- $00:12:14.670 \longrightarrow 00:12:18.190$ but there's not a unifying.
- NOTE Confidence: 0.86920714
- 00:12:18.190 --> 00:12:20.680 A picture of what people had
- NOTE Confidence: 0.86920714
- $00{:}12{:}20.680 \dashrightarrow 00{:}12{:}22.870$ before they developed long COVID.
- NOTE Confidence: 0.8334782
- $00:12:25.180 \longrightarrow 00:12:28.295$ And if you look at the symptoms,
- NOTE Confidence: 0.8334782
- $00{:}12{:}28{.}300 \dashrightarrow 00{:}12{:}31{.}415$ severity and the number of symptoms overtime,
- NOTE Confidence: 0.8334782
- $00{:}12{:}31{.}420 \dashrightarrow 00{:}12{:}34{.}451$ what you see is something like this
- NOTE Confidence: 0.8334782

 $00:12:34.451 \rightarrow 00:12:37.153$ where vast majority of this severity

NOTE Confidence: 0.8334782

 $00{:}12{:}37{.}153 \dashrightarrow 00{:}12{:}39{.}799$ score that goes extends to seven

NOTE Confidence: 0.8334782

 $00:12:39.799 \longrightarrow 00:12:42.127$ months are the moderate group,

NOTE Confidence: 0.8334782

 $00:12:42.130 \longrightarrow 00:12:44.800$ whereas a severe and very severe.

NOTE Confidence: 0.8334782

00:12:44.800 --> 00:12:47.476 They tend to decline over time,

NOTE Confidence: 0.8334782

 $00:12:47.480 \longrightarrow 00:12:48.968$ which is great.

NOTE Confidence: 0.8334782

00:12:48.968 --> 00:12:51.944 People are kind of converting to

NOTE Confidence: 0.8334782

 $00:12:51.944 \dashrightarrow 00:12:55.244$ from CV or two a moderate to mild.

NOTE Confidence: 0.8334782

 $00{:}12{:}55{.}250 \dashrightarrow 00{:}12{:}56{.}092$ Disease overtime.

NOTE Confidence: 0.8334782

 $00:12:56.092 \rightarrow 00:12:58.618$ And then very mild goes up

NOTE Confidence: 0.8334782

 $00:12:58.618 \longrightarrow 00:13:00.499$ and then no symptoms.

NOTE Confidence: 0.8334782

 $00:13:00.500 \rightarrow 00:13:03.769$ These are the people who stayed low.

NOTE Confidence: 0.8334782

 $00:13:03.770 \longrightarrow 00:13:06.584$ And if you look at the average

NOTE Confidence: 0.8334782

 $00{:}13{:}06{.}584 \dashrightarrow 00{:}13{:}09{.}138$ number of symptom as I mentioned,

NOTE Confidence: 0.8334782

 $00{:}13{:}09{.}140 \dashrightarrow 00{:}13{:}11.618$ every one has a variety of symptoms,

NOTE Confidence: 0.8334782

 $00{:}13{:}11.620 \dashrightarrow 00{:}13{:}13.615$ but the ones that don't

- NOTE Confidence: 0.8334782
- $00:13:13.615 \longrightarrow 00:13:16.160$ recover for up to 90 days,
- NOTE Confidence: 0.8334782
- $00:13:16.160 \longrightarrow 00:13:18.225$ they really do have numerous
- NOTE Confidence: 0.8334782
- $00:13:18.225 \rightarrow 00:13:20.290$ symptoms ranging in the teens.
- NOTE Confidence: 0.8334782
- $00:13:20.290 \rightarrow 00:13:22.792$ So meaning that they have numerous
- NOTE Confidence: 0.8334782
- 00:13:22.792 --> 00:13:24.924 different organ involvement and symptoms
- NOTE Confidence: 0.8334782
- $00:13:24.924 \rightarrow 00:13:27.306$ that last for extended time period,
- NOTE Confidence: 0.8334782
- $00{:}13{:}27{.}310 \dashrightarrow 00{:}13{:}29{.}908$ whereas those that recovered with an
- NOTE Confidence: 0.8334782
- $00:13:29.908 \rightarrow 00:13:32.269$ acute or recovered within 90 days.
- NOTE Confidence: 0.8334782
- $00{:}13{:}32{.}270 \dashrightarrow 00{:}13{:}34{.}720$ They are symptom number declines.
- NOTE Confidence: 0.8334782
- $00:13:34.720 \longrightarrow 00:13:36.650$ Quite rapidly and within three
- NOTE Confidence: 0.8334782
- $00:13:36.650 \rightarrow 00:13:39.270$ months they are devoid of symptoms,
- NOTE Confidence: 0.8334782
- 00:13:39.270 --> 00:13:42.007 so really we're interested in this kind
- NOTE Confidence: 0.8334782
- $00{:}13{:}42.007 \dashrightarrow 00{:}13{:}44.974$ of people who are unable to recover
- NOTE Confidence: 0.8334782
- $00{:}13{:}44{.}974 \dashrightarrow 00{:}13{:}47{.}542$ over 90 days with numerous symptoms.
- NOTE Confidence: 0.85052985
- $00:13:49.720 \longrightarrow 00:13:51.750$ So what is long COVID?
- NOTE Confidence: 0.85052985

 $00:13:51.750 \longrightarrow 00:13:54.180$ What is how is it cost?

NOTE Confidence: 0.85052985

 $00:13:54.180 \longrightarrow 00:13:56.610$ We have a couple of hypothesis.

NOTE Confidence: 0.85052985

 $00{:}13{:}56{.}610 \dashrightarrow 00{:}13{:}59{.}186$ One is that there is a viral reservoir

NOTE Confidence: 0.85052985

 $00:13:59.186 \rightarrow 00:14:02.014$ that is remaining in these people even NOTE Confidence: 0.85052985

00:14:02.014 --> 00:14:04.683 though they cannot detect any PCR

NOTE Confidence: 0.85052985

 $00{:}14{:}04{.}683 \dashrightarrow 00{:}14{:}07{.}138$ positive virus from their nasopharynx. NOTE Confidence: 0.85052985

 $00:14:07.140 \rightarrow 00:14:10.451$ There may be virus in different tissues NOTE Confidence: 0.85052985

 $00{:}14{:}10{.}451 \dashrightarrow 00{:}14{:}13{.}537$ that cannot be accessed by such a

NOTE Confidence: 0.85052985

 $00{:}14{:}13{.}537 \dashrightarrow 00{:}14{:}16{.}494$ nasal swab and that may be causing NOTE Confidence: 0.85052985

 $00:14:16.494 \rightarrow 00:14:19.494$ a chronic in long term symptoms.

NOTE Confidence: 0.85052985

 $00:14:19.500 \rightarrow 00:14:21.775$ And the other possibility hypothesis NOTE Confidence: 0.85052985

 $00:14:21.775 \rightarrow 00:14:24.622$ is that there is autoreactive immune

NOTE Confidence: 0.85052985

 $00:14:24.622 \rightarrow 00:14:26.610$ responses that are occurring,

NOTE Confidence: 0.85052985

00:14:26.610 --> 00:14:29.666 so these are the T&B cells of the

NOTE Confidence: 0.85052985

 $00:14:29.666 \rightarrow 00:14:32.498$ immune system that are now attacking

NOTE Confidence: 0.85052985

 $00:14:32.498 \longrightarrow 00:14:34.978$ the various different cells or

- NOTE Confidence: 0.85052985
- $00:14:34.978 \rightarrow 00:14:37.508$ factors within different organs,
- NOTE Confidence: 0.85052985
- $00{:}14{:}37{.}510 \dashrightarrow 00{:}14{:}40{.}821$ and that might be leading to the
- NOTE Confidence: 0.85052985
- $00:14:40.821 \rightarrow 00:14:43.715$ multi organ symptoms that I explained
- NOTE Confidence: 0.85052985
- $00:14:43.715 \longrightarrow 00:14:45.098$ to you before,
- NOTE Confidence: 0.85052985
- $00{:}14{:}45{.}100 \dashrightarrow 00{:}14{:}48{.}166$ and so both of these possibilities
- NOTE Confidence: 0.85052985
- $00:14:48.166 \rightarrow 00:14:50.210$ are still remaining valid.
- NOTE Confidence: 0.85052985
- $00:14:50.210 \longrightarrow 00:14:53.276$ And there is ample evidence for
- NOTE Confidence: 0.85052985
- $00:14:53.276 \longrightarrow 00:14:56.515$ both of these types of disease
- NOTE Confidence: 0.85052985
- $00:14:56.515 \rightarrow 00:14:59.235$ to be happening with COVID.
- NOTE Confidence: 0.85052985
- $00:14:59.240 \longrightarrow 00:15:02.820$ And so just share with you a couple of these.
- NOTE Confidence: 0.85052985
- $00{:}15{:}02.820 \dashrightarrow 00{:}15{:}05.412$ This is a study that biopsied
- NOTE Confidence: 0.85052985
- $00{:}15{:}05{.}412 \dashrightarrow 00{:}15{:}07{.}680$ intestine of patients with COVID.
- NOTE Confidence: 0.85052985
- $00{:}15{:}07.680 \dashrightarrow 00{:}15{:}11.658$ This is a 92 days from the symptom onset,
- NOTE Confidence: 0.85052985
- $00{:}15{:}11.660 \dashrightarrow 00{:}15{:}14.817$ so months after they have had started
- NOTE Confidence: 0.85052985
- 00:15:14.817 --> 00:15:18.434 the symptom and looking at what this is
- NOTE Confidence: 0.85052985

 $00{:}15{:}18.434 \dashrightarrow 00{:}15{:}21.380$ looking at is really source code V2,

NOTE Confidence: 0.85052985

 $00:15:21.380 \longrightarrow 00:15:24.032$ which is the virus that causes

NOTE Confidence: 0.85052985

00:15:24.032 --> 00:15:25.800 COVID new nucleocapsid protein,

NOTE Confidence: 0.85052985

 $00{:}15{:}25{.}800 \dashrightarrow 00{:}15{:}28{.}460$ which is indicated in green here and

NOTE Confidence: 0.85052985

 $00{:}15{:}28{.}460 \dashrightarrow 00{:}15{:}31{.}383$ you can see that these intestinal

NOTE Confidence: 0.85052985

 $00{:}15{:}31{.}383 \dashrightarrow 00{:}15{:}33{.}647$ sections contain cells with.

NOTE Confidence: 0.85052985

00:15:33.650 --> 00:15:36.344 Very distinct patterns of the nuclear

NOTE Confidence: 0.85052985

 $00:15:36.344 \rightarrow 00:15:39.359$ protein that you can see within the

NOTE Confidence: 0.85052985

 $00{:}15{:}39{.}359 \dashrightarrow 00{:}15{:}42{.}012$ cytosol of these cells and this is

NOTE Confidence: 0.85052985

 $00{:}15{:}42.096 \dashrightarrow 00{:}15{:}44.604$ from the terminal ileum and this

NOTE Confidence: 0.85052985

 $00{:}15{:}44.604 \dashrightarrow 00{:}15{:}46.276$ is from the duodenum.

NOTE Confidence: 0.85052985

00:15:46.280 --> 00:15:49.227 You can see that there are these

NOTE Confidence: 0.85052985

 $00{:}15{:}49{.}227 \dashrightarrow 00{:}15{:}50{.}974$ nucleocapsid positive cells that

NOTE Confidence: 0.85052985

 $00{:}15{:}50{.}974 \dashrightarrow 00{:}15{:}53{.}044$ are mostly epithelial cells that

NOTE Confidence: 0.85052985

 $00{:}15{:}53.044 \dashrightarrow 00{:}15{:}54.700$ are in the intestine,

NOTE Confidence: 0.85052985

 $00:15:54.700 \longrightarrow 00:15:57.164$ and they found five out of 14

- NOTE Confidence: 0.85052985
- $00:15:57.164 \rightarrow 00:15:59.749$ people who had positive staining.
- NOTE Confidence: 0.85052985
- $00:15:59.750 \longrightarrow 00:16:01.860$ For SARS Co V2 antigen.
- NOTE Confidence: 0.85052985
- $00{:}16{:}01.860 \dashrightarrow 00{:}16{:}04.260$ After an extended time period.
- NOTE Confidence: 0.85052985
- $00{:}16{:}04{.}260 \dashrightarrow 00{:}16{:}06{.}984$ Indicating that the viral reservoir could
- NOTE Confidence: 0.85052985
- $00{:}16{:}06{.}984 \dashrightarrow 00{:}16{:}10{.}368$ be happening in the long COVID patients.
- NOTE Confidence: 0.8219955
- $00:16:12.610 \longrightarrow 00:16:14.845$ Another possibility is the autoimmunity
- NOTE Confidence: 0.8219955
- $00{:}16{:}14.845 \dashrightarrow 00{:}16{:}18.691$ and this is a work that we published
- NOTE Confidence: 0.8219955
- $00:16:18.691 \rightarrow 00:16:21.236$ very recently where in collaboration
- NOTE Confidence: 0.8219955
- $00:16:21.236 \rightarrow 00:16:24.108$ with Doctor Aaron Rings Laboratory,
- NOTE Confidence: 0.8219955
- 00:16:24.110 --> 00:16:28.205 we dissected the existence of auto antibodies
- NOTE Confidence: 0.8219955
- $00{:}16{:}28.205 \dashrightarrow 00{:}16{:}32.439$ and COVID-19 and I want to take you through
- NOTE Confidence: 0.8219955
- $00{:}16{:}32{.}439 \dashrightarrow 00{:}16{:}36{.}110$ some of the key data from this study.
- NOTE Confidence: 0.8219955
- 00:16:36.110 --> 00:16:39.183 So doctor ranks laboratory developed a new
- NOTE Confidence: 0.8219955
- $00{:}16{:}39{.}183 \dashrightarrow 00{:}16{:}42{.}190$ tool called rapid extracellular antigen.
- NOTE Confidence: 0.8219955
- $00:16:42.190 \longrightarrow 00:16:45.963$ Profiling rape this is a powerful new
- NOTE Confidence: 0.8219955

 $00{:}16{:}45{.}963 \dashrightarrow 00{:}16{:}49{.}641$ technology in which you can assess the

NOTE Confidence: 0.8219955

 $00{:}16{:}49{.}641 \dashrightarrow 00{:}16{:}53{.}182$ ability of a patients antibody to bind

NOTE Confidence: 0.8219955

 $00{:}16{:}53.182 \dashrightarrow 00{:}16{:}56.619$ to variety of self antigens that are

NOTE Confidence: 0.8219955

00:16:56.619 --> 00:16:59.726 about 3000 different human EXO proteome,

NOTE Confidence: 0.8219955

 $00{:}16{:}59{.}726 \dashrightarrow 00{:}17{:}03{.}487$ which means that proteins that are either

NOTE Confidence: 0.8219955

00:17:03.487 --> 00:17:05.967 extracellular or secreted are included

NOTE Confidence: 0.8219955

 $00{:}17{:}05{.}967 \dashrightarrow 00{:}17{:}10{.}060$ in the in this East library and each

NOTE Confidence: 0.8219955

 $00:17:10.060 \rightarrow 00:17:13.090$ cell expresses different type of human.

NOTE Confidence: 0.8219955

 $00{:}17{:}13.090 \dashrightarrow 00{:}17{:}16.660$ Conditions and when you bind your antibody

NOTE Confidence: 0.8219955

 $00{:}17{:}16.660 \dashrightarrow 00{:}17{:}20.747$ to these cells and you can pull down the

NOTE Confidence: 0.8219955

 $00{:}17{:}20.747 \dashrightarrow 00{:}17{:}23.919$ cells that are bound by the antibody,

NOTE Confidence: 0.8219955

 $00{:}17{:}23{.}920 \dashrightarrow 00{:}17{:}26{.}895$ and then you can figure out what

NOTE Confidence: 0.8219955

 $00{:}17{:}26.895 \dashrightarrow 00{:}17{:}29.798$ kind of antigen was expressed by

NOTE Confidence: 0.8219955

 $00:17:29.798 \dashrightarrow 00:17:32.870$ such east by doing deep sequencing.

