

WEBVTT

NOTE duration:"01:01:39.2000000"

NOTE recognizability:0.809

NOTE language:en-us

NOTE Confidence: 0.812380848181818

00:00:00.000 --> 00:00:04.380 Afternoon if my distinct pleasure and

NOTE Confidence: 0.812380848181818

00:00:04.380 --> 00:00:08.180 honour to introduce Professor Joseph.

NOTE Confidence: 0.812380848181818

00:00:08.180 --> 00:00:11.800 Mary Swatski, am I right?

NOTE Confidence: 0.812380848181818

00:00:11.800 --> 00:00:15.520 From Mayo Clinic, Gill is professor who

NOTE Confidence: 0.812380848181818

00:00:15.520 --> 00:00:18.538 professor of pathology and senior shows

NOTE Confidence: 0.812380848181818

00:00:18.538 --> 00:00:23.070 a Dean of academic affair of male Alex

NOTE Confidence: 0.77712689

00:00:23.080 --> 00:00:25.200 School of Medicine. So

NOTE Confidence: 0.83067322

00:00:25.250 --> 00:00:29.498 look at he is coming president of Society

NOTE Confidence: 0.83067322

00:00:29.498 --> 00:00:33.058 for Cardiovascular pathology and role model

NOTE Confidence: 0.83067322

00:00:33.058 --> 00:00:36.068 for cardiovascular pathologist and for

NOTE Confidence: 0.83067322

00:00:36.068 --> 00:00:40.458 that matter maybe for all pathologists.

NOTE Confidence: 0.83067322

00:00:40.460 --> 00:00:43.316 Looking at his CV is a very impressive,

NOTE Confidence: 0.83067322

00:00:43.320 --> 00:00:44.907 it's educational activity.

NOTE Confidence: 0.83067322

00:00:44.907 --> 00:00:48.370 You can see that he teach all part
NOTE Confidence: 0.83067322

00:00:48.370 --> 00:00:51.588 of cardiovascular pathology and lung
NOTE Confidence: 0.83067322

00:00:51.588 --> 00:00:55.214 pathology rate create curriculum and
NOTE Confidence: 0.83067322

00:00:55.214 --> 00:00:58.042 talking about cardiovascular pathology
NOTE Confidence: 0.83067322

00:00:58.042 --> 00:01:02.125 from congenital heart disease for neoplasm
NOTE Confidence: 0.83067322

00:01:02.125 --> 00:01:05.635 from cardiac imaging to amyloid diagnosis.
NOTE Confidence: 0.83067322

00:01:05.640 --> 00:01:07.410 And because of that he is
NOTE Confidence: 0.83067322

00:01:07.410 --> 00:01:09.730 a very frequent speaker.
NOTE Confidence: 0.83067322

00:01:09.730 --> 00:01:12.470 At national and international meetings,
NOTE Confidence: 0.83067322

00:01:12.470 --> 00:01:14.418 including Scotland, England,
NOTE Confidence: 0.83067322

00:01:14.418 --> 00:01:18.506 you're separated by yourself and then France,
NOTE Confidence: 0.83067322

00:01:18.510 --> 00:01:20.022 Chile and everywhere and
NOTE Confidence: 0.83067322

00:01:20.022 --> 00:01:22.290 make me a little bit jealous.
NOTE Confidence: 0.83067322

00:01:22.290 --> 00:01:27.483 Almost every year you gave a talk at Hawaii.
NOTE Confidence: 0.83067322

00:01:27.490 --> 00:01:31.200 And you know that January or February,
NOTE Confidence: 0.83067322

00:01:31.200 --> 00:01:32.268 think about it,

NOTE Confidence: 0.83067322

00:01:32.268 --> 00:01:35.233 you know it's very cold time at Rochester

NOTE Confidence: 0.83067322

00:01:35.233 --> 00:01:38.393 and very nice because how are you so?

NOTE Confidence: 0.83067322

00:01:38.400 --> 00:01:41.886 Other than they had about more than

NOTE Confidence: 0.83067322

00:01:41.886 --> 00:01:44.425 200 original articles and about

NOTE Confidence: 0.83067322

00:01:44.425 --> 00:01:46.800 100 book chapters and books.

NOTE Confidence: 0.83067322

00:01:46.800 --> 00:01:47.952 So very impressive,

NOTE Confidence: 0.83067322

00:01:47.952 --> 00:01:51.339 you wonder how many hours you sleep at night.

NOTE Confidence: 0.83067322

00:01:51.340 --> 00:01:53.364 Without further ado, please.

NOTE Confidence: 0.83067322

00:01:53.364 --> 00:01:55.894 He's talking about matters of

NOTE Confidence: 0.83067322

00:01:55.894 --> 00:01:58.606 the heart or matters of heart.

NOTE Confidence: 0.83067322

00:01:58.610 --> 00:02:01.390 Thank you.

NOTE Confidence: 0.85509720875

00:02:01.390 --> 00:02:04.344 Well, that was a a ridiculously kind

NOTE Confidence: 0.85509720875

00:02:04.344 --> 00:02:06.702 introduction. I, I have to say I I've

NOTE Confidence: 0.85509720875

00:02:06.702 --> 00:02:09.307 been blown away by the the warm welcome,

NOTE Confidence: 0.85509720875

00:02:09.310 --> 00:02:11.838 this amazing August institution.