NOTE Confidence: 0.8219955

 $00:17:32.870 \rightarrow 00:17:35.859$ And this enables doctoring to determine a

NOTE Confidence: 0.8219955

 $00:17:35.859 \rightarrow 00:17:38.984$ wide variety of autoantibodies from a patient

- NOTE Confidence: 0.8219955
- 00:17:38.984 --> 00:17:42.760 in a very high throughput and comprehensive,

 $00:17:42.760 \longrightarrow 00:17:43.752$ unbiased manner.

NOTE Confidence: 0.8219955

 $00:17:43.752 \longrightarrow 00:17:47.224$ So with this his group and we

NOTE Confidence: 0.8219955

 $00{:}17{:}47.224 \dashrightarrow 00{:}17{:}49.873$ collaborated to look at auto

NOTE Confidence: 0.8219955

00:17:49.873 --> 00:17:51.933 antibodies and COVID-19 patients.

NOTE Confidence: 0.8219955

 $00:17:51.940 \longrightarrow 00:17:53.820$ These are hospitalized patients

NOTE Confidence: 0.8219955

 $00:17:53.820 \longrightarrow 00:17:55.700$ who had severe disease.

NOTE Confidence: 0.8219955

00:17:55.700 -> 00:17:57.083 Here moderate disease,

NOTE Confidence: 0.8219955

 $00{:}17{:}57{.}083 \dashrightarrow 00{:}17{:}59{.}849$ mild to asymptomatic who are not

NOTE Confidence: 0.8219955

 $00:17:59.849 \rightarrow 00:18:01.809$ hospitalized in negative controls.

NOTE Confidence: 0.8219955

 $00:18:01.810 \longrightarrow 00:18:04.160$ And the brighter the yellow,

NOTE Confidence: 0.8219955

 $00{:}18{:}04{.}160 \dashrightarrow 00{:}18{:}07{.}835$ the more autoantibody there is in a

NOTE Confidence: 0.8219955

 $00:18:07.835 \rightarrow 00:18:12.039$ patient and each patient is a column here.

NOTE Confidence: 0.8219955

00:18:12.040 --> 00:18:14.651 And what we found was quite striking

NOTE Confidence: 0.8219955

 $00{:}18{:}14.651 \dashrightarrow 00{:}18{:}17.252$ that there are auto antibodies against

00:18:17.252 --> 00:18:20.060 so many different host proteins over

NOTE Confidence: 0.8219955

00:18:20.060 --> 00:18:23.292 120 different host proteins are bound

NOTE Confidence: 0.8219955

 $00:18:23.292 \longrightarrow 00:18:25.440$ by COVID-19 patients antibodies,

NOTE Confidence: 0.8219955

 $00{:}18{:}25{.}440 \dashrightarrow 00{:}18{:}27{.}750$ and here particularly prominent are NOTE Confidence: 0.8219955

 $00:18:27.750 \rightarrow 00:18:29.598$ the antibodies against interference,

NOTE Confidence: 0.8219955

00:18:29.600 --> 00:18:32.408 which are the very factors that

NOTE Confidence: 0.8219955

 $00{:}18{:}32{.}408 \dashrightarrow 00{:}18{:}35{.}238$ the host immune responses used to

NOTE Confidence: 0.8219955

 $00:18:35.238 \longrightarrow 00:18:36.990$ fight a viral infection.

NOTE Confidence: 0.8219955

00:18:36.990 --> 00:18:39.714 So obviously if you have auto

NOTE Confidence: 0.8219955

 $00{:}18{:}39{.}714 \dashrightarrow 00{:}18{:}42{.}170$ antibodies against your own weapon.

NOTE Confidence: 0.8219955

00:18:42.170 --> 00:18:44.390 Then you cannot deploy those weapons

NOTE Confidence: 0.8219955

 $00{:}18{:}44{.}390 \dashrightarrow 00{:}18{:}47{.}089$ well to fight a viral infection,

NOTE Confidence: 0.8219955

 $00{:}18{:}47.090 \dashrightarrow 00{:}18{:}49.430$ and that's really what's happening in

NOTE Confidence: 0.8219955

 $00{:}18{:}49{.}430 \dashrightarrow 00{:}18{:}51{.}804$ the severe cobett COVID patients that

NOTE Confidence: 0.8219955

 $00:18:51.804 \rightarrow 00:18:54.030$ these patients are unable to fight

NOTE Confidence: 0.8219955

 $00:18:54.030 \rightarrow 00:18:56.658$ the viral infection because of their

- NOTE Confidence: 0.8219955
- $00:18:56.658 \rightarrow 00:18:58.928$ autoantibody against the very protein

 $00:18:58.928 \rightarrow 00:19:01.440$ that's needed to combat viral infections.

NOTE Confidence: 0.8219955

00:19:01.440 --> 00:19:03.490 But in addition to these,

NOTE Confidence: 0.8219955

 $00:19:03.490 \rightarrow 00:19:05.950$ there are so many other yellow

NOTE Confidence: 0.8219955

 $00{:}19{:}05{.}950 \dashrightarrow 00{:}19{:}07{.}590$ boxes you see here,

NOTE Confidence: 0.8219955

 $00{:}19{:}07{.}590 \dashrightarrow 00{:}19{:}09{.}895$ which are autoantibody against variety

NOTE Confidence: 0.8219955

 $00:19:09.895 \longrightarrow 00:19:12.200$ of different immune cells themselves.

NOTE Confidence: 0.8219955

00:19:12.200 --> 00:19:14.270 Which is kind of scary,

NOTE Confidence: 0.8219955

 $00{:}19{:}14.270 \dashrightarrow 00{:}19{:}16.425$ which means that these autoantibodies

NOTE Confidence: 0.8219955

00:19:16.425 --> 00:19:18.580 are actually dampening our own

NOTE Confidence: 0.8219955

 $00:19:18.649 \rightarrow 00:19:20.869$ ability to fight a viral infection.

NOTE Confidence: 0.8219955

 $00{:}19{:}20.870 \dashrightarrow 00{:}19{:}24.174$ Just to give you a couple of examples,

NOTE Confidence: 0.8219955

 $00{:}19{:}24{.}180 \dashrightarrow 00{:}19{:}26{.}838$ this is looking at cumulative autoantibodies

NOTE Confidence: 0.8219955

00:19:26.838 --> 00:19:29.756 that exist in COVID-19 patients and a

NOTE Confidence: 0.8219955

00:19:29.756 --> 00:19:32.255 severe moderate patients who are in the

 $00{:}19{:}32{.}330 \dashrightarrow 00{:}19{:}34{.}874$ hospital developed a large number of

NOTE Confidence: 0.8219955

00:19:34.874 --> 00:19:37.606 auto antibodies against all of these

NOTE Confidence: 0.8219955

00:19:37.606 --> 00:19:40.714 different immune factors and cell types.

NOTE Confidence: 0.8219955

 $00{:}19{:}40.720 \dashrightarrow 00{:}19{:}43.583$ And when you look at the functional

NOTE Confidence: 0.8219955

 $00:19:43.583 \rightarrow 00:19:45.960$ consequences of these autoantibodies,

NOTE Confidence: 0.8219955

 $00:19:45.960 \longrightarrow 00:19:48.340$ it is quite striking that,

NOTE Confidence: 0.8219955

 $00:19:48.340 \longrightarrow 00:19:49.405$ as I mentioned,

NOTE Confidence: 0.8219955

 $00:19:49.405 \longrightarrow 00:19:52.724$ the top left box corner that had these

NOTE Confidence: 0.8219955

00:19:52.724 --> 00:19:54.998 interferon specific autoantibodies.

NOTE Confidence: 0.8219955

 $00{:}19{:}55{.}000 \dashrightarrow 00{:}19{:}58{.}276$ If you look at those patients ability

NOTE Confidence: 0.8219955

00:19:58.276 --> 00:20:01.658 to control the viral load over time,

NOTE Confidence: 0.8219955

 $00{:}20{:}01.660 \dashrightarrow 00{:}20{:}04.305$ inbred the patients with these

NOTE Confidence: 0.8219955

 $00{:}20{:}04{.}305 \dashrightarrow 00{:}20{:}05{.}892$ interferon specific autoantibodies

NOTE Confidence: 0.8219955

 $00:20:05.892 \rightarrow 00:20:08.328$ were unable to clear the virus,

NOTE Confidence: 0.83178055

 $00{:}20{:}08{.}330 \dashrightarrow 00{:}20{:}10{.}780$ whereas those patients without work.

NOTE Confidence: 0.83178055

 $00{:}20{:}10.780 \dashrightarrow 00{:}20{:}13.867$ Able to decline in viral load and

- NOTE Confidence: 0.83178055
- $00:20:13.867 \rightarrow 00:20:16.530$ ultimately control the virus infection.

 $00:20:16.530 \longrightarrow 00:20:17.964$ Indicating that these

NOTE Confidence: 0.83178055

 $00:20:17.964 \rightarrow 00:20:20.354$ autoantibodies are not only there,

NOTE Confidence: 0.83178055

 $00:20:20.360 \rightarrow 00:20:23.285$ but it's functionally impairing our

NOTE Confidence: 0.83178055

 $00:20:23.285 \longrightarrow 00:20:27.290$ ability to fight a viral infection.

NOTE Confidence: 0.83178055

 $00{:}20{:}27{.}290 \dashrightarrow 00{:}20{:}29{.}756$ And one more example of autoantibody

NOTE Confidence: 0.83178055

 $00:20:29.756 \rightarrow 00:20:31.840$ against different immune cell types.

NOTE Confidence: 0.83178055

00:20:31.840 --> 00:20:33.500 So you've probably heard

NOTE Confidence: 0.83178055

 $00{:}20{:}33{.}500 \dashrightarrow 00{:}20{:}35{.}160$ a lot about antibodies.

NOTE Confidence: 0.83178055

00:20:35.160 --> 00:20:36.812 Antibodies are really important

NOTE Confidence: 0.83178055

 $00:20:36.812 \longrightarrow 00:20:38.877$ to fight a viral infection,

NOTE Confidence: 0.83178055

00:20:38.880 --> 00:20:41.736 and the cell types that produce these

NOTE Confidence: 0.83178055

00:20:41.736 --> 00:20:44.643 antibodies are known as B cells and

NOTE Confidence: 0.83178055

 $00{:}20{:}44.643 \dashrightarrow 00{:}20{:}46.648$ B cells themselves are absolutely

NOTE Confidence: 0.83178055

 $00{:}20{:}46.648 \dashrightarrow 00{:}20{:}48.820$ critical for making the antibody.

 $00{:}20{:}48.820 \dashrightarrow 00{:}20{:}51.852$ And yet in some people we found that

NOTE Confidence: 0.83178055

 $00:20:51.852 \rightarrow 00:20:54.164$ COVID patients developed an antibody

NOTE Confidence: 0.83178055

 $00{:}20{:}54.164 \dashrightarrow 00{:}20{:}56.624$ against the B cells themselves.

NOTE Confidence: 0.83178055

 $00{:}20{:}56.630 \dashrightarrow 00{:}20{:}59.766$ So it's like a real like a suicidal

NOTE Confidence: 0.83178055

 $00{:}20{:}59.766 \dashrightarrow 00{:}21{:}02.315$ antibody that you know bind to the

NOTE Confidence: 0.83178055

 $00{:}21{:}02{.}315 \dashrightarrow 00{:}21{:}04.879$ B cells and then then kill them.

NOTE Confidence: 0.83178055

 $00:21:04.880 \rightarrow 00:21:06.760$ And these antibodies interesting Lee.

NOTE Confidence: 0.83178055

 $00{:}21{:}06.760 \dashrightarrow 00{:}21{:}09.226$ Those people who had these peaceful

NOTE Confidence: 0.83178055

 $00{:}21{:}09{.}226$ --> $00{:}21{:}11{.}833$ specific anybody have very low B cells NOTE Confidence: 0.83178055

 $00{:}21{:}11{.}833 \dashrightarrow 00{:}21{:}14{.}410$ as well as inability to mount and a

NOTE Confidence: 0.83178055

 $00{:}21{:}14.410 \dashrightarrow 00{:}21{:}16.510$ antibody response against the virus.

NOTE Confidence: 0.83178055

 $00:21:16.510 \longrightarrow 00:21:17.530$ So really,

NOTE Confidence: 0.83178055

 $00{:}21{:}17.530 \dashrightarrow 00{:}21{:}19.570$ indicating that these autoantibodies

NOTE Confidence: 0.83178055

 $00:21:19.570 \longrightarrow 00:21:22.051$ have a impairment induced impairment

NOTE Confidence: 0.83178055

 $00{:}21{:}22{.}051 \dashrightarrow 00{:}21{:}25{.}011$ in the immune system so that people can

NOTE Confidence: 0.83178055

 $00{:}21{:}25.011 \dashrightarrow 00{:}21{:}27.759$ no longer fight the viral infection.

- NOTE Confidence: 0.83178055
- $00:21:27.760 \longrightarrow 00:21:30.652$ And in addition to these immune

 $00:21:30.652 \rightarrow 00:21:32.580$ factors and cell types,

NOTE Confidence: 0.83178055

 $00{:}21{:}32{.}580 \dashrightarrow 00{:}21{:}35{.}471$ we found auto antibodies to a wide

NOTE Confidence: 0.83178055

 $00{:}21{:}35{.}471 \dashrightarrow 00{:}21{:}37{.}912$ range of tissue associated antigens

NOTE Confidence: 0.83178055

 $00:21:37.912 \longrightarrow 00:21:41.260$ that are in the brain vasculature,

NOTE Confidence: 0.83178055

 $00{:}21{:}41{.}260 \dashrightarrow 00{:}21{:}43{.}184$ connective tissues, cardiac tissues,

NOTE Confidence: 0.83178055

00:21:43.184 --> 00:21:45.344 hepatic tissues, saliva skin,

NOTE Confidence: 0.83178055

00:21:45.344 --> 00:21:48.329 GI tract, and many others.

NOTE Confidence: 0.83178055

 $00{:}21{:}48.330 \dashrightarrow 00{:}21{:}51.914$ So this really paints a picture of a

NOTE Confidence: 0.83178055

00:21:51.914 --> 00:21:54.549 diverse autoantibody causing all kinds of,

NOTE Confidence: 0.83178055

00:21:54.550 --> 00:21:55.438 you know,

NOTE Confidence: 0.83178055

 $00{:}21{:}55{.}438 \dashrightarrow 00{:}21{:}57{.}214$ immune mediated damage across

NOTE Confidence: 0.83178055

 $00:21:57.214 \longrightarrow 00:21:58.990$ variety of different organs.

NOTE Confidence: 0.83178055

 $00{:}21{:}58{.}990 \dashrightarrow 00{:}22{:}01{.}944$ And that was my second hypothesis of

NOTE Confidence: 0.83178055

00:22:01.944 --> 00:22:04.758 how along COVID might develop now.

 $00:22:04.760 \longrightarrow 00:22:07.784$ These are really patients who had like

NOTE Confidence: 0.83178055

 $00{:}22{:}07{.}784 \dashrightarrow 00{:}22{:}10{.}528$ severe disease enough to be hospitalised,

NOTE Confidence: 0.83178055

 $00:22:10.530 \longrightarrow 00:22:13.212$ so it's not really the typical

NOTE Confidence: 0.83178055

 $00:22:13.212 \longrightarrow 00:22:16.021$ loan COVID patients were right now

NOTE Confidence: 0.83178055

00:22:16.021 --> 00:22:18.823 looking at long COVID patients SERA.