NOTE Confidence: 0.85509720875

00:02:11.838 --> 00:02:14.494 Obviously, Doctor Wong's introduction and
NOTE Confidence: 0.85509720875

00:02:14.494 --> 00:02:17.530 his hosting have been absolutely exceptional.
NOTE Confidence: 0.85509720875

00:02:17.530 --> 00:02:19.656 I do have to say it was it was kind of
NOTE Confidence: 0.85509720875

00:02:19.656 --> 00:02:21.610 adorable. It extended even last night.
NOTE Confidence: 0.85509720875

00:02:21.610 --> 00:02:23.746 He refused to let this Midwestern boy walk
NOTE Confidence: 0.85509720875

00:02:23.746 --> 00:02:26.126 alone two blocks from the restaurant to here.
NOTE Confidence: 0.85509720875

00:02:26.130 --> 00:02:27.948 It was it was like a scene right out
NOTE Confidence: 0.85509720875

00:02:27.948 --> 00:02:30.810 of bodyguard. It was very impressive.
NOTE Confidence: 0.85509720875

00:02:30.810 --> 00:02:32.538 So. Thank you very much.
NOTE Confidence: 0.85509720875

00:02:32.538 --> 00:02:34.350 Glad to be here among friends.
NOTE Confidence: 0.85509720875

00:02:34.350 --> 00:02:35.834 Doctor Dosik, of course.
NOTE Confidence: 0.85509720875

00:02:35.834 --> 00:02:38.844 And I thought this was a a pretty
NOTE Confidence: 0.85509720875

00:02:38.844 --> 00:02:41.315 special week for me to come here,
NOTE Confidence: 0.85509720875

00:02:41.320 --> 00:02:42.788 mostly because of course,
NOTE Confidence: 0.85509720875

00:02:42.788 --> 00:02:45.580 as you all know, or I hope you know it,
NOTE Confidence: 0.85509720875

00:02:45.580 --> 00:02:48.380 it's the week in which we we

NOTE Confidence: 0.85509720875

00:02:48.380 --> 00:02:50.340 celebrate a certain holiday.

NOTE Confidence: 0.85509720875

00:02:50.340 --> 00:02:51.999 And for all of you out there

NOTE Confidence: 0.85509720875

00:02:51.999 --> 00:02:53.100 who have significant others,

NOTE Confidence: 0.85509720875

00:02:53.100 --> 00:02:54.930 I hope you didn't forget it.

NOTE Confidence: 0.85509720875

00:02:54.930 --> 00:02:56.832 It's the week that we celebrate

NOTE Confidence: 0.85509720875

00:02:56.832 --> 00:02:58.800 the Feast of Saint Valentine.

NOTE Confidence: 0.85509720875

00:02:58.800 --> 00:03:00.496 And I don't know if any of you

NOTE Confidence: 0.85509720875

00:03:00.496 --> 00:03:02.338 know the story of how Valentine's.

NOTE Confidence: 0.79050334625

00:03:24.460 --> 00:03:25.498 Particularly well with

NOTE Confidence: 0.79050334625

00:03:25.498 --> 00:03:27.228 Claudius Gothicus at the time,

NOTE Confidence: 0.79050334625

00:03:27.230 --> 00:03:30.614 or Claudius the 2nd, and thus he was

NOTE Confidence: 0.79050334625

00:03:30.614 --> 00:03:33.129 imprisoned and sentenced to death.

NOTE Confidence: 0.79050334625

00:03:33.130 --> 00:03:36.538 And he befriended his jailer while he was

NOTE Confidence: 0.79050334625

00:03:36.538 --> 00:03:39.710 an inmate, and he somehow got permission

NOTE Confidence: 0.79050334625

00:03:39.710 --> 00:03:42.910 to write to his jailers daughter.

NOTE Confidence: 0.79050334625

00:03:42.910 --> 00:03:44.716 And he would write her letters and
NOTE Confidence: 0.79050334625

00:03:44.716 --> 00:03:46.060 he would always sign them.
NOTE Confidence: 0.79050334625

00:03:46.060 --> 00:03:47.275 From your Valentine.
NOTE Confidence: 0.79050334625

00:03:47.275 --> 00:03:50.110 And the jailer wasn't wild about this,
NOTE Confidence: 0.79050334625

00:03:50.110 --> 00:03:51.798 but he allowed it to go on because
NOTE Confidence: 0.79050334625

00:03:51.798 --> 00:03:52.450 his daughter was.
NOTE Confidence: 0.79050334625

00:03:52.450 --> 00:03:54.286 She was blind, she was handicapped.
NOTE Confidence: 0.79050334625

00:03:54.290 --> 00:03:55.530 And this gave her something,
NOTE Confidence: 0.79050334625

00:03:55.530 --> 00:03:57.210 and she really liked it.
NOTE Confidence: 0.79050334625

00:03:57.210 --> 00:03:59.802 And Valentine had told her in his letters
NOTE Confidence: 0.79050334625

00:03:59.802 --> 00:04:02.510 that he was going to cure her blindness
NOTE Confidence: 0.79050334625

00:04:02.510 --> 00:04:05.228 and that God would see her way through,
NOTE Confidence: 0.79050334625

00:04:05.230 --> 00:04:08.386 so to speak, to a cure.
NOTE Confidence: 0.79050334625

00:04:08.390 --> 00:04:11.190 And eventually her blindness did
NOTE Confidence: 0.79050334625

00:04:11.190 --> 00:04:14.810 seem to improve or get better.
NOTE Confidence: 0.79050334625

00:04:14.810 --> 00:04:16.598 And because of that,

NOTE Confidence: 0.79050334625

00:04:16.598 --> 00:04:18.833 the the jailers family basically

NOTE Confidence: 0.79050334625

00:04:18.833 --> 00:04:21.670 saw Valentine's as this miraculous

NOTE Confidence: 0.79050334625

00:04:21.670 --> 00:04:24.550 individual who could work miracles.

NOTE Confidence: 0.79050334625

00:04:24.550 --> 00:04:26.132 And so they saved all those letters

NOTE Confidence: 0.79050334625

00:04:26.132 --> 00:04:27.801 as kind of these relic things

NOTE Confidence: 0.79050334625

00:04:27.801 --> 00:04:29.366 and started passing them around.

NOTE Confidence: 0.79050334625

00:04:29.370 --> 00:04:32.569 And they then started the tradition of

NOTE Confidence: 0.79050334625

00:04:32.569 --> 00:04:35.948 sending loved ones these letters and notes,

NOTE Confidence: 0.79050334625

00:04:35.950 --> 00:04:38.470 some of which would be adorned with symbols.

NOTE Confidence: 0.79050334625

00:04:38.470 --> 00:04:42.446 And geometric symbols of which, roughly.

NOTE Confidence: 0.79050334625

00:04:42.446 --> 00:04:44.550 Elevation of the heart.

NOTE Confidence: 0.79050334625

00:04:44.550 --> 00:04:45.663 Everybody's familiar with

NOTE Confidence: 0.79050334625

00:04:45.663 --> 00:04:47.147 the Valentine heart there,

NOTE Confidence: 0.79050334625

00:04:47.150 --> 00:04:49.268 and it does bear some resemblance,

NOTE Confidence: 0.79050334625

00:04:49.270 --> 00:04:52.350 obviously, to an anatomic heart as well.

NOTE Confidence: 0.79050334625

00:04:52.350 --> 00:04:55.070 And so thus we continue that tradition today,
NOTE Confidence: 0.79050334625

00:04:55.070 --> 00:04:59.165 and we exchange letters and poems and
NOTE Confidence: 0.79050334625

00:04:59.170 --> 00:05:01.599 all kinds of little trinkets to express
NOTE Confidence: 0.79050334625

00:05:01.599 --> 00:05:04.420 our love for one another in honor of
NOTE Confidence: 0.79050334625

00:05:04.420 --> 00:05:07.130 Saint Valentine and what he did for Julia,
NOTE Confidence: 0.79050334625

00:05:07.130 --> 00:05:11.064 the jailer's daughter when he was imprisoned.
NOTE Confidence: 0.79050334625

00:05:11.070 --> 00:05:13.800 So I think it's it's appropriate in
NOTE Confidence: 0.79050334625

00:05:13.800 --> 00:05:16.644 in this vein unintended of which I
NOTE Confidence: 0.79050334625

00:05:16.644 --> 00:05:19.813 speak here that I I outline what I
NOTE Confidence: 0.79050334625

00:05:19.813 --> 00:05:22.605 plan to talk about today in honor of
NOTE Confidence: 0.79050334625

00:05:22.610 --> 00:05:24.850 Saint Valentine's by way of a poem.
NOTE Confidence: 0.79050334625

00:05:24.850 --> 00:05:28.376 So here is my outline a heart themed
NOTE Confidence: 0.79050334625

00:05:28.376 --> 00:05:30.548 lecture for you in three acts.
NOTE Confidence: 0.79050334625

00:05:30.550 --> 00:05:33.169 We'll start with a tale of a VAX and
NOTE Confidence: 0.79050334625

00:05:33.169 --> 00:05:35.761 then something new updates from The Who
NOTE Confidence: 0.79050334625

00:05:35.761 --> 00:05:38.809 and will end with some amyloid plaques.

NOTE Confidence: 0.79050334625

00:05:38.810 --> 00:05:40.874 So that's as good as it gets guys.

NOTE Confidence: 0.79050334625

00:05:40.880 --> 00:05:42.950 So. But that doesn't entertain you.

NOTE Confidence: 0.79050334625

00:05:42.950 --> 00:05:43.712 Nothing will.

NOTE Confidence: 0.79050334625

00:05:43.712 --> 00:05:44.474 So alright,

NOTE Confidence: 0.79050334625

00:05:44.474 --> 00:05:47.355 for those of you who are perhaps

NOTE Confidence: 0.79050334625

00:05:47.355 --> 00:05:50.451 less sentimental and prefer a more

NOTE Confidence: 0.79050334625

00:05:50.451 --> 00:05:52.309 classical outline, here it is.

NOTE Confidence: 0.79050334625

00:05:52.309 --> 00:05:54.220 So we're gonna start off by talking

NOTE Confidence: 0.79050334625

00:05:54.282 --> 00:05:55.907 a little bit about COVID-19,

NOTE Confidence: 0.79050334625

00:05:55.910 --> 00:05:58.003 kind of getting our thinking back into

NOTE Confidence: 0.79050334625

00:05:58.003 --> 00:06:00.226 the pandemic as if it ever really left.

NOTE Confidence: 0.79050334625

00:06:00.230 --> 00:06:02.134 Then we'll talk about some of those

NOTE Confidence: 0.79050334625

00:06:02.134 --> 00:06:04.049 updates from The Who that I alluded

NOTE Confidence: 0.79050334625

00:06:04.049 --> 00:06:06.020 to moments ago and then discuss some

NOTE Confidence: 0.79050334625

00:06:06.020 --> 00:06:07.745 new trends in cardiac amyloidosis

NOTE Confidence: 0.79050334625

00:06:07.745 --> 00:06:09.652 and some newer technologies on the
NOTE Confidence: 0.79050334625

00:06:09.652 --> 00:06:11.479 horizon that I think are exciting and.
NOTE Confidence: 0.79050334625

00:06:11.480 --> 00:06:13.865 Certainly these topics extend beyond
NOTE Confidence: 0.79050334625

00:06:13.865 --> 00:06:16.250 the realm of cardiovascular pathology
NOTE Confidence: 0.79050334625

00:06:16.319 --> 00:06:18.469 into other areas of pathologic
NOTE Confidence: 0.79050334625

00:06:18.469 --> 00:06:20.189 diagnostic pathology as well.
NOTE Confidence: 0.79050334625

00:06:20.190 --> 00:06:23.557 So first we're going to start each
NOTE Confidence: 0.79050334625

00:06:23.557 --> 00:06:26.710 of these acts with a vignette.
NOTE Confidence: 0.79050334625

00:06:26.710 --> 00:06:28.886 In our first vignette is a 53 year
NOTE Confidence: 0.79050334625

00:06:28.886 --> 00:06:31.111 old woman who presented with elevated
NOTE Confidence: 0.79050334625

00:06:31.111 --> 00:06:33.529 troponins and New heart block without
NOTE Confidence: 0.79050334625

00:06:33.591 --> 00:06:36.067 discrete lesions noted angiographically,
NOTE Confidence: 0.79050334625

00:06:36.070 --> 00:06:38.650 SARS Kobe 2 testing was negative
NOTE Confidence: 0.79050334625

00:06:38.650 --> 00:06:40.370 and the patient had
NOTE Confidence: 0.828767777692308

00:06:40.457 --> 00:06:43.449 received notably an MRA 12211273 vaccine
NOTE Confidence: 0.828767777692308

00:06:43.449 --> 00:06:46.287 6 days prior to her presentation.