NOTE Confidence: 0.83178055

 $00{:}22{:}18.830 \dashrightarrow 00{:}22{:}21.590$ To see if we see a similar kinds

NOTE Confidence: 0.83178055

 $00{:}22{:}21{.}590 \dashrightarrow 00{:}22{:}24{.}176$ of autoantibodies an if So what the

NOTE Confidence: 0.83178055

 $00:22:24.176 \rightarrow 00:22:26.001$ nature of these autoantibodies are,

NOTE Confidence: 0.83178055

 $00{:}22{:}26.010 \dashrightarrow 00{:}22{:}28.014$ you know what kinds of tissue

NOTE Confidence: 0.83178055

 $00:22:28.014 \rightarrow 00:22:29.960$ or antigens are they binding?

NOTE Confidence: 0.8698312

 $00{:}22{:}32{.}370 \dashrightarrow 00{:}22{:}36{.}190$ So it seems that there is very little that we

NOTE Confidence: 0.8698312

 $00{:}22{:}36{.}277 \dashrightarrow 00{:}22{:}40{.}093$ can do right now to help long COVID patients.

NOTE Confidence: 0.8698312

 $00{:}22{:}40{.}100 \dashrightarrow 00{:}22{:}43{.}316$ We don't have a the rapy, we don't even

NOTE Confidence: 0.8698312

 $00:22:43.316 \rightarrow 00:22:46.620$ have a great diagnosis for the long COVID.

NOTE Confidence: 0.8698312

 $00:22:46.620 \longrightarrow 00:22:49.497$ Finally, the CDC has a guideline for

NOTE Confidence: 0.8698312

00:22:49.497 --> 00:22:51.909 COVID diagnosis for the long COVID,

- NOTE Confidence: 0.8698312
- $00:22:51.910 \rightarrow 00:22:55.490$ but there is one kind of ray of hope here

 $00{:}22{:}55{.}581 \dashrightarrow 00{:}22{:}58{.}725$ because I've been looking and hearing

NOTE Confidence: 0.8698312

 $00:22:58.725 \longrightarrow 00:23:02.050$ from people on Twitter that patient.

NOTE Confidence: 0.8698312

00:23:02.050 --> 00:23:03.950 Patient based group reporting.

NOTE Confidence: 0.8698312

 $00:23:03.950 \longrightarrow 00:23:07.184$ About 40% of the long haulers.

NOTE Confidence: 0.8698312

 $00{:}23{:}07{.}184 \dashrightarrow 00{:}23{:}09{.}468$ Feeling better after vaccination.

NOTE Confidence: 0.8698312

 $00:23:09.470 \longrightarrow 00:23:11.520$ And so, as I mentioned,

NOTE Confidence: 0.8698312

 $00:23:11.520 \longrightarrow 00:23:14.088$ long COVID may be caused by

NOTE Confidence: 0.8698312

 $00{:}23{:}14.088 \dashrightarrow 00{:}23{:}16.955$ persistent viral reservoir or and or

NOTE Confidence: 0.8698312

 $00{:}23{:}16.955 \dashrightarrow 00{:}23{:}19.107$ autoantibody or autoimmune response.

NOTE Confidence: 0.8698312

 $00{:}23{:}19{.}110 \dashrightarrow 00{:}23{:}22{.}198$ And so we think that the vaccine may

NOTE Confidence: 0.8698312

 $00{:}23{:}22.198 \dashrightarrow 00{:}23{:}25.108$ improve long covered symptom by inducing

NOTE Confidence: 0.8698312

00:23:25.108 --> 00:23:28.186 robust antibodies and T cells against

NOTE Confidence: 0.8698312

 $00{:}23{:}28{.}265 \dashrightarrow 00{:}23{:}30{.}869$ the virus to clear the reservoir.

NOTE Confidence: 0.8698312

 $00{:}23{:}30{.}870 \dashrightarrow 00{:}23{:}34{.}685$ Or it may temporarily sort of suppress

 $00{:}23{:}34.685 \dashrightarrow 00{:}23{:}38.255$ the autoreactive cells ability to cause

NOTE Confidence: 0.8698312

 $00:23:38.255 \rightarrow 00:23:41.325$ toxic immunopathology in the patients,

NOTE Confidence: 0.8698312

 $00:23:41.330 \longrightarrow 00:23:45.397$ and So what this means is that,

NOTE Confidence: 0.8698312

 $00{:}23{:}45{.}400 \dashrightarrow 00{:}23{:}49{.}540$ for instance, the M RNA vaccines.

NOTE Confidence: 0.8698312

 $00{:}23{:}49{.}540 \dashrightarrow 00{:}23{:}52{.}276$ Induce both innate and adaptive immune

NOTE Confidence: 0.8698312

 $00{:}23{:}52{.}276 \dashrightarrow 00{:}23{:}54{.}718$ responses and the innate immune

NOTE Confidence: 0.8698312

 $00{:}23{:}54{.}718$ --> $00{:}23{:}57{.}398$ response cytokines combined two and

NOTE Confidence: 0.8698312

 $00{:}23{:}57{.}398 \dashrightarrow 00{:}24{:}00{.}106$ suppress the autoreactive cells and

NOTE Confidence: 0.8698312

 $00{:}24{:}00{.}106$ --> $00{:}24{:}03{.}016$ therefore improve the symptoms or the

NOTE Confidence: 0.8698312

00:24:03.016 --> 00:24:05.388 adaptive immune responses that are

NOTE Confidence: 0.8698312

 $00{:}24{:}05{.}388$ --> $00{:}24{:}08{.}112$ engaged by the vaccine with antibodies NOTE Confidence: 0.8698312

 $00{:}24{:}08{.}112 \dashrightarrow 00{:}24{:}11{.}551$ and T cells that are attacking the

NOTE Confidence: 0.8698312

 $00{:}24{:}11.551 \dashrightarrow 00{:}24{:}14.642$ virus of our and controlling the

NOTE Confidence: 0.8698312

 $00:24:14.642 \rightarrow 00:24:17.427$ persistent virus in these patients,

NOTE Confidence: 0.8698312

 $00:24:17.430 \longrightarrow 00:24:21.550$ and maybe both of these things are happening.

NOTE Confidence: 0.8698312

 $00{:}24{:}21{.}550 \dashrightarrow 00{:}24{:}24{.}080$ Depending on what the patients

- NOTE Confidence: 0.8698312
- $00:24:24.080 \longrightarrow 00:24:27.250$ have with respect to long covin.
- NOTE Confidence: 0.8698312
- $00{:}24{:}27{.}250 \dashrightarrow 00{:}24{:}31{.}390$ And so we thought that this would be a
- NOTE Confidence: 0.8698312
- 00:24:31.390 --> 00:24:35.593 great place to look into the underlying
- NOTE Confidence: 0.8698312
- $00{:}24{:}35{.}593 \dashrightarrow 00{:}24{:}39{.}435$ mechanism along COVID as well as
- NOTE Confidence: 0.8698312
- $00{:}24{:}39{.}435 \dashrightarrow 00{:}24{:}43{.}353$ potentially defined the rapy against it so.
- NOTE Confidence: 0.8698312
- $00{:}24{:}43{.}360 \dashrightarrow 00{:}24{:}46{.}300$ We formed a Yale COVID recovery study
- NOTE Confidence: 0.8698312
- $00{:}24{:}46{.}300 \dashrightarrow 00{:}24{:}50{.}645$ and when I say we it's really a superb
- NOTE Confidence: 0.8698312
- 00:24:50.645 --> 00:24:53.754 leadership of Harlan Krumholz and his
- NOTE Confidence: 0.8698312
- 00:24:53.754 --> 00:24:56.314 post grad associate Daisy Massey,
- NOTE Confidence: 0.8698312
- $00:24:56.320 \longrightarrow 00:24:58.720$ who really put this forward.
- NOTE Confidence: 0.8698312
- $00{:}24{:}58{.}720 \dashrightarrow 00{:}25{:}01{.}960$ And now we have a study up and
- NOTE Confidence: 0.8698312
- $00{:}25{:}01{.}960 \dashrightarrow 00{:}25{:}04{.}931$ running where we are recruiting among
- NOTE Confidence: 0.8698312
- $00{:}25{:}04{.}931 \dashrightarrow 00{:}25{:}08{.}027$ COVID patients with who have not
- NOTE Confidence: 0.8698312
- $00{:}25{:}08{.}120 \dashrightarrow 00{:}25{:}10{.}240$ gotten the vaccine yet,
- NOTE Confidence: 0.8698312
- $00:25:10.240 \longrightarrow 00:25:12.100$ and then we're following
- NOTE Confidence: 0.8698312
$00:25:12.100 \rightarrow 00:25:13.960$ their immune response overtime

NOTE Confidence: 0.8698312

00:25:13.960 - 00:25:16.230 after they become vaccinated.

NOTE Confidence: 0.8698312

 $00{:}25{:}16{.}230 \dashrightarrow 00{:}25{:}19{.}776$ To see what kind of changes occur in the NOTE Confidence: 0.8698312

 $00{:}25{:}19.776$ --> $00{:}25{:}23.068$ immune response in the long haulers and

NOTE Confidence: 0.8698312

 $00{:}25{:}23.068 \dashrightarrow 00{:}25{:}26.058$ what those changes mean with respect

NOTE Confidence: 0.8698312

 $00{:}25{:}26.058 \dashrightarrow 00{:}25{:}29.136$ to their recovery from the symptoms.

NOTE Confidence: 0.8698312

 $00{:}25{:}29{.}140 \dashrightarrow 00{:}25{:}32{.}612$ And this is again of a large

NOTE Confidence: 0.8698312

00:25:32.612 --> 00:25:35.128 collaboration between Charles de la Cruz,

NOTE Confidence: 0.8698312

00:25:35.130 --> 00:25:36.890 Natalie Lambert Arm Ring,

NOTE Confidence: 0.8698312

 $00:25:36.890 \rightarrow 00:25:39.530$ who I already mentioned is the

NOTE Confidence: 0.8698312

 $00{:}25{:}39.612 \dashrightarrow 00{:}25{:}42.047$ creator of the Reed technology.

NOTE Confidence: 0.8698312

 $00:25:42.050 \rightarrow 00:25:45.431$ Erica spots as well as these other

NOTE Confidence: 0.8698312

 $00:25:45.431 \rightarrow 00:25:47.850$ younger investigators who are really.

NOTE Confidence: 0.8698312

 $00{:}25{:}47.850 \dashrightarrow 00{:}25{:}49.275$ Recruiting and consenting

NOTE Confidence: 0.8698312

 $00{:}25{:}49{.}275 \dashrightarrow 00{:}25{:}51{.}175$ and studying the patients.

NOTE Confidence: 0.8698312

 $00:25:51.180 \longrightarrow 00:25:54.564$ And so I'm very fortunate to be involved

- NOTE Confidence: 0.8698312
- $00:25:54.564 \rightarrow 00:25:57.744$ in this large group who are really

 $00{:}25{:}57{.}744 \dashrightarrow 00{:}26{:}01{.}157$ looking at the impact of vaccine on

NOTE Confidence: 0.8698312

00:26:01.157 -> 00:26:04.379 long hauler with respect to every

NOTE Confidence: 0.8698312

 $00{:}26{:}04{.}379 \dashrightarrow 00{:}26{:}07{.}364$ immune parameter that you can imagine,

NOTE Confidence: 0.8698312

 $00:26:07.364 \rightarrow 00:26:10.220$ we're throwing everything at this disease.

NOTE Confidence: 0.8698312

 $00:26:10.220 \rightarrow 00:26:13.235$ Whatever the cutting edge technology

NOTE Confidence: 0.8698312

 $00:26:13.235 \longrightarrow 00:26:15.647$ we have on hand.

NOTE Confidence: 0.8698312

 $00{:}26{:}15.650 \dashrightarrow 00{:}26{:}18.639$ So the mission is really to understand

NOTE Confidence: 0.8698312

 $00{:}26{:}18.639 \dashrightarrow 00{:}26{:}20.380$ the immunological determinant of

NOTE Confidence: 0.8698312

 $00:26:20.380 \longrightarrow 00:26:22.365$ disease pathogenesis of long COVID.

NOTE Confidence: 0.8698312

 $00{:}26{:}22{.}370 \dashrightarrow 00{:}26{:}24{.}890$ In order to inform rational the rapy.

NOTE Confidence: 0.8698312

 $00{:}26{:}24{.}890 \dashrightarrow 00{:}26{:}28{.}130$ And we're very excited to to

NOTE Confidence: 0.8698312

 $00:26:28.130 \longrightarrow 00:26:31.210$ carry on with this effort.

NOTE Confidence: 0.8698312

00:26:31.210 --> 00:26:33.070 So I want to acknowledge

NOTE Confidence: 0.8698312

 $00{:}26{:}33.070 \dashrightarrow 00{:}26{:}34.930$ the number of people here.

 $00:26:34.930 \longrightarrow 00:26:37.274$ First of all, I was able to only

NOTE Confidence: 0.8404231

 $00{:}26{:}37{.}274 \dashrightarrow 00{:}26{:}39{.}577$ discuss a little bit of our research

NOTE Confidence: 0.8404231

 $00{:}26{:}39{.}577 \dashrightarrow 00{:}26{:}42{.}815$ today that has to do with the diverse

NOTE Confidence: 0.8404231

 $00:26:42.815 \rightarrow 00:26:45.350$ autoantibodies in patients with COVID-19.

NOTE Confidence: 0.8404231

 $00{:}26{:}45{.}350 \dashrightarrow 00{:}26{:}47{.}798$ But I also mentioned some of the misfiring

NOTE Confidence: 0.8404231

 $00{:}26{:}47.798 \dashrightarrow 00{:}26{:}49.769$ of the immunological responses that

NOTE Confidence: 0.8404231

 $00:26:49.769 \rightarrow 00:26:52.786$ happen in severe COVID with fatal COVID.

NOTE Confidence: 0.8404231

 $00:26:52.790 \rightarrow 00:26:55.387$ I also mentioned there's a delay in

NOTE Confidence: 0.8404231

 $00{:}26{:}55{.}387 \dashrightarrow 00{:}26{:}57{.}285$ the neutralizing antibody titer and

NOTE Confidence: 0.8404231

 $00{:}26{:}57{.}285 \dashrightarrow 00{:}26{:}59{.}080$ then sex differences in immunity

NOTE Confidence: 0.8404231

 $00{:}26{:}59{.}080 \dashrightarrow 00{:}27{:}00{.}710$ that I mentioned earlier.

NOTE Confidence: 0.8404231

 $00{:}27{:}00{.}710 \dashrightarrow 00{:}27{:}03{.}910$ And these are the real heroes.

NOTE Confidence: 0.8404231

 $00:27:03.910 \longrightarrow 00:27:05.910$ They're the ones that really

NOTE Confidence: 0.8404231

 $00:27:05.910 \longrightarrow 00:27:07.510$ carried out the study.

NOTE Confidence: 0.8404231

00:27:07.510 -> 00:27:09.827 The names are listed here and my

NOTE Confidence: 0.8404231

 $00:27:09.827 \rightarrow 00:27:12.299$ lab members who have been absolutely

 $00:27:12.299 \rightarrow 00:27:15.107$ amazing over the entire pandemic period,

NOTE Confidence: 0.8404231

 $00:27:15.110 \rightarrow 00:27:17.910$ not only looking at the immune responses,

NOTE Confidence: 0.8404231

 $00{:}27{:}17{.}910 \dashrightarrow 00{:}27{:}20{.}028$ but also creating an animal model

NOTE Confidence: 0.8404231

 $00:27:20.028 \rightarrow 00:27:22.860$ to study COVID as well as really

NOTE Confidence: 0.8404231

 $00:27:22.860 \rightarrow 00:27:25.110$ getting involved in the surveillance.

NOTE Confidence: 0.8404231

 $00{:}27{:}25.110 \dashrightarrow 00{:}27{:}27.564$ The PCR testing for the health

NOTE Confidence: 0.8404231

 $00{:}27{:}27{.}564 \dashrightarrow 00{:}27{:}30{.}072$ care workers which were able to

NOTE Confidence: 0.8404231

00:27:30.072 - 00:27:32.454 pick up some early exposure cases.

NOTE Confidence: 0.8404231

00:27:32.460 --> 00:27:35.288 Back in the spring of last year,

NOTE Confidence: 0.8404231

 $00{:}27{:}35{.}290 \dashrightarrow 00{:}27{:}37{.}190$ when testing was quite limited

NOTE Confidence: 0.8404231

 $00{:}27{:}37{.}190 \dashrightarrow 00{:}27{:}39{.}877$ and this entire set of work that

NOTE Confidence: 0.8404231

 $00{:}27{:}39{.}877 \dashrightarrow 00{:}27{:}42{.}383$ are listed here is enabled by the

NOTE Confidence: 0.8404231

00:27:42.383 --> 00:27:44.180 impact deal BIOREPOSITORY,

NOTE Confidence: 0.8404231

 $00{:}27{:}44.180 \dashrightarrow 00{:}27{:}47.180$ which is run by Doctor Albert Co at

NOTE Confidence: 0.8404231

 $00:27:47.180 \longrightarrow 00:27:49.712$ the school public health as well

 $00:27:49.712 \longrightarrow 00:27:52.256$ as all the others listed here.

NOTE Confidence: 0.8404231

 $00{:}27{:}52{.}260 \dashrightarrow 00{:}27{:}55{.}332$ And I want to thank the funders for

NOTE Confidence: 0.8404231

 $00:27:55.332 \rightarrow 00:27:58.316$ allowing us to carry on this research,

NOTE Confidence: 0.8404231

 $00:27:58.320 \rightarrow 00:28:00.826$ so I'm going to stop sharing here

NOTE Confidence: 0.8404231

 $00:28:00.826 \longrightarrow 00:28:02.760$ and take any questions.

NOTE Confidence: 0.7615253

00:28:14.510 --> 00:28:15.650 Still no.

NOTE Confidence: 0.83940935

00:28:21.100 --> 00:28:23.074 OK, can you hear me now?

NOTE Confidence: 0.83940935

 $00:28:23.074 \rightarrow 00:28:25.302$ Yes yes wonderful ekigho sorry everybody.

NOTE Confidence: 0.83940935

 $00:28:25.302 \rightarrow 00:28:27.267$ We're having some technical difficulties

NOTE Confidence: 0.83940935

 $00:28:27.267 \rightarrow 00:28:29.647$ on my end so thank you for your patience.

NOTE Confidence: 0.83940935

 $00:28:29.650 \longrightarrow 00:28:30.310$ Wonderful presentation.

NOTE Confidence: 0.83940935

00:28:30.310 --> 00:28:31.960 Thank you very very much.

NOTE Confidence: 0.83940935

 $00:28:31.960 \rightarrow 00:28:34.389$ This is just extraordinary work and I

NOTE Confidence: 0.83940935

 $00{:}28{:}34{.}389 \dashrightarrow 00{:}28{:}36{.}558$ appreciate you giving kudos to the team.

NOTE Confidence: 0.83940935

00:28:36.560 --> 00:28:37.888 'cause as everyone knows,

NOTE Confidence: 0.83940935

 $00:28:37.888 \rightarrow 00:28:40.584$ this is a true team partnership and we're

 $00:28:40.584 \rightarrow 00:28:42.810$ so excited that you're leading the way.

NOTE Confidence: 0.83940935

 $00{:}28{:}42.810 \dashrightarrow 00{:}28{:}45.314$ I am actually shocked to see that we

NOTE Confidence: 0.83940935

 $00:28:45.314 \longrightarrow 00:28:47.749$ don't have any questions in the chat.

NOTE Confidence: 0.83940935

00:28:47.750 --> 00:28:49.718 So please, I know this group.

NOTE Confidence: 0.83940935

 $00:28:49.720 \longrightarrow 00:28:52.440$ This is not a shy group of alumni.

NOTE Confidence: 0.83940935

00:28:52.440 --> 00:28:53.815 Submit your questions and luckily

NOTE Confidence: 0.83940935

 $00{:}28{:}53.815 \dashrightarrow 00{:}28{:}55.749$ we did have a couple people submit

NOTE Confidence: 0.83940935

 $00{:}28{:}55{.}749 \dashrightarrow 00{:}28{:}57{.}749$ to me just a few days prior because

NOTE Confidence: 0.83940935

 $00{:}28{:}57{.}803 \dashrightarrow 00{:}28{:}59{.}585$ they were so excited they couldn't.

NOTE Confidence: 0.83940935

00:28:59.590 --> 00:29:01.473 They couldn't wait to ask you, Akiko.

NOTE Confidence: 0.83940935

 $00{:}29{:}01{.}473 \dashrightarrow 00{:}29{:}03{.}570$ So let me let me jump right in with

NOTE Confidence: 0.83940935

 $00{:}29{:}03.635 \dashrightarrow 00{:}29{:}05.639$ some of our pre submitted questions.

NOTE Confidence: 0.83940935

00:29:05.640 --> 00:29:07.704 The first is why do you think women

NOTE Confidence: 0.83940935

 $00{:}29{:}07{.}704 \dashrightarrow 00{:}29{:}10{.}038$ are more at risk of getting lung COVID? NOTE Confidence: 0.85460174

 $00{:}29{:}11.000 \dashrightarrow 00{:}29{:}13.961$ Yeah, so that's a very interesting question NOTE Confidence: 0.85460174

 $00:29:13.961 \rightarrow 00:29:17.647$ because as I mentioned in the seminar there,

NOTE Confidence: 0.85460174

 $00{:}29{:}17.650 \dashrightarrow 00{:}29{:}20.404$ the demographic for the long COVID

NOTE Confidence: 0.85460174

 $00{:}29{:}20{.}404 \dashrightarrow 00{:}29{:}23{.}651$ is quite distinct from what we see

NOTE Confidence: 0.85460174

 $00:29:23.651 \rightarrow 00:29:25.866$ with the hospitalized patients who

NOTE Confidence: 0.85460174

 $00{:}29{:}25{.}866$ --> $00{:}29{:}29{.}292$ are much older and males are more at

NOTE Confidence: 0.85460174

00:29:29.292 --> 00:29:31.920 risk for severe disease with COVID,

NOTE Confidence: 0.85460174

 $00{:}29{:}31{.}920 \dashrightarrow 00{:}29{:}35{.}350$ whereas the long Cove it is really

NOTE Confidence: 0.85460174

00:29:35.350 - 00:29:38.988 dominated by younger women 30 to 50 year

NOTE Confidence: 0.85460174

 $00{:}29{:}38{.}988 \dashrightarrow 00{:}29{:}41{.}880$ old there dominated in that group so.

NOTE Confidence: 0.85460174

 $00:29:41.880 \longrightarrow 00:29:44.268$ There are a couple of reasons

NOTE Confidence: 0.85460174

 $00:29:44.268 \longrightarrow 00:29:45.860$ why this might be.

NOTE Confidence: 0.85460174

 $00:29:45.860 \longrightarrow 00:29:48.248$ One is what I alluded to,

NOTE Confidence: 0.85460174

 $00:29:48.250 \longrightarrow 00:29:50.497$ which is this group of women are

NOTE Confidence: 0.85460174

 $00:29:50.497 \longrightarrow 00:29:52.990$ also a high risk for developing

NOTE Confidence: 0.85460174

 $00{:}29{:}52{.}990 \dashrightarrow 00{:}29{:}55{.}410$ autoimmune disease such as lupus,

NOTE Confidence: 0.85460174

 $00:29:55.410 \rightarrow 00:29:56.950$ arthritis and many others,

 $00:29:56.950 \rightarrow 00:29:59.746$ and so if that's the group that's

NOTE Confidence: 0.85460174

00:29:59.746 --> 00:30:02.176 sort of developing a long COVID,

NOTE Confidence: 0.85460174

 $00:30:02.180 \longrightarrow 00:30:03.908$ it's potentially possible that

NOTE Confidence: 0.85460174

 $00{:}30{:}03{.}908 \dashrightarrow 00{:}30{:}06{.}500$ the autoimmune disease is the 2nd

NOTE Confidence: 0.85460174

 $00{:}30{:}06{.}577 \dashrightarrow 00{:}30{:}09{.}223$ hypothesis that I have about long COVID

NOTE Confidence: 0.85460174

 $00{:}30{:}09{.}223 \dashrightarrow 00{:}30{:}11.650$ may be happening in those patients.

NOTE Confidence: 0.85460174

 $00{:}30{:}11.650 \dashrightarrow 00{:}30{:}14.282$ In that you know they they were sort

NOTE Confidence: 0.85460174

 $00:30:14.282 \rightarrow 00:30:16.989$ of prone to developing autoimmunity.

NOTE Confidence: 0.85460174

 $00:30:16.990 \longrightarrow 00:30:19.078$ But this virus kind of tipped

NOTE Confidence: 0.85460174

 $00:30:19.078 \longrightarrow 00:30:21.067$ the balance forward to developing

NOTE Confidence: 0.85460174

00:30:21.067 --> 00:30:23.159 a severe autoimmune disease,

NOTE Confidence: 0.85460174

 $00{:}30{:}23.160 \dashrightarrow 00{:}30{:}26.216$ in which in which case you know they

NOTE Confidence: 0.85460174

 $00{:}30{:}26{.}216$ --> $00{:}30{:}28{.}224$ developped these autoantibody to variety

NOTE Confidence: 0.85460174

 $00:30:28.224 \longrightarrow 00:30:31.495$ of cell types in you know that may

NOTE Confidence: 0.85460174

 $00{:}30{:}31{.}495 \dashrightarrow 00{:}30{:}33{.}840$ be causing these multiple symptoms.

 $00:30:33.840 \longrightarrow 00:30:35.668$ So that's one hypothesis.

NOTE Confidence: 0.85460174

 $00{:}30{:}35{.}668 \dashrightarrow 00{:}30{:}39{.}457$ There may also be some you know factors

NOTE Confidence: 0.85460174

 $00{:}30{:}39{.}457 \dashrightarrow 00{:}30{:}42{.}803$ that are related to sex hormones or.

NOTE Confidence: 0.85460174

 $00:30:42.810 \longrightarrow 00:30:44.740$ Other issues that we haven't

NOTE Confidence: 0.85460174

 $00:30:44.740 \longrightarrow 00:30:46.670$ been able to tackle yet,

NOTE Confidence: 0.85460174

 $00{:}30{:}46.670 \dashrightarrow 00{:}30{:}49.758$ which may be also happening in this group.

NOTE Confidence: 0.82806945

00:30:50.610 --> 00:30:52.927 OK, great, thank you and the second

NOTE Confidence: 0.82806945

 $00:30:52.927 \rightarrow 00:30:55.366$ question is do people who are severely

NOTE Confidence: 0.82806945

 $00{:}30{:}55{.}366 \dashrightarrow 00{:}30{:}57{.}900$ ill from COVID also get lung COVID?

NOTE Confidence: 0.843374

 $00:30:58.700 \rightarrow 00:31:00.950$ Yeah, that's a really good question.

NOTE Confidence: 0.843374

 $00:31:00.950 \longrightarrow 00:31:03.678$ In fact, as I mentioned that the percentage NOTE Confidence: 0.843374

 $00:31:03.678 \longrightarrow 00:31:06.537$ of long haul or disease really differ

NOTE Confidence: 0.843374

 $00{:}31{:}06{.}537 \dashrightarrow 00{:}31{:}09{.}066$ between different studies and one of

NOTE Confidence: 0.843374

 $00:31:09.066 \rightarrow 00:31:11.154$ the key differences in these studies

NOTE Confidence: 0.843374

 $00:31:11.154 \rightarrow 00:31:13.700$ is that when you follow patients who

NOTE Confidence: 0.843374

 $00:31:13.700 \rightarrow 00:31:15.950$ were sick enough to be hospitalized,

- NOTE Confidence: 0.843374
- 00:31:15.950 --> 00:31:18.578 and some of them got, you know,

 $00{:}31{:}18{.}578$ --> $00{:}31{:}20{.}448$ mechanical ventilation and so on.

NOTE Confidence: 0.843374

 $00:31:20.450 \longrightarrow 00:31:22.949$ These sort of the patients who sustained

NOTE Confidence: 0.843374

 $00:31:22.949 \rightarrow 00:31:25.330$ lung damage in other organ damage,

NOTE Confidence: 0.843374

 $00{:}31{:}25{.}330 \dashrightarrow 00{:}31{:}27{.}634$ which tend to be very long

NOTE Confidence: 0.843374

 $00:31:27.634 \longrightarrow 00:31:28.786$ lasting because it's.

NOTE Confidence: 0.843374

 $00:31:28.790 \rightarrow 00:31:31.088$ Really hard to repair these tissues,

NOTE Confidence: 0.843374

 $00:31:31.090 \rightarrow 00:31:32.855$ especially because these people are

NOTE Confidence: 0.843374

 $00{:}31{:}32.855 \dashrightarrow 00{:}31{:}35.923$ also in the older age group whose repair

NOTE Confidence: 0.843374

 $00:31:35.923 \dashrightarrow 00:31:37.978$ functions have declined over time.

NOTE Confidence: 0.843374

00:31:37.980 --> 00:31:41.044 So you know if you ask these people,

NOTE Confidence: 0.843374

 $00{:}31{:}41{.}050 \dashrightarrow 00{:}31{:}43{.}336$ do you still have lingering symptoms?

NOTE Confidence: 0.843374

 $00{:}31{:}43{.}340 \dashrightarrow 00{:}31{:}44{.}876$ The answer is vast.

NOTE Confidence: 0.843374

 $00:31:44.876 \longrightarrow 00:31:47.558$ Majority is yes, so about 70 percent.

NOTE Confidence: 0.843374

 $00:31:47.558 \rightarrow 00:31:50.01075\%$ of people who've had sort of

 $00:31:50.010 \rightarrow 00:31:52.540$ severe enough COVID to be hospitalized.

NOTE Confidence: 0.843374

 $00:31:52.540 \rightarrow 00:31:54.450$ They still have lingering symptoms.

NOTE Confidence: 0.843374

 $00:31:54.450 \dashrightarrow 00:31:56.748$ That's different from what we're calling NOTE Confidence: 0.843374

00:31:56.748 --> 00:31:59.400 a long COVID, which is people with.

NOTE Confidence: 0.843374

 $00:31:59.400 \longrightarrow 00:32:01.275$ Milder disease who are never

NOTE Confidence: 0.843374

 $00{:}32{:}01{.}275 \dashrightarrow 00{:}32{:}03{.}199$ hospitalized who are developing these?

NOTE Confidence: 0.843374

00:32:03.200 --> 00:32:04.000 You know,

NOTE Confidence: 0.843374

 $00{:}32{:}04.000 \dashrightarrow 00{:}32{:}06.400$ very long term symptom after either

NOTE Confidence: 0.843374

00:32:06.400 --> 00:32:08.241 asymptomatic or mild infection and

NOTE Confidence: 0.843374

00:32:08.241 --> 00:32:10.936 that tends to be the the group that

NOTE Confidence: 0.843374

 $00{:}32{:}10{.}936 \dashrightarrow 00{:}32{:}13{.}186$ is more dominated by younger women.

NOTE Confidence: 0.843374

 $00:32:13.190 \longrightarrow 00:32:16.150$ And so I think the Long Cove it.

NOTE Confidence: 0.843374

 $00:32:16.150 \longrightarrow 00:32:18.370$ It's easy to kind of bunch

NOTE Confidence: 0.843374

 $00:32:18.370 \longrightarrow 00:32:19.850$ everything into one basket,

NOTE Confidence: 0.843374

 $00{:}32{:}19{.}850 \dashrightarrow 00{:}32{:}22{.}447$ but it in terms of pathogenesis we

NOTE Confidence: 0.843374

 $00:32:22.447 \rightarrow 00:32:24.754$ really need to separate these groups

- NOTE Confidence: 0.843374
- $00:32:24.754 \rightarrow 00:32:28.239$ and so I would say that the long Cove

 $00:32:28.239 \rightarrow 00:32:31.067$ it is really referring to this milder.