NOTE Confidence: 0.828767777692308
00:06:46.290 --> 00:06:47.625 And the myocardial biopsy was
NOTE Confidence: 0.828767777692308
00:06:47.625 --> 00:06:48.693 performed in a photomicrograph
NOTE Confidence: 0.828767777692308
00:06:48.693 --> 00:06:50.145 of such as shown on the right.
NOTE Confidence: 0.828767777692308
00:06:50.150 --> 00:06:52.238 Hand side of the slide here.
NOTE Confidence: 0.828767777692308
00:06:52.240 --> 00:06:54.632 What I hope you'll realize here from this
NOTE Confidence: 0.828767777692308
00:06:54.632 --> 00:06:56.839 relatively low power is indeed heart muscle,
NOTE Confidence: 0.828767777692308
00:06:56.840 --> 00:06:58.792 but it does appear to be a little
NOTE Confidence: 0.828767777692308
00:06:58.792 --> 00:07:00.617 bit more cellular than one might
NOTE Confidence: 0.828767777692308
00:07:00.617 --> 00:07:02.531 expect to see for heart muscle.
NOTE Confidence: 0.828767777692308
00:07:02.540 --> 00:07:04.640 Closer in, you get a sense forward.
NOTE Confidence: 0.828767777692308
00:07:04.640 --> 00:07:06.420 The character of that cellularity.
NOTE Confidence: 0.828767777692308
00:07:06.420 --> 00:07:07.908 There's a leukocytic infiltrate
NOTE Confidence: 0.828767777692308
00:07:07.908 --> 00:07:09.768 that's filling up the interstitium,
NOTE Confidence: 0.828767777692308
00:07:09.770 --> 00:07:11.794 and indeed it it's not just sitting there,
NOTE Confidence: 0.828767777692308
00:07:11.800 --> 00:07:14.341 but there does seem to be some
NOTE Confidence: 0.828767777692308

00:07:14.341 --> 00:07:15.811 behavior associated with it
NOTE Confidence: 0.828767777692308

00:07:15.811 --> 00:07:17.677 in the form of myocyte injury.
NOTE Confidence: 0.828767777692308

00:07:17.680 --> 00:07:18.856 You'll note at the top here,
NOTE Confidence: 0.828767777692308

00:07:18.860 --> 00:07:21.278 some of the myocytes have lost
NOTE Confidence: 0.828767777692308

00:07:21.280 --> 00:07:23.300 their cross striations a bit.
NOTE Confidence: 0.828767777692308

00:07:23.300 --> 00:07:25.308 Some of the sarcoplasmic
NOTE Confidence: 0.828767777692308

00:07:25.308 --> 00:07:26.814 membrane is scalloping.
NOTE Confidence: 0.828767777692308

00:07:26.820 --> 00:07:28.554 It's becoming a little bit Ruddy
NOTE Confidence: 0.828767777692308

00:07:28.554 --> 00:07:30.210 or rugged along its surface.
NOTE Confidence: 0.828767777692308

00:07:30.210 --> 00:07:31.614 So those leukocytes are
NOTE Confidence: 0.828767777692308

00:07:31.614 --> 00:07:33.018 not just simply transiting,
NOTE Confidence: 0.828767777692308

00:07:33.020 --> 00:07:34.720 but they're actually causing
NOTE Confidence: 0.828767777692308

00:07:34.720 --> 00:07:35.570 myocardial injury.
NOTE Confidence: 0.828767777692308

00:07:35.570 --> 00:07:37.590 This is definitionally active
NOTE Confidence: 0.828767777692308

00:07:37.590 --> 00:07:40.115 myocarditis at that at this
NOTE Confidence: 0.828767777692308

00:07:40.115 --> 00:07:42.708 point and the question becomes.

NOTE Confidence: 0.828767777692308
00:07:42.710 --> 00:07:45.778 What is its ideology?
NOTE Confidence: 0.828767777692308
00:07:45.780 --> 00:07:49.232 So let's talk a little bit about
NOTE Confidence: 0.828767777692308
00:07:49.232 --> 00:07:50.360 myocarditis and its etiologies.
NOTE Confidence: 0.828767777692308
00:07:50.360 --> 00:07:51.065 I want to,
NOTE Confidence: 0.828767777692308
00:07:51.065 --> 00:07:53.480 I want to rewind to a time that again,
NOTE Confidence: 0.828767777692308
00:07:53.480 --> 00:07:56.490 I think we would probably rather all
NOTE Confidence: 0.828767777692308
00:07:56.490 --> 00:07:59.398 forget about nearly three years ago now,
NOTE Confidence: 0.828767777692308
00:07:59.400 --> 00:08:01.938 which was the summer of 2020.
NOTE Confidence: 0.828767777692308
00:08:01.940 --> 00:08:04.369 That was of course our first summer
NOTE Confidence: 0.828767777692308
00:08:04.369 --> 00:08:06.547 where COVID was in full swing
NOTE Confidence: 0.828767777692308
00:08:06.547 --> 00:08:08.671 and a number of studies started
NOTE Confidence: 0.828767777692308
00:08:08.671 --> 00:08:10.868 coming out between June and July,
NOTE Confidence: 0.828767777692308
00:08:10.870 --> 00:08:13.755 primarily out of the radiology
NOTE Confidence: 0.828767777692308
00:08:13.755 --> 00:08:16.063 literature detailing and discussing
NOTE Confidence: 0.828767777692308
00:08:16.063 --> 00:08:18.330 patients who have had COVID-19 are
NOTE Confidence: 0.828767777692308