NOTE Confidence: 0.843374

 $00:32:31.070 \longrightarrow 00:32:32.466$ Infection that's causing long

NOTE Confidence: 0.843374

 $00:32:32.466 \longrightarrow 00:32:34.560$ term symptom as opposed to the

NOTE Confidence: 0.843374

 $00:32:34.627 \longrightarrow 00:32:36.462$ hospitalized patients who are still

NOTE Confidence: 0.843374

 $00:32:36.462 \longrightarrow 00:32:38.699$ feeling ill from the damage that

NOTE Confidence: 0.843374

 $00:32:38.699 \rightarrow 00:32:40.399$ they sustained from the COVID.

NOTE Confidence: 0.843374

 $00:32:40.400 \dashrightarrow 00:32:42.920$ So I hope that answers that question.

NOTE Confidence: 0.8416212

 $00:32:43.530 \longrightarrow 00:32:45.156$ Absolutely thank you through all answer.

NOTE Confidence: 0.8416212

00:32:45.160 - 00:32:47.008 So we are starting to get some

NOTE Confidence: 0.8416212

 $00{:}32{:}47.008 \dashrightarrow 00{:}32{:}49.283$ questions in the chat, which is great.

NOTE Confidence: 0.8416212

00:32:49.283 --> 00:32:51.950 I'm going to send the first one

NOTE Confidence: 0.8416212

 $00:32:52.040 \rightarrow 00:32:54.532$ over to you and. Read it verbatim.

NOTE Confidence: 0.8416212

00:32:54.532 --> 00:32:56.136 So given autoimmunity likely

NOTE Confidence: 0.8416212

 $00:32:56.136 \longrightarrow 00:32:58.500$ plays an important role in the

00:32:58.500 --> 00:32:59.896 pathogenesis of long COVID,

NOTE Confidence: 0.8416212

 $00{:}32{:}59{.}900 \dashrightarrow 00{:}33{:}02{.}116$ I want to find out if these patients

NOTE Confidence: 0.8416212

 $00{:}33{:}02{.}116 \dashrightarrow 00{:}33{:}04{.}093$ have an increased prevalence of

NOTE Confidence: 0.8416212

00:33:04.093 --> 00:33:06.358 family history or personal history

NOTE Confidence: 0.8416212

 $00:33:06.358 \rightarrow 00:33:08.780$ of autoimmune diseases like collagen,

NOTE Confidence: 0.8416212

00:33:08.780 --> 00:33:09.935 vascular disease preceding

NOTE Confidence: 0.8416212

 $00:33:09.935 \longrightarrow 00:33:11.475$ the diagnosis of COVID-19.

NOTE Confidence: 0.86512786

 $00{:}33{:}12.610 \dashrightarrow 00{:}33{:}14.760$ Yeah, that's an excellent question,

NOTE Confidence: 0.86512786

 $00{:}33{:}14.760 \dashrightarrow 00{:}33{:}17.472$ so I'm not sure how much the kind NOTE Confidence: 0.86512786

 $00:33:17.472 \rightarrow 00:33:19.230$ of inherited susceptibility to

NOTE Confidence: 0.86512786

 $00{:}33{:}19{.}230$ --> $00{:}33{:}21{.}735$ autoimmune diseases were known in NOTE Confidence: 0.86512786

 $00{:}33{:}21.735 \dashrightarrow 00{:}33{:}25.055$ the long haulers right now we are

NOTE Confidence: 0.86512786

 $00{:}33{:}25.055 \dashrightarrow 00{:}33{:}27.225$ collecting this kind of information.

NOTE Confidence: 0.86512786

00:33:27.230 --> 00:33:29.678 First. We have this very extensive

NOTE Confidence: 0.86512786

 $00{:}33{:}29.678 \dashrightarrow 00{:}33{:}31.960$ survey of symptoms and history.

NOTE Confidence: 0.86512786

00:33:31.960 - 00:33:34.528 You know whether they've had any

- NOTE Confidence: 0.86512786
- 00:33:34.528 --> 00:33:36.690 autoimmune disease in the past,

 $00{:}33{:}36.690 \dashrightarrow 00{:}33{:}39.700$ what kind of medications they were giving,

NOTE Confidence: 0.86512786

 $00:33:39.700 \longrightarrow 00:33:43.214$ so we should be able to collect

NOTE Confidence: 0.86512786

 $00:33:43.214 \rightarrow 00:33:44.720$ some of these.

NOTE Confidence: 0.86512786

 $00:33:44.720 \longrightarrow 00:33:45.650$ Important information soon,

NOTE Confidence: 0.86512786

00:33:45.650 --> 00:33:47.200 but obviously our family history

NOTE Confidence: 0.86512786

 $00:33:47.200 \longrightarrow 00:33:49.258$ of all the different diseases that's,

NOTE Confidence: 0.86512786

 $00:33:49.260 \rightarrow 00:33:51.430$ I think the next next step we're

NOTE Confidence: 0.86512786

 $00:33:51.430 \longrightarrow 00:33:53.756$ going to have to reach out to

NOTE Confidence: 0.86512786

 $00{:}33{:}53{.}756 \dashrightarrow 00{:}33{:}55{.}406$ these patients and find out.

NOTE Confidence: 0.867803

 $00{:}33{:}56{.}240 \dashrightarrow 00{:}33{:}57{.}266$ Great, thank you.

NOTE Confidence: 0.867803

 $00{:}33{:}57.266 \dashrightarrow 00{:}33{:}59.660$ The next question is has the REACH

NOTE Confidence: 0.867803

 $00:33:59.727 \rightarrow 00:34:01.632$ technology been applied to other

NOTE Confidence: 0.867803

 $00{:}34{:}01{.}632 \dashrightarrow 00{:}34{:}04{.}318$ viral illnesses and if So what sort

NOTE Confidence: 0.867803

 $00{:}34{:}04{.}318 \dashrightarrow 00{:}34{:}06{.}448$ of differences in number and or

 $00:34:06.448 \rightarrow 00:34:08.249$ diversity of responses are seen?

NOTE Confidence: 0.8348238

00:34:09.220 --> 00:34:11.530 Yeah, another very excellent question,

NOTE Confidence: 0.8348238

 $00{:}34{:}11{.}530 \dashrightarrow 00{:}34{:}15{.}149$ so we don't think that COVID is

NOTE Confidence: 0.8348238

 $00:34:15.149 \longrightarrow 00:34:17.979$ alone in inducing these types

NOTE Confidence: 0.8348238

 $00{:}34{:}17{.}979 \dashrightarrow 00{:}34{:}20{.}914$ of auto mean oldani bodies.

NOTE Confidence: 0.8348238

 $00:34:20.920 \dashrightarrow 00:34:23.836$ So we are currently testing or in the in NOTE Confidence: 0.8348238

 $00{:}34{:}23.836 \dashrightarrow 00{:}34{:}27.228$ the midst of planning a test for other

NOTE Confidence: 0.8348238

 $00:34:27.228 \longrightarrow 00:34:29.707$ acute respiratory viral infections and

NOTE Confidence: 0.8348238

 $00{:}34{:}29{.}707 \dashrightarrow 00{:}34{:}32{.}497$ potentially other types of infections,

NOTE Confidence: 0.8348238

 $00:34:32.500 \rightarrow 00:34:35.510$ so we don't know the answer yet.

NOTE Confidence: 0.8348238

 $00:34:35.510 \dashrightarrow 00:34:38.078$ This brief technology is quite knew.

NOTE Confidence: 0.8348238

 $00:34:38.080 \longrightarrow 00:34:40.220$ It's really the first of

NOTE Confidence: 0.8348238

 $00{:}34{:}40{.}220 \dashrightarrow 00{:}34{:}41{.}932$ many application was kovid,

NOTE Confidence: 0.8348238

00:34:41.940 --> 00:34:45.468 but I believe Doctor Ring is going to be

NOTE Confidence: 0.8348238

 $00{:}34{:}45{.}468 \dashrightarrow 00{:}34{:}48{.}380$ expanding his analysis to other diseases,

NOTE Confidence: 0.8348238

 $00:34:48.380 \longrightarrow 00:34:52.358$ and in fact he has done reap analysis of.

- NOTE Confidence: 0.8348238
- 00:34:52.360 -> 00:34:53.710 Known autoimmune diseases

 $00:34:53.710 \longrightarrow 00:34:55.960$ and have found that lupus,

NOTE Confidence: 0.8348238

 $00:34:55.960 \rightarrow 00:34:58.756$ the diversity of antibodies that are

NOTE Confidence: 0.8348238

 $00:34:58.756 \rightarrow 00:35:01.810$ found in COVID exceeds that of lupus,

NOTE Confidence: 0.8348238

 $00:35:01.810 \dashrightarrow 00:35:05.074$ so it's really kind of a remarkable picture

NOTE Confidence: 0.8348238

 $00{:}35{:}05{.}074$ --> $00{:}35{:}08{.}110$ of autoimmune activation happening in Kovan,

NOTE Confidence: 0.8348238

 $00{:}35{:}08{.}110 \dashrightarrow 00{:}35{:}09{.}910$ and whether that happens

NOTE Confidence: 0.8348238

 $00:35:09.910 \longrightarrow 00:35:12.160$ after flu infection and virus.

NOTE Confidence: 0.8348238

 $00{:}35{:}12.160 \dashrightarrow 00{:}35{:}14.410$ Other kind of viral infection.

NOTE Confidence: 0.8348238

 $00:35:14.410 \longrightarrow 00:35:17.343$ We are really in the midst of

NOTE Confidence: 0.8348238

 $00:35:17.343 \longrightarrow 00:35:19.809$ doing this kind of research.

NOTE Confidence: 0.8348238

00:35:19.810 --> 00:35:20.710 Great, thank

NOTE Confidence: 0.8067941

 $00{:}35{:}20.710 \dashrightarrow 00{:}35{:}24.160$ you so the next one is.

NOTE Confidence: 0.8067941

 $00{:}35{:}24.160 \dashrightarrow 00{:}35{:}25.725$ Are there any emerging the rapies

NOTE Confidence: 0.8067941

 $00:35:25.725 \longrightarrow 00:35:26.977$ that show early promise?

 $00:35:28.160 \rightarrow 00:35:30.792$ Yeah, so the only only glimpse we

NOTE Confidence: 0.83408064

 $00:35:30.792 \rightarrow 00:35:33.350$ have of anything helping long COVID

NOTE Confidence: 0.83408064

 $00:35:33.350 \rightarrow 00:35:36.056$ really appears to be this vaccines.

NOTE Confidence: 0.83408064

 $00:35:36.060 \rightarrow 00:35:38.755$ There are other anecdotal reportes of people

NOTE Confidence: 0.83408064

 $00:35:38.755 \rightarrow 00:35:41.060$ feeling better with other medications.

NOTE Confidence: 0.83408064

00:35:41.060 - 00:35:43.664 I you know we don't have enough

NOTE Confidence: 0.83408064

 $00{:}35{:}43.664 \dashrightarrow 00{:}35{:}45.789$ number to conclude what other

NOTE Confidence: 0.83408064

 $00:35:45.789 \rightarrow 00:35:48.124$ therapies might be working there.

NOTE Confidence: 0.83408064

 $00{:}35{:}48{.}130 \dashrightarrow 00{:}35{:}51{.}594$ There may be some clinical trials that are

NOTE Confidence: 0.83408064

 $00{:}35{:}51{.}594 \dashrightarrow 00{:}35{:}54{.}369$ ongoing that's going to inform us soon,

NOTE Confidence: 0.83408064

 $00:35:54.370 \dashrightarrow 00:35:57.674$ but this is an important question because.

NOTE Confidence: 0.83408064

00:35:57.680 --> 00:36:00.038 You know, depending on the hypothesis,

NOTE Confidence: 0.83408064

 $00:36:00.040 \longrightarrow 00:36:02.005$ if the reservoir the viral

NOTE Confidence: 0.83408064

00:36:02.005 --> 00:36:03.970 reservoir is causing long COVID,

NOTE Confidence: 0.83408064

00:36:03.970 - 00:36:07.106 we really need to go after that virus,

NOTE Confidence: 0.83408064

 $00:36:07.110 \longrightarrow 00:36:10.046$ which means we can treat these patients with

- NOTE Confidence: 0.83408064
- 00:36:10.046 --> 00:36:12.219 monoclonal antibody cocktails or antivirals.

 $00{:}36{:}12.220 \dashrightarrow 00{:}36{:}15.364$ Or, you know, fear on something like that.

NOTE Confidence: 0.83408064

00:36:15.370 --> 00:36:17.330 They really get the virus,

NOTE Confidence: 0.83408064

 $00:36:17.330 \longrightarrow 00:36:19.688$ whereas if it's really caused by,

NOTE Confidence: 0.83408064

00:36:19.690 --> 00:36:21.086 you know autoimmune disease,

NOTE Confidence: 0.83408064

 $00:36:21.086 \longrightarrow 00:36:23.180$ then we really need to be

NOTE Confidence: 0.83408064

 $00:36:23.249 \rightarrow 00:36:25.189$ dampening the immune response.

NOTE Confidence: 0.83408064

 $00{:}36{:}25.190 \dashrightarrow 00{:}36{:}27.626$ So the rapies that are used in

NOTE Confidence: 0.83408064

 $00:36:27.626 \dashrightarrow 00:36:29.979$ autoimmune diseases can be used for.

NOTE Confidence: 0.83408064

00:36:29.980 --> 00:36:32.479 More COVID may be potentially more targeted.

NOTE Confidence: 0.83408064

 $00{:}36{:}32{.}480 \dashrightarrow 00{:}36{:}35{.}264$ Approach can be developed based on what kind

NOTE Confidence: 0.83408064

 $00:36:35.264 \rightarrow 00:36:37.479$ of autoantigens that they were detecting,

NOTE Confidence: 0.83408064

 $00{:}36{:}37{.}480 \dashrightarrow 00{:}36{:}39{.}442$ so there's a lot of different

NOTE Confidence: 0.83408064

 $00:36:39.442 \longrightarrow 00:36:41.400$ ways to go about therapy,

NOTE Confidence: 0.83408064

 $00:36:41.400 \longrightarrow 00:36:44.432$ but we really need to know the disease

 $00:36:44.432 \rightarrow 00:36:46.757$ pathogenesis before we can engage in those. NOTE Confidence: 0.8304333 $00{:}36{:}47{.}450 \dashrightarrow 00{:}36{:}50{.}138$ I thank you for the next writer. NOTE Confidence: 0.8304333 $00:36:50.140 \longrightarrow 00:36:52.828$ Has had two doses of the Pfizer NOTE Confidence: 0.8304333 $00:36:52.828 \rightarrow 00:36:55.162$ vaccine and lives in Georgia and NOTE Confidence: 0.8304333 $00:36:55.162 \longrightarrow 00:36:57.738$ is reluctant to go out in public NOTE Confidence: 0.8304333 00:36:57.820 --> 00:37:00.124 and was wondering if you could NOTE Confidence: 0.8304333 $00:37:00.124 \longrightarrow 00:37:02.416$ speak to is anyone working on NOTE Confidence: 0.8304333 $00:37:02.416 \rightarrow 00:37:03.928$ neutralizing antibodies and antibody NOTE Confidence: 0.8304333 00:37:03.928 --> 00:37:06.270 test or CMI test for vaccines? NOTE Confidence: 0.8304333 00:37:06.270 --> 00:37:08.568 He's a little concerned about the NOTE Confidence: 0.8304333 00:37:08.570 - 00:37:09.336 neutralizing antibodies NOTE Confidence: 0.8304333 00:37:09.336 --> 00:37:10.868 or cell mediated immunity. NOTE Confidence: 0.8304333 00:37:10.870 --> 00:37:12.790 Yeah, that's also a common, NOTE Confidence: 0.8304333 00:37:12.790 --> 00:37:15.106 you know concern that people even NOTE Confidence: 0.8304333 $00:37:15.106 \rightarrow 00:37:17.460$ though they got the two doses. NOTE Confidence: 0.8304333 $00:37:17.460 \longrightarrow 00:37:19.348$ There are rare cases,

- NOTE Confidence: 0.8304333
- $00:37:19.348 \longrightarrow 00:37:21.708$ a breakthrough infection that happen,
- NOTE Confidence: 0.8304333
- $00:37:21.710 \longrightarrow 00:37:24.070$ and that's with all vaccines.
- NOTE Confidence: 0.8304333
- $00:37:24.070 \longrightarrow 00:37:24.520$ Fortunately,
- NOTE Confidence: 0.8304333
- $00{:}37{:}24.520 \dashrightarrow 00{:}37{:}28.120$ the M RNA vaccines like the Pfizer one
- NOTE Confidence: 0.8304333
- $00:37:28.120 \longrightarrow 00:37:31.146$ that the question or just indicated.
- NOTE Confidence: 0.8304333
- $00:37:31.150 \longrightarrow 00:37:33.982$ I have really high efficacy and
- NOTE Confidence: 0.8304333
- 00:37:33.982 --> 00:37:35.398 effectiveness against infection,
- NOTE Confidence: 0.8304333
- $00:37:35.400 \longrightarrow 00:37:37.760$ so that's really great news,
- NOTE Confidence: 0.8304333
- $00:37:37.760 \dashrightarrow 00:37:39.920$ but the breakthrough does occur
- NOTE Confidence: 0.8304333
- $00{:}37{:}39{.}920 \dashrightarrow 00{:}37{:}42{.}654$ in rare cases and we don't
- NOTE Confidence: 0.8304333
- $00:37:42.654 \rightarrow 00:37:45.546$ know why some people with fully
- NOTE Confidence: 0.8304333
- $00{:}37{:}45{.}546$ --> $00{:}37{:}47{.}750$ vaccinate status are getting.
- NOTE Confidence: 0.8304333
- $00{:}37{:}47.750 \dashrightarrow 00{:}37{:}48.410$ Infected again,
- NOTE Confidence: 0.8304333
- $00{:}37{:}48{.}410 \dashrightarrow 00{:}37{:}51{.}050$ it could be that there there was an
- NOTE Confidence: 0.8304333
- $00:37:51.122 \rightarrow 00:37:54.038$ underlying immune deficiency in these people,
- NOTE Confidence: 0.8304333

 $00{:}37{:}54.040 \dashrightarrow 00{:}37{:}56.704$ or it could be that they got exposed to

NOTE Confidence: 0.8304333

 $00:37:56.704 \rightarrow 00:37:59.683$ a variant that you know wasn't quite

NOTE Confidence: 0.8304333

 $00:37:59.683 \rightarrow 00:38:02.290$ well neutralized by their antibodies,

NOTE Confidence: 0.8304333

 $00:38:02.290 \longrightarrow 00:38:05.434$ and so I agree with this person 100%.

NOTE Confidence: 0.8304333

 $00:38:05.440 \longrightarrow 00:38:08.576$ I think we need a neutralizing antibody test.

NOTE Confidence: 0.8304333

 $00{:}38{:}08{.}580 \dashrightarrow 00{:}38{:}11{.}724$ It's right now to do this with the

NOTE Confidence: 0.8304333

 $00:38:11.724 \rightarrow 00:38:14.082$ real virus. It's a huge endeavor.

NOTE Confidence: 0.8304333

 $00:38:14.082 \longrightarrow 00:38:16.440$ We do this in the lab,

NOTE Confidence: 0.8304333

 $00{:}38{:}16{.}440 \dashrightarrow 00{:}38{:}19{.}597$ but it requires the biosafety Level 3.

NOTE Confidence: 0.8304333

 $00:38:19.600 \rightarrow 00:38:21.916$ Days and days of hard work.

NOTE Confidence: 0.8304333

 $00:38:21.920 \longrightarrow 00:38:24.824$ And so to do this in millions of

NOTE Confidence: 0.8304333

 $00{:}38{:}24.824 \dashrightarrow 00{:}38{:}26.930$ people would not be possible.

NOTE Confidence: 0.8304333

00:38:26.930 --> 00:38:27.306 However,

NOTE Confidence: 0.8304333

 $00:38:27.306 \rightarrow 00:38:29.938$ I hope that the companies are coming

NOTE Confidence: 0.8304333

 $00{:}38{:}29{.}938 \dashrightarrow 00{:}38{:}32{.}526$ up with similar approach where it's

NOTE Confidence: 0.8304333

 $00{:}38{:}32{.}526 \dashrightarrow 00{:}38{:}35{.}166$ a little bit more more streamlined

- NOTE Confidence: 0.8304333
- $00{:}38{:}35{.}242 \dashrightarrow 00{:}38{:}37{.}524$ and less less cumbersome to be able
- NOTE Confidence: 0.8304333
- $00{:}38{:}37{.}524 \dashrightarrow 00{:}38{:}39{.}584$ to look at the neutralizing titer,
- NOTE Confidence: 0.8304333
- $00:38:39.584 \longrightarrow 00:38:42.090$ and one of the proxy for the
- NOTE Confidence: 0.8304333
- $00:38:42.162 \rightarrow 00:38:44.514$ neutralizing titer is the anti RBD
- NOTE Confidence: 0.8304333
- $00:38:44.514 \longrightarrow 00:38:46.968$ antibody these so they sort of
- NOTE Confidence: 0.8304333
- $00:38:46.968 \dashrightarrow 00:38:49.803$ receptor binding domain of the spike protein.
- NOTE Confidence: 0.8304333
- $00:38:49.810 \longrightarrow 00:38:50.998$ That's being targeted.
- NOTE Confidence: 0.8304333
- $00:38:50.998 \dashrightarrow 00:38:52.978$ Bispecific antibodies and that tend
- NOTE Confidence: 0.8304333
- $00{:}38{:}52{.}978 \dashrightarrow 00{:}38{:}55{.}542$ to have a pretty good correlation
- NOTE Confidence: 0.8304333
- $00:38:55.542 \rightarrow 00:38:56.826$ with neutralizing titer.
- NOTE Confidence: 0.8304333
- $00{:}38{:}56{.}830 \dashrightarrow 00{:}38{:}59{.}334$ So one way to get around the entire
- NOTE Confidence: 0.8304333
- $00:38:59.334 \rightarrow 00:39:01.413$ sort of cumbersome neutralizing assays
- NOTE Confidence: 0.8304333
- $00:39:01.413 \rightarrow 00:39:05.500$ to use anti RBD Eliza to monitor antibodies.
- NOTE Confidence: 0.8304333
- $00{:}39{:}05{.}500 \dashrightarrow 00{:}39{:}07{.}660$ But I just wanted to reiterate
- NOTE Confidence: 0.8304333
- $00{:}39{:}07{.}660 \dashrightarrow 00{:}39{:}09{.}673$ that the Pfizer vaccine Moderna
- NOTE Confidence: 0.8304333

 $00:39:09.673 \rightarrow 00:39:11.697$ these are extremely effective.

NOTE Confidence: 0.8304333

00:39:11.700 --> 00:39:14.346 So vast majority of people are

NOTE Confidence: 0.8304333

00:39:14.346 --> 00:39:17.728 going to be protected and so I think

NOTE Confidence: 0.8304333

 $00:39:17.728 \longrightarrow 00:39:20.020$ the the person should be able.

NOTE Confidence: 0.8304333

 $00:39:20.020 \rightarrow 00:39:21.976$ Little bit more comforted by that.

NOTE Confidence: 0.8304333

 $00:39:21.980 \longrightarrow 00:39:22.632$ Thank you.

NOTE Confidence: 0.8304333

00:39:22.632 --> 00:39:22.958 I'm

NOTE Confidence: 0.83638006

 $00:39:22.960 \rightarrow 00:39:24.928$ going to read this one verbatim.

NOTE Confidence: 0.83638006

 $00{:}39{:}24{.}930 \dashrightarrow 00{:}39{:}27{.}275$ It's a little long when you mentioned

NOTE Confidence: 0.83638006

 $00{:}39{:}27{.}275 \dashrightarrow 00{:}39{:}29{.}279$ the multisystem nature of long COVID-19

NOTE Confidence: 0.83638006

 $00:39:29.279 \rightarrow 00:39:31.470$ and a potential reservoir of the virus,

NOTE Confidence: 0.83638006

 $00:39:31.470 \longrightarrow 00:39:33.745$ and many of the different tissue types.

NOTE Confidence: 0.83638006

00:39:33.750 --> 00:39:36.216 Do you? Do we have any idea of how

NOTE Confidence: 0.83638006

 $00:39:36.216 \rightarrow 00:39:38.656$ the virus reside in these tissue?

NOTE Confidence: 0.83638006

 $00:39:38.660 \rightarrow 00:39:40.736$ My understanding is that some of

NOTE Confidence: 0.83638006

 $00:39:40.736 \longrightarrow 00:39:42.469$ these tissue types mentioned do

- NOTE Confidence: 0.83638006
- $00:39:42.469 \rightarrow 00:39:44.215$ not express ace two SP receptors.

 $00{:}39{:}45{.}810 \dashrightarrow 00{:}39{:}49{.}941$ Yes, so I think the consensus is that this

NOTE Confidence: 0.8226567

 $00:39:49.941 \dashrightarrow 00:39:53.946$ virus obviously uses a Stew as a receptor.

NOTE Confidence: 0.8226567

 $00:39:53.950 \rightarrow 00:39:57.310$ It also has other requirement like TEMPRESS,

NOTE Confidence: 0.8226567

 $00:39:57.310 \longrightarrow 00:40:00.341$ which is a protease that enables entry

NOTE Confidence: 0.8226567

 $00{:}40{:}00{.}341 \dashrightarrow 00{:}40{:}03{.}693$ process and so there there are different

NOTE Confidence: 0.8226567

 $00:40:03.693 \rightarrow 00:40:06.639$ types of host cell requirement for

NOTE Confidence: 0.8226567

 $00:40:06.721 \rightarrow 00:40:10.235$ infection and if you survey the literature,

NOTE Confidence: 0.8226567

 $00{:}40{:}10.240 \dashrightarrow 00{:}40{:}13.312$ vast majority of the target cells

NOTE Confidence: 0.8226567

 $00:40:13.312 \longrightarrow 00:40:15.720$ are epithelial in nature so.

NOTE Confidence: 0.8226567

 $00:40:15.720 \longrightarrow 00:40:17.950$ Nasal cavity the long the

NOTE Confidence: 0.8226567

00:40:17.950 --> 00:40:19.288 intestinal tract kidney.

NOTE Confidence: 0.8226567

 $00:40:19.290 \longrightarrow 00:40:21.305$ The epithelial cells appear to

NOTE Confidence: 0.8226567

00:40:21.305 --> 00:40:24.190 be a major target of infection,

NOTE Confidence: 0.8226567

 $00:40:24.190 \longrightarrow 00:40:27.347$ so that's number one and that they

 $00:40:27.347 \rightarrow 00:40:30.478$ have high levels of ACE 2 and #2

NOTE Confidence: 0.8226567

 $00{:}40{:}30{.}478 \dashrightarrow 00{:}40{:}32{.}784$ is that there are some reports

NOTE Confidence: 0.8226567

 $00{:}40{:}32{.}784 \dashrightarrow 00{:}40{:}35{.}439$ including our own that detected

NOTE Confidence: 0.8226567

 $00:40:35.439 \longrightarrow 00:40:38.869$ virus in the neurons in the brain.

NOTE Confidence: 0.8226567

 $00{:}40{:}38.869 \dashrightarrow 00{:}40{:}41.034$ And so there's controversy about

NOTE Confidence: 0.8226567

00:40:41.034 --> 00:40:43.812 whether it's two is expressed well in

NOTE Confidence: 0.8226567

 $00{:}40{:}43.812 \dashrightarrow 00{:}40{:}46.667$ the neurons or the brain, and in fact,

NOTE Confidence: 0.8226567

 $00:40:46.667 \rightarrow 00:40:50.699$ if you look at the M RNA level for a Stew,

NOTE Confidence: 0.8226567

 $00{:}40{:}50.700 \dashrightarrow 00{:}40{:}51.783$ it's quite low.

NOTE Confidence: 0.8226567

00:40:51.783 --> 00:40:54.310 However, if you look at the protein,

NOTE Confidence: 0.8226567

 $00{:}40{:}54{.}310$ --> $00{:}40{:}56{.}722$ it's there an we've also demonstrated

NOTE Confidence: 0.8226567

00:40:56.722 --> 00:40:58.687 a functional requirement phase two

NOTE Confidence: 0.8226567

 $00{:}40{:}58.687 \dashrightarrow 00{:}41{:}00.457$ by neutralizing ace two or blocking

NOTE Confidence: 0.8226567

 $00{:}41{:}00{.}457 \dashrightarrow 00{:}41{:}02{.}904$ a Stew and showing that the virus

NOTE Confidence: 0.8226567

 $00{:}41{:}02{.}904 \dashrightarrow 00{:}41{:}04{.}774$ not lingering effects these cells,

NOTE Confidence: 0.8226567

 $00{:}41{:}04.780 \dashrightarrow 00{:}41{:}07.125$ indicating that it is it is possible

- NOTE Confidence: 0.8226567
- $00:41:07.125 \longrightarrow 00:41:09.407$ to have these kind of persistent

 $00{:}41{:}09{.}407 \dashrightarrow 00{:}41{:}11{.}417$ infection in organs that are.

NOTE Confidence: 0.8226567

 $00{:}41{:}11{.}420 \dashrightarrow 00{:}41{:}14{.}282$ Not positive for S2 by M RNA in the

NOTE Confidence: 0.8226567

 $00{:}41{:}14.282 \dashrightarrow 00{:}41{:}16.489$ standard way of looking at things.

NOTE Confidence: 0.8226567

 $00:41:16.490 \longrightarrow 00:41:18.856$ But if you look at the protein,

NOTE Confidence: 0.8226567

 $00:41:18.860 \rightarrow 00:41:20.440$ they're actually quite positive and

NOTE Confidence: 0.8226567

 $00:41:20.440 \longrightarrow 00:41:22.570$ that also goes for the placenta.

NOTE Confidence: 0.8226567

00:41:22.570 --> 00:41:24.598 Placenta also has very low levels

NOTE Confidence: 0.8226567

 $00:41:24.598 \longrightarrow 00:41:25.950$ of the M RNA,

NOTE Confidence: 0.8226567

00:41:25.950 --> 00:41:28.390 and yet if you look at the protein

NOTE Confidence: 0.8226567

 $00{:}41{:}28{.}390 \dashrightarrow 00{:}41{:}30{.}348$ expression it's quite positive there.

NOTE Confidence: 0.8391581

00:41:38.580 --> 00:41:41.060 Hear me OK, OK Now I can hear yes

NOTE Confidence: 0.8391581

 $00:41:41.060 \longrightarrow 00:41:44.220$ just a little bit. It's good.

NOTE Confidence: 0.85488737

00:41:45.630 --> 00:41:49.246 OK. Are there pediatric cases

NOTE Confidence: 0.85488737

 $00:41:49.246 \longrightarrow 00:41:50.966$ of lung COVID either post?

00:41:53.080 --> 00:41:56.450 I'm sorry I don't know the acronym ISC

NOTE Confidence: 0.802349

 $00{:}41{:}56{.}450 \dashrightarrow 00{:}42{:}00{.}238$ or in children who have not had this an

NOTE Confidence: 0.802349

00:42:00.240 --> 00:42:03.026 ISC right? So the MISC like I

NOTE Confidence: 0.802349

 $00{:}42{:}03.026 \dashrightarrow 00{:}42{:}05.623$ mentioned earlier is a rare event

NOTE Confidence: 0.802349

 $00:42:05.623 \rightarrow 00:42:07.813$ that happened in some children.