00:08:18.330 --> 00:08:20.600 either active or in the subacute
NOTE Confidence: 0.828767777692308

00:08:20.600 --> 00:08:23.120 phase that we're presenting with
NOTE Confidence: 0.828767777692308

00:08:23.120 --> 00:08:25.136 cardiac issues and asymptomatic
NOTE Confidence: 0.828767777692308

00:08:25.210 --> 00:08:27.532 cardiac patients as well that were
NOTE Confidence: 0.828767777692308

00:08:27.532 --> 00:08:30.020 being screened by way of cardiac
NOTE Confidence: 0.828767777692308

00:08:30.020 --> 00:08:32.840 MRI and CT for cardiac sequella.
NOTE Confidence: 0.828767777692308

00:08:32.840 --> 00:08:34.284 Of COVID-19,
NOTE Confidence: 0.828767777692308

00:08:34.284 --> 00:08:38.616 the results were admittedly quite alarming.
NOTE Confidence: 0.828767777692308

00:08:38.620 --> 00:08:41.698 The first study showed 100 patients
NOTE Confidence: 0.828767777692308

00:08:41.700 --> 00:08:45.140 and or exhibited 100 patients,
NOTE Confidence: 0.828767777692308

00:08:45.140 --> 00:08:48.128 nearly 80% of which showed some
NOTE Confidence: 0.828767777692308

00:08:48.128 --> 00:08:50.120 cardiac involvement by Mr.
NOTE Confidence: 0.828767777692308

00:08:50.120 --> 00:08:51.456 Now this involvement didn't
NOTE Confidence: 0.828767777692308

00:08:51.456 --> 00:08:53.126 necessarily mean that there were
NOTE Confidence: 0.828767777692308

00:08:53.126 --> 00:08:54.869 clinical symptoms associated with it,
NOTE Confidence: 0.828767777692308

00:08:54.870 --> 00:08:56.840 but rather there was delayed

NOTE Confidence: 0.828767777692308
00:08:56.840 --> 00:08:58.416 gadolinium enhancement meaning that
NOTE Confidence: 0.828767777692308
00:08:58.416 --> 00:09:00.362 there was evidence of inflammation
NOTE Confidence: 0.828767777692308
00:09:00.362 --> 00:09:01.850 in the myocardium irrespective
NOTE Confidence: 0.828767777692308
00:09:01.850 --> 00:09:03.949 of the patient symptomatology.
NOTE Confidence: 0.828767777692308
00:09:03.950 --> 00:09:05.658 Following those patients along
NOTE Confidence: 0.828767777692308
00:09:05.658 --> 00:09:07.366 after their acute phase,
NOTE Confidence: 0.828767777692308
00:09:07.370 --> 00:09:09.230 almost 2/3 of those patients
NOTE Confidence: 0.828767777692308
00:09:09.230 --> 00:09:11.090 showed some evidence of ongoing
NOTE Confidence: 0.828767777692308
00:09:11.160 --> 00:09:13.210 inflammation in the heart muscle.
NOTE Confidence: 0.828767777692308
00:09:13.210 --> 00:09:15.338 This is alarming and this is very concerning,
NOTE Confidence: 0.828767777692308
00:09:15.340 --> 00:09:16.225 especially at this time where
NOTE Confidence: 0.828767777692308
00:09:16.225 --> 00:09:17.470 we're all kind of in the dark,
NOTE Confidence: 0.828767777692308
00:09:17.470 --> 00:09:19.570 trying to feel our way through in
NOTE Confidence: 0.828767777692308
00:09:19.570 --> 00:09:21.393 the darkness of what this virus
NOTE Confidence: 0.828767777692308
00:09:21.393 --> 00:09:23.402 is going to do to the populace.
NOTE Confidence: 0.828767777692308

00:09:23.410 --> 00:09:25.385 A second study of relatively
NOTE Confidence: 0.828767777692308

00:09:25.385 --> 00:09:26.570 young competitive athletes,
NOTE Confidence: 0.828767777692308

00:09:26.570 --> 00:09:29.042 26 of them showed similarly an
NOTE Confidence: 0.828767777692308

00:09:29.042 --> 00:09:31.148 alarming numbers, with almost half,
NOTE Confidence: 0.828767777692308

00:09:31.148 --> 00:09:34.130 12 having some evidence by way of
NOTE Confidence: 0.828767777692308

00:09:34.217 --> 00:09:37.057 imaging of myocardial involvement.
NOTE Confidence: 0.828767777692308

00:09:37.060 --> 00:09:38.516 By inflammation.
NOTE Confidence: 0.828767777692308

00:09:38.516 --> 00:09:40.700 Again, terribly alarming,
NOTE Confidence: 0.828767777692308

00:09:40.700 --> 00:09:42.870 but important to note that all of
NOTE Confidence: 0.828767777692308

00:09:42.870 --> 00:09:44.985 this is contingent on imaging studies
NOTE Confidence: 0.828767777692308

00:09:44.985 --> 00:09:46.860 and their ability to accurately
NOTE Confidence: 0.828767777692308

00:09:46.860 --> 00:09:48.591 reflect what is histopathologically
NOTE Confidence: 0.828767777692308

00:09:48.591 --> 00:09:50.419 happening in the heart.
NOTE Confidence: 0.828767777692308

00:09:50.420 --> 00:09:51.640 And that's a big if.
NOTE Confidence: 0.828767777692308

00:09:51.640 --> 00:09:54.070 That's a big jump there.
NOTE Confidence: 0.828767777692308

00:09:54.070 --> 00:09:56.155 So of course the local

NOTE Confidence: 0.828767777692308
00:09:56.155 --> 00:09:58.240 media stations picked up on
NOTE Confidence: 0.877098615555556
00:09:58.325 --> 00:10:01.825 this and national media stations were far
NOTE Confidence: 0.877098615555556
00:10:01.825 --> 00:10:04.965 behind and they ran with these stories
NOTE Confidence: 0.877098615555556
00:10:04.965 --> 00:10:07.968 and they were alarmist to say the least.
NOTE Confidence: 0.877098615555556
00:10:07.970 --> 00:10:10.490 It wasn't just a left-leaning outsources
NOTE Confidence: 0.877098615555556
00:10:10.490 --> 00:10:14.054 as well, but right wing sources or right
NOTE Confidence: 0.877098615555556
00:10:14.054 --> 00:10:16.606 leaning sources as well discussed the
NOTE Confidence: 0.877098615555556
00:10:16.606 --> 00:10:18.446 potential concern for these studies
NOTE Confidence: 0.877098615555556
00:10:18.446 --> 00:10:20.680 or that these studies were telling
NOTE Confidence: 0.877098615555556
00:10:20.680 --> 00:10:22.816 us that COVID-19 really is targeting
NOTE Confidence: 0.877098615555556
00:10:22.816 --> 00:10:25.049 the heart muscle and in some cases.
NOTE Confidence: 0.877098615555556
00:10:25.050 --> 00:10:27.130 In many cases, and is going to be
NOTE Confidence: 0.877098615555556
00:10:27.130 --> 00:10:29.177 causing this outbreak or this epidemic,
NOTE Confidence: 0.877098615555556
00:10:29.180 --> 00:10:31.730 the secondary epidemic of heart
NOTE Confidence: 0.877098615555556
00:10:31.730 --> 00:10:32.706 disease henceforth.
NOTE Confidence: 0.877098615555556

00:10:32.706 --> 00:10:34.570 Well, at this time,
NOTE Confidence: 0.877098615555556

00:10:34.570 --> 00:10:36.622 those of us who were somewhat
NOTE Confidence: 0.877098615555556

00:10:36.622 --> 00:10:38.523 familiar with the imaging literature
NOTE Confidence: 0.877098615555556

00:10:38.523 --> 00:10:41.289 and its correlation or lack thereof
NOTE Confidence: 0.877098615555556

00:10:41.289 --> 00:10:43.386 with histopathology decided that it
NOTE Confidence: 0.877098615555556

00:10:43.386 --> 00:10:45.654 was probably prudent to put out an
NOTE Confidence: 0.877098615555556

00:10:45.654 --> 00:10:47.145 editorial trying to slow this down
NOTE Confidence: 0.877098615555556

00:10:47.145 --> 00:10:48.867 a little bit and trying to tell
NOTE Confidence: 0.877098615555556

00:10:48.867 --> 00:10:50.117 people to hold their horses.
NOTE Confidence: 0.877098615555556

00:10:50.120 --> 00:10:52.577 And really we need to better understand
NOTE Confidence: 0.877098615555556

00:10:52.577 --> 00:10:55.477 what's going on from a pathology standpoint.
NOTE Confidence: 0.877098615555556

00:10:55.480 --> 00:10:57.020 Again, kind of dragging the
NOTE Confidence: 0.877098615555556

00:10:57.020 --> 00:10:58.560 narrative from the radiology side,
NOTE Confidence: 0.877098615555556

00:10:58.560 --> 00:10:59.720 putting it back on pathology,
NOTE Confidence: 0.877098615555556

00:10:59.720 --> 00:11:01.346 saying there's still a role for
NOTE Confidence: 0.877098615555556

00:11:01.346 --> 00:11:02.915 pathology here to tell us what

NOTE Confidence: 0.877098615555556
00:11:02.915 --> 00:11:04.193 is going on at the tissue.
NOTE Confidence: 0.877098615555556
00:11:04.200 --> 00:11:05.971 Level and how the virus is interacting
NOTE Confidence: 0.877098615555556
00:11:05.971 --> 00:11:08.104 with the tissue and may or may not
NOTE Confidence: 0.877098615555556
00:11:08.104 --> 00:11:09.164 be associated with inflammation.
NOTE Confidence: 0.877098615555556
00:11:09.170 --> 00:11:11.802 So we basically put out this editorial
NOTE Confidence: 0.877098615555556
00:11:11.802 --> 00:11:14.303 in the hopes of stimulating much
NOTE Confidence: 0.877098615555556
00:11:14.303 --> 00:11:17.674 more research and much more focus and
NOTE Confidence: 0.877098615555556
00:11:17.674 --> 00:11:20.150 attention on what COVID-19 effects
NOTE Confidence: 0.877098615555556
00:11:20.150 --> 00:11:21.825 were from the pathologic basis.
NOTE Confidence: 0.877098615555556
00:11:21.830 --> 00:11:22.268 Fortunately,
NOTE Confidence: 0.877098615555556
00:11:22.268 --> 00:11:24.020 the Society for Cardiovascular
NOTE Confidence: 0.877098615555556
00:11:24.020 --> 00:11:26.210 Pathology served as an excellent
NOTE Confidence: 0.877098615555556
00:11:26.270 --> 00:11:28.140 conduit to Marshall an international
NOTE Confidence: 0.877098615555556
00:11:28.140 --> 00:11:30.432 team together that could put the
NOTE Confidence: 0.877098615555556
00:11:30.432 --> 00:11:32.217 initial cases of COVID-19 autopsies
NOTE Confidence: 0.877098615555556

00:11:32.217 --> 00:11:33.996 that they had received together.
NOTE Confidence: 0.877098615555556

00:11:33.996 --> 00:11:36.072 And start looking at them in
NOTE Confidence: 0.877098615555556

00:11:36.072 --> 00:11:37.929 a systematic and careful way.
NOTE Confidence: 0.877098615555556

00:11:37.930 --> 00:11:41.594 And so 21 of the initial COVID-19 autopsies,
NOTE Confidence: 0.877098615555556

00:11:41.600 --> 00:11:43.376 which include some of the initial
NOTE Confidence: 0.877098615555556

00:11:43.376 --> 00:11:45.234 autopsies that were done in Italy
NOTE Confidence: 0.877098615555556

00:11:45.234 --> 00:11:46.769 through the University of Patawa,
NOTE Confidence: 0.877098615555556