NOTE Confidence: 0.802349

 $00:42:07.820 \longrightarrow 00:42:11.000$ It is very severe.

NOTE Confidence: 0.802349

00:42:11.000 --> 00:42:13.100 That requires hospitalization and treatment,

NOTE Confidence: 0.802349

 $00:42:13.100 \longrightarrow 00:42:14.780$ whereas there are pediatric

NOTE Confidence: 0.802349

 $00:42:14.780 \longrightarrow 00:42:16.460$ cases of long COVID.

NOTE Confidence: 0.802349

 $00:42:16.460 \rightarrow 00:42:19.820$ Again, I want to distinguish that from MI.

NOTE Confidence: 0.802349

 $00{:}42{:}19.820 \dashrightarrow 00{:}42{:}22.074$ See is these are the children who

NOTE Confidence: 0.802349

 $00:42:22.074 \rightarrow 00:42:24.210$ have mild to asymptomatic COVID

NOTE Confidence: 0.802349

 $00:42:24.210 \longrightarrow 00:42:26.960$ infection and then develop overtime.

NOTE Confidence: 0.802349

 $00:42:26.960 \rightarrow 00:42:30.136$ This long term symptoms an I know that

NOTE Confidence: 0.802349

 $00{:}42{:}30{.}136 \dashrightarrow 00{:}42{:}32{.}333$ many children actually suffer from

NOTE Confidence: 0.802349

 $00:42:32.333 \rightarrow 00:42:34.985$ lung COVID people who are athletes

- NOTE Confidence: 0.802349
- $00{:}42{:}34{.}985 \dashrightarrow 00{:}42{:}37{.}533$ in our very active in different

 $00{:}42{:}37{.}533 \dashrightarrow 00{:}42{:}40{.}122$ sports no longer able to run.

NOTE Confidence: 0.802349

00:42:40.122 --> 00:42:42.370 You know, because they,

NOTE Confidence: 0.802349

 $00:42:42.370 \longrightarrow 00:42:45.044$ they they they they get post exertional

NOTE Confidence: 0.802349

 $00{:}42{:}45.044 \dashrightarrow 00{:}42{:}47.858$ malaise as well as shortness of breath.

NOTE Confidence: 0.802349

 $00:42:47.860 \longrightarrow 00:42:50.212$ They just can't engage in these

NOTE Confidence: 0.802349

 $00:42:50.212 \rightarrow 00:42:51.780$ kinds of sports anymore.

NOTE Confidence: 0.802349

 $00{:}42{:}51{.}780 \dashrightarrow 00{:}42{:}54{.}517$ There are people who are getting anxiety,

NOTE Confidence: 0.802349

00:42:54.520 --> 00:42:54.979 depression,

NOTE Confidence: 0.802349

 $00:42:54.979 \longrightarrow 00:42:57.733$ and other mental issues as a

NOTE Confidence: 0.802349

 $00:42:57.733 \longrightarrow 00:43:00.663$ result of long COVID in the

NOTE Confidence: 0.802349

 $00{:}43{:}00{.}663 \dashrightarrow 00{:}43{:}02{.}619$ in the pediatric population.

NOTE Confidence: 0.802349

00:43:02.620 --> 00:43:03.284 You know,

NOTE Confidence: 0.802349

 $00:43:03.284 \longrightarrow 00:43:05.276$ and then there are these very

NOTE Confidence: 0.802349

 $00:43:05.276 \longrightarrow 00:43:06.780$ severe cases that happen.

- 00:43:06.780 --> 00:43:07.821 The Missy kids,
- NOTE Confidence: 0.802349
- 00:43:07.821 --> 00:43:10.250 so it's a range of different things,
- NOTE Confidence: 0.802349
- $00:43:10.250 \longrightarrow 00:43:12.987$ but the long Cove is a very
- NOTE Confidence: 0.802349
- 00:43:12.987 --> 00:43:14.530 distinct phenotype from the
- NOTE Confidence: 0.802349
- 00:43:14.530 --> 00:43:16.842 Missy and as as far as I know,
- NOTE Confidence: 0.802349
- 00:43:16.850 --> 00:43:18.580 I haven't heard of anyone
- NOTE Confidence: 0.802349
- 00:43:18.580 --> 00:43:19.964 with Missy developing long,
- NOTE Confidence: 0.802349
- 00:43:19.970 --> 00:43:21.110 Long Cove it,
- NOTE Confidence: 0.802349
- 00:43:21.110 --> 00:43:23.390 but it's such a rare intersection
- NOTE Confidence: 0.802349
- $00:43:23.390 \longrightarrow 00:43:25.824$ that you know maybe future
- NOTE Confidence: 0.802349
- $00:43:25.824 \rightarrow 00:43:27.800$ investigation will reveal those.
- NOTE Confidence: 0.802349
- $00{:}43{:}27.800 \dashrightarrow 00{:}43{:}28.150$ Thank
- NOTE Confidence: 0.8359486
- 00:43:28.150 00:43:30.390 you, how can a long hauler determine
- NOTE Confidence: 0.8359486
- $00:43:30.390 \longrightarrow 00:43:32.942$ whether there is an issue with viral
- NOTE Confidence: 0.8359486
- 00:43:32.942 --> 00:43:35.228 reservoir problem or an autoimmune problem?
- NOTE Confidence: 0.81586700000001
- 00:43:36.320 --> 00:43:37.718 Yeah, excellent question,

- NOTE Confidence: 0.81586700000001
- $00:43:37.718 \rightarrow 00:43:40.514$ and that's precisely why we're doing
- NOTE Confidence: 0.81586700000001
- $00{:}43{:}40{.}514 \dashrightarrow 00{:}43{:}42{.}899$ this deep immunological dive into
- NOTE Confidence: 0.81586700000001
- 00:43:42.899 00:43:45.199 these patients because I believe
- NOTE Confidence: 0.81586700000001
- $00:43:45.199 \longrightarrow 00:43:47.400$ that these two possibilities may
- NOTE Confidence: 0.815867000000001
- 00:43:47.400 --> 00:43:49.908 be happening either in subset of
- NOTE Confidence: 0.81586700000001
- 00:43:49.910 > 00:43:52.628 patients having one or the other,
- NOTE Confidence: 0.81586700000001
- $00:43:52.630 \longrightarrow 00:43:54.890$ or another subset having both.
- NOTE Confidence: 0.81586700000001
- $00:43:54.890 \rightarrow 00:43:58.082$ Or maybe it's a varying degree that's
- NOTE Confidence: 0.815867000000001
- $00:43:58.082 \longrightarrow 00:44:00.330$ happening in within a patient.
- NOTE Confidence: 0.81586700000001
- $00:44:00.330 \longrightarrow 00:44:02.962$ So in order to we would love
- NOTE Confidence: 0.81586700000001
- $00:44:02.962 \longrightarrow 00:44:06.270$ to find a biomarker for either.
- NOTE Confidence: 0.815867000000001
- 00:44:06.270 --> 00:44:08.508 A person having a persistent infection
- NOTE Confidence: 0.815867000000001
- 00:44:08.508 --> 00:44:10.811 or those who are having autoimmunity
- NOTE Confidence: 0.81586700000001
- 00:44:10.811 --> 00:44:14.211 and with this deep dive we will be able
- NOTE Confidence: 0.815867000000001
- $00{:}44{:}14{.}211 \dashrightarrow 00{:}44{:}16{.}969$ to determine if there are these two
- NOTE Confidence: 0.815867000000001

 $00{:}44{:}16.969 \dashrightarrow 00{:}44{:}19.292$ different baskets of disease and what

NOTE Confidence: 0.81586700000001

 $00:44:19.292 \rightarrow 00:44:21.207$ parameters are correlating with each.

NOTE Confidence: 0.81586700000001

00:44:21.210 --> 00:44:22.586 And so you know,

NOTE Confidence: 0.81586700000001

 $00:44:22.586 \longrightarrow 00:44:24.650$ I I've actually seen the first

NOTE Confidence: 0.81586700000001

 $00:44:24.724 \longrightarrow 00:44:27.286$ glimpse of the data from the long

NOTE Confidence: 0.81586700000001

 $00:44:27.286 \longrightarrow 00:44:29.629$ holders and it's really striking.

NOTE Confidence: 0.81586700000001

 $00:44:29.630 \longrightarrow 00:44:31.928$ I would love to report this.

NOTE Confidence: 0.81586700000001

 $00:44:31.930 \longrightarrow 00:44:34.690$ It's such a such an early look that

NOTE Confidence: 0.815867000000001

00:44:34.690 --> 00:44:38.012 I I can't even talk about it, but.

NOTE Confidence: 0.815867000000001

 $00:44:38.012 \rightarrow 00:44:40.668$ But I know that there is a signature

NOTE Confidence: 0.81586700000001

 $00{:}44{:}40.668 \dashrightarrow 00{:}44{:}43.120$ so very excited to be able to.

NOTE Confidence: 0.815867000000001

 $00:44:43.120 \longrightarrow 00:44:45.064$ You don't figure this out soon

NOTE Confidence: 0.815867000000001

 $00:44:45.064 \rightarrow 00:44:47.439$ and report it and to help people.

NOTE Confidence: 0.84366614

 $00:44:49.080 \longrightarrow 00:44:50.710$ It's really exciting to hear

NOTE Confidence: 0.84366614

 $00:44:50.710 \longrightarrow 00:44:53.029$ there's more to come in that area.

NOTE Confidence: 0.84366614

 $00:44:53.030 \rightarrow 00:44:54.670$ I'm going to read this

- NOTE Confidence: 0.84366614
- $00:44:54.670 \longrightarrow 00:44:55.982$ one verbatim split along.

 $00:44:55.990 \longrightarrow 00:44:58.244$ You said earlier that if a virus

NOTE Confidence: 0.84366614

00:44:58.244 --> 00:44:59.940 reservoir is causing long COVID,

NOTE Confidence: 0.84366614

 $00:44:59.940 \longrightarrow 00:45:02.236$ you'd have to hop up immune system.

NOTE Confidence: 0.84366614

 $00{:}45{:}02{.}240 \dashrightarrow 00{:}45{:}03{.}396$ On the other hand,

NOTE Confidence: 0.84366614

 $00{:}45{:}03{.}396 \dashrightarrow 00{:}45{:}05{.}130$ if the immune system response is

NOTE Confidence: 0.84366614

 $00:45:05.193 \rightarrow 00:45:07.178$ causing it by attacking antibodies,

NOTE Confidence: 0.84366614

 $00{:}45{:}07{.}180 \dashrightarrow 00{:}45{:}09{.}804$ you need to slow the Union system down.

NOTE Confidence: 0.84366614

 $00{:}45{:}09{.}810 \dashrightarrow 00{:}45{:}11{.}450$ What happens if both are

NOTE Confidence: 0.84366614

 $00:45:11.450 \longrightarrow 00:45:12.762$ true went that greatly

NOTE Confidence: 0.84366614

 $00:45:12.770 \longrightarrow 00:45:13.426$ complicate treatment.

NOTE Confidence: 0.84366614

00:45:13.426 --> 00:45:14.803 Yeah, very tricky, right?

NOTE Confidence: 0.84366614

 $00{:}45{:}14.803 \dashrightarrow 00{:}45{:}19.249$ But I think there is a way to do this so.

NOTE Confidence: 0.84366614

 $00:45:19.250 \longrightarrow 00:45:20.898$ The fact that, OK,

NOTE Confidence: 0.84366614

 $00{:}45{:}20.898 \dashrightarrow 00{:}45{:}23.960$ let's assume a person has both a

00:45:23.960 --> 00:45:26.101 viral reservoir, an auto, anybody.

NOTE Confidence: 0.84366614

 $00{:}45{:}26.101 \dashrightarrow 00{:}45{:}28.363$ We could tackle the viral reservoir

NOTE Confidence: 0.84366614

 $00:45:28.363 \rightarrow 00:45:30.366$ using synthetic treatment like

NOTE Confidence: 0.84366614

00:45:30.366 --> 00:45:32.446 monoclonal antibody cocktail an.

NOTE Confidence: 0.84366614

 $00{:}45{:}32{.}450 \dashrightarrow 00{:}45{:}35{.}170$ If we get rid of that reservoir we

NOTE Confidence: 0.84366614

 $00{:}45{:}35{.}170 \dashrightarrow 00{:}45{:}38{.}068$ get rid of that part of the disease NOTE Confidence: 0.84366614

 $00{:}45{:}38.068 \dashrightarrow 00{:}45{:}40.790$ and then for the autoimmune part NOTE Confidence: 0.84366614

 $00{:}45{:}40.790 \dashrightarrow 00{:}45{:}43.825$ we can basically use treatments

NOTE Confidence: 0.84366614

 $00{:}45{:}43.825 \dashrightarrow 00{:}45{:}45.646$ that are immunosuppressive,

NOTE Confidence: 0.84366614

 $00{:}45{:}45{.}650 \dashrightarrow 00{:}45{:}47{.}915$ which will damp en the autoreactive

NOTE Confidence: 0.84366614

 $00{:}45{:}47{.}915 \dashrightarrow 00{:}45{:}50{.}180$ cells in those patients so.

NOTE Confidence: 0.84366614

00:45:50.180 --> 00:45:52.460 I think combination combination of

NOTE Confidence: 0.84366614

 $00{:}45{:}52{.}460 \dashrightarrow 00{:}45{:}54{.}284$ different approaches and the rapy

NOTE Confidence: 0.84366614

 $00:45:54.284 \rightarrow 00:45:56.714$ that are not going to be interfering

NOTE Confidence: 0.84366614

 $00:45:56.714 \longrightarrow 00:45:58.620$ with each other is possible.