00:11:46.770 --> 00:11:48.870 characterized and evaluated these
NOTE Confidence: 0.877098615555556

00:11:48.870 --> 00:11:49.920 myocardial samplings,
NOTE Confidence: 0.877098615555556

00:11:49.920 --> 00:11:52.084 extensively sampled heart tissue
NOTE Confidence: 0.877098615555556

00:11:52.084 --> 00:11:54.450 for myocarditis, non myocarditis,
NOTE Confidence: 0.877098615555556

00:11:54.450 --> 00:11:56.370 myositis systemic injury,
NOTE Confidence: 0.877098615555556

00:11:56.370 --> 00:11:57.875 which is of course part and parcel
NOTE Confidence: 0.877098615555556

00:11:57.875 --> 00:11:59.468 to many cases of COVID-19 disease.
NOTE Confidence: 0.877098615555556

00:11:59.470 --> 00:12:01.810 Patients enter into respiratory failure.
NOTE Confidence: 0.877098615555556

00:12:01.810 --> 00:12:03.694 They obviously have all kinds of

NOTE Confidence: 0.877098615555556

00:12:03.694 --> 00:12:05.289 supply demand issues that can

NOTE Confidence: 0.877098615555556

00:12:05.289 --> 00:12:06.689 incite that type of injury,

NOTE Confidence: 0.877098615555556

00:12:06.690 --> 00:12:08.133 pericarditis, pericardial injury.

NOTE Confidence: 0.877098615555556

00:12:08.133 --> 00:12:11.500 As well as vasculitis and vascular injury.

NOTE Confidence: 0.877098615555556

00:12:11.500 --> 00:12:15.390 What was found was that about 17% of people

NOTE Confidence: 0.877098615555556

00:12:15.390 --> 00:12:17.840 did indeed have myocardial inflammation.

NOTE Confidence: 0.877098615555556

00:12:17.840 --> 00:12:19.320 If you carefully and

NOTE Confidence: 0.877098615555556

00:12:19.320 --> 00:12:20.800 extensively sampled for such.

NOTE Confidence: 0.877098615555556

00:12:20.800 --> 00:12:22.578 And when I say carefully and extensively,

NOTE Confidence: 0.877098615555556

00:12:22.580 --> 00:12:24.820 we're talking upwards of 25 to 30

NOTE Confidence: 0.877098615555556

00:12:24.820 --> 00:12:26.536 samples of myocardium that you're

NOTE Confidence: 0.877098615555556

00:12:26.536 --> 00:12:28.630 pouring over looking for these foci.

NOTE Confidence: 0.877098615555556

00:12:28.630 --> 00:12:30.838 And in the vast majority of these cases,

NOTE Confidence: 0.877098615555556

00:12:30.840 --> 00:12:35.020 about 80% of those 717%.

NOTE Confidence: 0.877098615555556

00:12:35.020 --> 00:12:35.856 So black,

NOTE Confidence: 0.877098615555556

00:12:35.856 --> 00:12:38.364 actually 2/3 of that number had
NOTE Confidence: 0.877098615555556

00:12:38.364 --> 00:12:40.172 very focal myocardial inflammation,
NOTE Confidence: 0.877098615555556

00:12:40.172 --> 00:12:42.116 so very, very spotty.
NOTE Confidence: 0.877098615555556

00:12:42.120 --> 00:12:43.755 Inflammation nowhere near the type
NOTE Confidence: 0.877098615555556

00:12:43.755 --> 00:12:46.512 that you would expect to see by way of
NOTE Confidence: 0.877098615555556

00:12:46.512 --> 00:12:48.437 imaging and then that was reported in
NOTE Confidence: 0.877098615555556

00:12:48.437 --> 00:12:50.327 those initial reports by way of CMR.
NOTE Confidence: 0.877098615555556

00:12:50.330 --> 00:12:52.215 So this certainly dragged those
NOTE Confidence: 0.877098615555556

00:12:52.215 --> 00:12:54.100 numbers down quite a bit.
NOTE Confidence: 0.877098615555556

00:12:54.100 --> 00:12:55.492 You had to look at a lot of
NOTE Confidence: 0.877098615555556

00:12:55.492 --> 00:12:56.870 myocardium to even find a little bit.
NOTE Confidence: 0.877098615555556

00:12:56.870 --> 00:12:57.800 And very,
NOTE Confidence: 0.877098615555556

00:12:57.800 --> 00:13:00.125 very few cases had striking
NOTE Confidence: 0.877098615555556

00:13:00.125 --> 00:13:01.520 and florid types
NOTE Confidence: 0.8156753725

00:13:01.616 --> 00:13:04.558 of myocarditis. A number of other
NOTE Confidence: 0.8156753725

00:13:04.558 --> 00:13:06.206 pathologies were also identified.

NOTE Confidence: 0.8156753725

00:13:06.210 --> 00:13:07.770 Macrophage infiltration into the

NOTE Confidence: 0.8156753725

00:13:07.770 --> 00:13:10.110 interstitium was kind of a curious

NOTE Confidence: 0.8156753725

00:13:10.177 --> 00:13:12.157 finding that really was not known.

NOTE Confidence: 0.8156753725

00:13:12.160 --> 00:13:14.416 To exist in other viral types of infections.

NOTE Confidence: 0.8156753725

00:13:14.420 --> 00:13:15.842 So that seemed to be a

NOTE Confidence: 0.8156753725

00:13:15.842 --> 00:13:16.553 somewhat unique finding.

NOTE Confidence: 0.8156753725

00:13:16.560 --> 00:13:18.933 And then this other finding of small

NOTE Confidence: 0.8156753725

00:13:18.933 --> 00:13:20.806 vessel thrombosis seemed to be coming

NOTE Confidence: 0.8156753725

00:13:20.806 --> 00:13:22.668 up more frequently than we saw with

NOTE Confidence: 0.8156753725

00:13:22.732 --> 00:13:24.647 other types of virally mediated

NOTE Confidence: 0.8156753725

00:13:24.647 --> 00:13:26.179 myocarditis such as influenza,

NOTE Confidence: 0.8156753725

00:13:26.180 --> 00:13:28.680 Cocksackie and adenovirus of course.