NOTE Confidence: 0.8308757

00:46:00.530 --> 00:46:02.530 OK, great and we're getting

- NOTE Confidence: 0.8308757
- $00:46:02.530 \longrightarrow 00:46:04.130$ low on questions folks,
- NOTE Confidence: 0.8308757
- $00{:}46{:}04{.}130 \dashrightarrow 00{:}46{:}06{.}290$ so if you have anymore we
- NOTE Confidence: 0.8308757
- $00:46:06.290 \longrightarrow 00:46:08.530$ have a few more minutes.
- NOTE Confidence: 0.8308757
- $00:46:08.530 \longrightarrow 00:46:09.730$ Why wouldn't vaccine?
- NOTE Confidence: 0.8308757
- $00:46:09.730 \longrightarrow 00:46:11.730$ Why wouldn't vaccines cause immune
- NOTE Confidence: 0.8308757
- 00:46:11.730 --> 00:46:13.330 mediated COVID like symptoms
- NOTE Confidence: 0.8308757
- $00:46:13.330 \longrightarrow 00:46:15.330$ like the natural one does?
- NOTE Confidence: 0.8308757
- 00:46:15.330 --> 00:46:17.330 Yeah, another very good question.
- NOTE Confidence: 0.8308757
- $00{:}46{:}17.330 \dashrightarrow 00{:}46{:}20.578$ So the natural infection has a myriad of
- NOTE Confidence: 0.8308757
- $00{:}46{:}20.578 \dashrightarrow 00{:}46{:}22.928$ different effects on the immune system.
- NOTE Confidence: 0.8308757
- $00{:}46{:}22{.}930 \dashrightarrow 00{:}46{:}26{.}154$ One of the things that we saw very
- NOTE Confidence: 0.8308757
- $00:46:26.154 \longrightarrow 00:46:29.267$ early on in the COVID patient is
- NOTE Confidence: 0.8308757
- $00:46:29.267 \longrightarrow 00:46:32.319$ a severe decline in the T cells.
- NOTE Confidence: 0.8308757
- $00{:}46{:}32{.}320 \dashrightarrow 00{:}46{:}34{.}623$ So the virus infection causes a rapid
- NOTE Confidence: 0.8308757
- $00{:}46{:}34{.}623 \dashrightarrow 00{:}46{:}37{.}844$ drop in the T cells and T cells are the NOTE Confidence: 0.8308757

- $00{:}46{:}37.844 \dashrightarrow 00{:}46{:}40.049$ central command of the immune system.
- NOTE Confidence: 0.8308757
- 00:46:40.050 --> 00:46:42.060 If you don't have T cells,
- NOTE Confidence: 0.8308757
- $00{:}46{:}42.060 \dashrightarrow 00{:}46{:}44.748$ B cells don't know what to do another.
- NOTE Confidence: 0.8308757
- $00:46:44.750 \longrightarrow 00:46:46.430$ You know innate immune cells
- NOTE Confidence: 0.8308757
- 00:46:46.430 --> 00:46:48.110 don't know what to do,
- NOTE Confidence: 0.8308757
- $00{:}46{:}48.110 \dashrightarrow 00{:}46{:}50.126$ so the T cells are this.
- NOTE Confidence: 0.8308757
- $00:46:50.130 \longrightarrow 00:46:52.230$ This command center is being degraded
- NOTE Confidence: 0.8308757
- $00:46:52.230 \rightarrow 00:46:54.979$ or you know diminished by the virus and
- NOTE Confidence: 0.8308757
- $00{:}46{:}54{.}979 \dashrightarrow 00{:}46{:}56{.}905$ so all the subsequent immune responses
- NOTE Confidence: 0.8308757
- $00{:}46{:}56{.}968 \dashrightarrow 00{:}46{:}59{.}536$ that occur are misdirected or not very well.
- NOTE Confidence: 0.8308757
- $00:46:59.540 \longrightarrow 00:47:00.641$ You know conducted,
- NOTE Confidence: 0.8308757
- $00{:}47{:}00{.}641 \dashrightarrow 00{:}47{:}03{.}608$ whereas in the case of vaccines we have
- NOTE Confidence: 0.8308757
- $00{:}47{:}03.608 \dashrightarrow 00{:}47{:}06.488$ absolutely no impact on the T cell I mean.
- NOTE Confidence: 0.8308757
- $00{:}47{:}06{.}490 \dashrightarrow 00{:}47{:}09{.}282$ They're not going to touch the T cells
- NOTE Confidence: 0.8308757
- $00:47:09.282 \rightarrow 00:47:12.038$ with respect to numbers or their function,
- NOTE Confidence: 0.8308757
- $00:47:12.040 \longrightarrow 00:47:14.446$ but rather the stimulate them so

- NOTE Confidence: 0.8308757
- $00:47:14.446 \longrightarrow 00:47:16.437$ that the antibody secreting cells

00:47:16.437 $\operatorname{-->}$ 00:47:18.327 the B cells can be engaged,

NOTE Confidence: 0.8308757

 $00:47:18.330 \rightarrow 00:47:21.210$ and so the vaccine is really designed only

NOTE Confidence: 0.8308757

 $00:47:21.210 \rightarrow 00:47:24.248$ to provide the best kind of immune response,

NOTE Confidence: 0.8308757

 $00{:}47{:}24.250 \dashrightarrow 00{:}47{:}26.707$ whereas the infection does a whole bunch

NOTE Confidence: 0.8308757

 $00{:}47{:}26.707 \dashrightarrow 00{:}47{:}29.353$ of other things that interfere with our

NOTE Confidence: 0.8308757

 $00:47:29.353 \rightarrow 00:47:31.645$ ability to fight the viral infection.

NOTE Confidence: 0.8308757

00:47:31.650 --> 00:47:33.870 And that's really with all viruses,

NOTE Confidence: 0.8308757

00:47:33.870 --> 00:47:34.314 right?

NOTE Confidence: 0.8308757

 $00{:}47{:}34{.}314$ --> $00{:}47{:}36{.}978$ They have so many evasion mechanisms.

NOTE Confidence: 0.8308757

 $00:47:36.980 \longrightarrow 00:47:39.092$ That that they without them they

NOTE Confidence: 0.8308757

 $00{:}47{:}39.092 \dashrightarrow 00{:}47{:}41.150$ cannot be a successful pathogen.

NOTE Confidence: 0.8308757

 $00{:}47{:}41.150 \dashrightarrow 00{:}47{:}43.268$ So there's a huge difference between

NOTE Confidence: 0.8308757

 $00{:}47{:}43.268 \dashrightarrow 00{:}47{:}45.517$ the immune response that happened to

NOTE Confidence: 0.8308757

 $00{:}47{:}45{.}517 \dashrightarrow 00{:}47{:}47{.}457$ live infectious virus versus those
00:47:47.457 - 00:47:49.489 that happened during a vaccination,

NOTE Confidence: 0.8308757

 $00:47:49.490 \longrightarrow 00:47:51.681$ and that may be why we're seeing

NOTE Confidence: 0.8308757

00:47:51.681 --> 00:47:54.331 such an amazing effect of the vaccine

NOTE Confidence: 0.8308757

00:47:54.331 --> 00:47:55.975 in inducing super physiological

NOTE Confidence: 0.8308757

 $00:47:55.975 \longrightarrow 00:47:57.450$ levels of antibody.

NOTE Confidence: 0.8308757

 $00{:}47{:}57{.}450 \dashrightarrow 00{:}47{:}59{.}892$ Meaning most people don't develop that

NOTE Confidence: 0.8308757

 $00:47:59.892 \rightarrow 00:48:02.980$ kind of anybody with a natural infection.

NOTE Confidence: 0.8308757

 $00:48:02.980 \longrightarrow 00:48:05.416$ But with the two dose of vaccine,

NOTE Confidence: 0.8308757

 $00{:}48{:}05{.}420 \dashrightarrow 00{:}48{:}07{.}718$ we're seeing like incredible titers of

NOTE Confidence: 0.8308757

 $00{:}48{:}07{.}718$ --> $00{:}48{:}09{.}947$ any body that's going to hopefully give NOTE Confidence: 0.8308757

 $00{:}48{:}09{.}947 \dashrightarrow 00{:}48{:}12{.}720$ us protection for at least a year or so.

NOTE Confidence: 0.8308757

 $00:48:12.720 \longrightarrow 00:48:14.460$ So that's really the difference.

NOTE Confidence: 0.87985843

00:48:15.780 --> 00:48:18.258 Thank you, I think we might have

NOTE Confidence: 0.87985843

 $00{:}48{:}18.258 \dashrightarrow 00{:}48{:}21.138$ time for one or two more questions,

NOTE Confidence: 0.87985843

 $00:48:21.140 \longrightarrow 00:48:23.947$ so the topic of children hasn't really

NOTE Confidence: 0.87985843

 $00:48:23.947 \longrightarrow 00:48:26.118$ been discussed much in this area.

NOTE Confidence: 0.87985843

 $00{:}48{:}26{.}120 \dashrightarrow 00{:}48{:}29{.}950$ So could you talk to us about long COVID and

NOTE Confidence: 0.87985843

 $00{:}48{:}29{.}950 \dashrightarrow 00{:}48{:}31{.}870$ do children get it right?

NOTE Confidence: 0.87985843

 $00{:}48{:}31{.}870 \dashrightarrow 00{:}48{:}34{.}926$ So I have heard you know the children.

NOTE Confidence: 0.87985843

 $00{:}48{:}34{.}930 \dashrightarrow 00{:}48{:}37{.}594$ The data are still coming out because you

NOTE Confidence: 0.87985843

 $00:48:37.594 \rightarrow 00:48:40.289$ know they just became eligible recently,

NOTE Confidence: 0.87985843

 $00{:}48{:}40{.}290 \dashrightarrow 00{:}48{:}43{.}006$ so we don't know what the impact

NOTE Confidence: 0.87985843

 $00:48:43.006 \longrightarrow 00:48:45.445$ of the vaccines are for the

NOTE Confidence: 0.87985843

 $00:48:45.445 \longrightarrow 00:48:47.420$ long COVID in children yet.

NOTE Confidence: 0.87985843

 $00:48:47.420 \longrightarrow 00:48:49.350$ However, we know that Long

NOTE Confidence: 0.87985843

00:48:49.350 --> 00:48:51.849 Cove it does happen in children

NOTE Confidence: 0.87985843

00:48:51.849 --> 00:48:54.279 even in very young children,

NOTE Confidence: 0.87985843

 $00{:}48{:}54{.}280 \dashrightarrow 00{:}48{:}57{.}448$ so I think that you know that this

NOTE Confidence: 0.87985843

 $00{:}48{:}57{.}448 \dashrightarrow 00{:}48{:}59{.}675$ unfortunate doesn't spare people over

NOTE Confidence: 0.87985843

 $00:48:59.675 \rightarrow 00:49:02.853$ younger age and unlike the infection itself,

NOTE Confidence: 0.87985843

 $00:49:02.860 \longrightarrow 00:49:04.680$ most people who are younger

NOTE Confidence: 0.87985843

 $00:49:04.680 \longrightarrow 00:49:07.124$ are having very mild or some

NOTE Confidence: 0.87985843

 $00:49:07.124 \rightarrow 00:49:09.296$ asymptomatic infection was alone.

NOTE Confidence: 0.87985843

00:49:09.300 --> 00:49:11.868 COVID can happen in this group,

NOTE Confidence: 0.87985843

 $00:49:11.870 \longrightarrow 00:49:14.342$ so I think that's really more

NOTE Confidence: 0.87985843

 $00:49:14.342 \longrightarrow 00:49:17.280$ reason why we need to accelerate.

NOTE Confidence: 0.87985843

 $00{:}49{:}17{.}280 \dashrightarrow 00{:}49{:}18{.}812$ Vaccination in the younger

NOTE Confidence: 0.87985843

00:49:18.812 --> 00:49:20.344 people because you know,

NOTE Confidence: 0.87985843

 $00{:}49{:}20{.}350 \dashrightarrow 00{:}49{:}22{.}666$ even though they might recover with

NOTE Confidence: 0.87985843

 $00{:}49{:}22.666 \dashrightarrow 00{:}49{:}24.960$ a mild infection with the kovid,

NOTE Confidence: 0.87985843

 $00:49:24.960 \rightarrow 00:49:27.648$ they may suffer from long term symptoms.

NOTE Confidence: 0.87985843

 $00{:}49{:}27.650 \dashrightarrow 00{:}49{:}29.948$ An I think the vaccines done.

NOTE Confidence: 0.91688365

 $00:49:31.930 \rightarrow 00:49:35.146$ And the last question of the morning is.

NOTE Confidence: 0.77377456

 $00{:}49{:}37{.}170 \dashrightarrow 00{:}49{:}38{.}900$ Add Seed's answer suggests that

NOTE Confidence: 0.77377456

00:49:38.900 --> 00:49:40.630 vaccines will provide better long

NOTE Confidence: 0.77377456

 $00{:}49{:}40.688 \dashrightarrow 00{:}49{:}42.658$ term immunity than natural infection.

NOTE Confidence: 0.85586125

00:49:44.200 --> 00:49:46.608 Yes, I believe it does because of

NOTE Confidence: 0.85586125

00:49:46.608 --> 00:49:50.015 what I just said that the the vaccines

NOTE Confidence: 0.85586125

 $00{:}49{:}50.015 \dashrightarrow 00{:}49{:}52.310$ are inducing incredible levels of

NOTE Confidence: 0.85586125

 $00{:}49{:}52{.}388 \dashrightarrow 00{:}49{:}54{.}728$ neutralizing any body as well as just

NOTE Confidence: 0.85586125

 $00{:}49{:}54{.}728 \dashrightarrow 00{:}49{:}57{.}499$ a high tide or any body and they're

NOTE Confidence: 0.85586125

 $00{:}49{:}57{.}499 \dashrightarrow 00{:}49{:}59{.}917$ seeming to be pretty well maintained.

NOTE Confidence: 0.85586125

 $00{:}49{:}59{.}920 \dashrightarrow 00{:}50{:}02{.}580$ Over time there was a study that

NOTE Confidence: 0.85586125

00:50:02.580 --> 00:50:05.445 examined them at six months point an

NOTE Confidence: 0.85586125

 $00:50:05.445 \dashrightarrow 00:50:08.380$ the titers are still staying very high,

NOTE Confidence: 0.85586125

 $00{:}50{:}08{.}380 \dashrightarrow 00{:}50{:}11{.}005$ so that kind of very slow regression

NOTE Confidence: 0.85586125

 $00{:}50{:}11.005 \dashrightarrow 00{:}50{:}13.730$ of the antibody levels suggests that.

NOTE Confidence: 0.85586125

 $00{:}50{:}13.730 \dashrightarrow 00{:}50{:}15.644$ The longevity as well as potency

NOTE Confidence: 0.85586125

00:50:15.644 --> 00:50:18.025 of antibody may be better after

NOTE Confidence: 0.85586125

 $00:50:18.025 \rightarrow 00:50:20.109$ vaccination than unnatural infection,

NOTE Confidence: 0.85586125

 $00{:}50{:}20{.}110 \dashrightarrow 00{:}50{:}22{.}534$ and so hopefully I mean this

NOTE Confidence: 0.85586125

 $00:50:22.534 \rightarrow 00:50:25.300$ is really our way out of this.

NOTE Confidence: 0.85586125

 $00:50:28.476 \dashrightarrow 00:50:30.889$ protected from acute and long cobin. NOTE Confidence: 0.84953994 00:50:32.300 --> 00:50:33.625 Wonderful well keep going keep NOTE Confidence: 0.84953994 $00:50:33.625 \rightarrow 00:50:35.570$ going just have to say thank you NOTE Confidence: 0.84953994 00:50:35.570 --> 00:50:37.280 so much for spending your Saturday NOTE Confidence: 0.84953994 $00:50:37.280 \rightarrow 00:50:38.815$ morning with this wonderful group NOTE Confidence: 0.84953994 00:50:38.815 --> 00:50:40.645 of Yale School of Medicine alumni. NOTE Confidence: 0.84953994 $00:50:40.650 \rightarrow 00:50:42.090$ It was a fascinating talk. NOTE Confidence: 0.84953994 00:50:42.090 --> 00:50:43.334 I everyones questions were NOTE Confidence: 0.84953994 $00:50:43.334 \rightarrow 00:50:45.200$ answered so thank you so much NOTE Confidence: 0.84953994 $00:50:45.264 \rightarrow 00:50:46.986$ and enjoy the rest of your day. NOTE Confidence: 0.79829794 00:50:47.550 --> 00:50:49.258 Thank you so much NOTE Confidence: 0.79829794 00:50:49.260 --> 00:50:51.941 Aaron. OK thanks everybody and I will NOTE Confidence: 0.79829794 $00:50:51.941 \rightarrow 00:50:55.020$ share that Dean stun Bermond is talking NOTE Confidence: 0.79829794 00:50:55.020 --> 00:50:57.798 at 11:00 o'clock if anyone's interested. NOTE Confidence: 0.79829794 $00:50:57.800 \rightarrow 00:51:01.230$ He's the School of Public Health teen 77

 $00:50:25.300 \rightarrow 00:50:28.476$ Pandemic is to get vaccinated and to be

NOTE Confidence: 0.85586125

- NOTE Confidence: 0.79829794
- $00{:}51{:}01{.}230 \dashrightarrow 00{:}51{:}04{.}728$ and he's also talking about COVID.

NOTE Confidence: 0.79829794

00:51:04.730 --> 00:51:06.140 In the public health setting,

NOTE Confidence: 0.79829794

 $00{:}51{:}06{.}140 \dashrightarrow 00{:}51{:}09{.}299$ so you can switch over for an 11:00 o'clock

NOTE Confidence: 0.79829794

 $00{:}51{:}09{.}299 \dashrightarrow 00{:}51{:}11{.}066$ presentation if you're interested and

NOTE Confidence: 0.79829794

 $00{:}51{:}11.066 \dashrightarrow 00{:}51{:}13.664$ enjoy the rest of your alumni weekend.