NOTE Confidence: 0.8156753725

00:13:28.680 --> 00:13:30.888 So we decided to take a closer look

NOTE Confidence: 0.8156753725

00:13:30.888 --> 00:13:32.952 at that small vessel thrombi issue

NOTE Confidence: 0.8156753725

00:13:32.952 --> 00:13:35.570 and lo and behold, there were many,

NOTE Confidence: 0.8156753725

00:13:35.570 --> 00:13:37.910 many cases of this small vessel
NOTE Confidence: 0.8156753725

00:13:37.910 --> 00:13:39.680 micro occlusive disease,
NOTE Confidence: 0.8156753725

00:13:39.680 --> 00:13:40.944 these small shallow thrombi,
NOTE Confidence: 0.8156753725

00:13:40.944 --> 00:13:42.208 some of which were.
NOTE Confidence: 0.8156753725

00:13:42.210 --> 00:13:43.932 Use of some of which were not
NOTE Confidence: 0.8156753725

00:13:43.932 --> 00:13:45.653 in these cases of COVID-19 and
NOTE Confidence: 0.8156753725

00:13:45.653 --> 00:13:47.501 that was elevated above all other
NOTE Confidence: 0.8156753725

00:13:47.501 --> 00:13:49.290 types of viral myocarditis that we
NOTE Confidence: 0.8156753725

00:13:49.290 --> 00:13:51.224 had in our registry at the time.
NOTE Confidence: 0.8156753725

00:13:51.224 --> 00:13:53.240 So this did seem to be a unique
NOTE Confidence: 0.8156753725

00:13:53.309 --> 00:13:54.909 feature and comported with the
NOTE Confidence: 0.8156753725

00:13:54.909 --> 00:13:56.890 fact that some of the binding
NOTE Confidence: 0.8156753725

00:13:56.890 --> 00:13:59.088 proteins we know to be expressed in
NOTE Confidence: 0.8156753725

00:13:59.088 --> 00:14:01.552 at high levels in in endothelium.
NOTE Confidence: 0.8156753725

00:14:01.552 --> 00:14:04.806 And so there was long held this
NOTE Confidence: 0.8156753725

00:14:04.806 --> 00:14:07.670 idea that COVID-19 was going to be

NOTE Confidence: 0.8156753725

00:14:07.670 --> 00:14:09.710 targeting the endothelium and certainly

NOTE Confidence: 0.8156753725

00:14:09.777 --> 00:14:12.010 this bears that out to some extent.

NOTE Confidence: 0.8156753725

00:14:12.010 --> 00:14:13.990 Now of course over the the

NOTE Confidence: 0.8156753725

00:14:13.990 --> 00:14:15.750 the next few months many,

NOTE Confidence: 0.8156753725

00:14:15.750 --> 00:14:17.375 many more studies would start

NOTE Confidence: 0.8156753725

00:14:17.375 --> 00:14:19.870 to look at cases of myocarditis.

NOTE Confidence: 0.8156753725

00:14:19.870 --> 00:14:22.103 And so here are three examples of

NOTE Confidence: 0.8156753725

00:14:22.103 --> 00:14:24.139 cases that had pretty rigorous

NOTE Confidence: 0.8156753725

00:14:24.139 --> 00:14:26.159 pathologic evaluation looking for

NOTE Confidence: 0.8156753725

00:14:26.159 --> 00:14:29.377 myocarditis in the setting of COVID as well.

NOTE Confidence: 0.8156753725

00:14:29.380 --> 00:14:32.160 And the the long and short of it is the,

NOTE Confidence: 0.8156753725

00:14:32.160 --> 00:14:32.442 the,

NOTE Confidence: 0.8156753725

00:14:32.442 --> 00:14:34.416 the take home message here is that

NOTE Confidence: 0.8156753725

00:14:34.416 --> 00:14:36.691 when you look at all of these

NOTE Confidence: 0.8156753725

00:14:36.691 --> 00:14:38.336 pathology studies in composite only

NOTE Confidence: 0.8156753725

00:14:38.404 --> 00:14:40.427 about 1 to 5% show myocarditis to

NOTE Confidence: 0.8156753725

00:14:40.427 --> 00:14:42.941 any appreciable degree in the vast

NOTE Confidence: 0.8156753725

00:14:42.941 --> 00:14:45.160 majority of these being quite mild.

NOTE Confidence: 0.8156753725

00:14:45.160 --> 00:14:47.452 As you can see 80% of these cases

NOTE Confidence: 0.8156753725

00:14:47.452 --> 00:14:49.122 the myocarditis was only micro

NOTE Confidence: 0.8156753725

00:14:49.122 --> 00:14:50.780 focal in the myocardium.

NOTE Confidence: 0.8156753725

00:14:50.780 --> 00:14:53.630 So it's really unlikely that

NOTE Confidence: 0.8156753725

00:14:53.630 --> 00:14:56.480 COVID-19 is causing this outbreak,

NOTE Confidence: 0.8156753725

00:14:56.480 --> 00:14:59.870 this rash outbreak of myocarditis.

NOTE Confidence: 0.8156753725

00:14:59.870 --> 00:15:01.605 As was being described originally

NOTE Confidence: 0.8156753725

00:15:01.605 --> 00:15:03.013 in the media, however,

NOTE Confidence: 0.8156753725

00:15:03.013 --> 00:15:04.828 with the ubiquity of COVID-19,

NOTE Confidence: 0.8156753725

00:15:04.830 --> 00:15:07.356 certainly even this one to 5%

NOTE Confidence: 0.8156753725

00:15:07.360 --> 00:15:09.304 number can pretty place a pretty

NOTE Confidence: 0.8156753725

00:15:09.304 --> 00:15:11.028 significant burden on the healthcare

NOTE Confidence: 0.8156753725

00:15:11.028 --> 00:15:12.888 system by way of myocarditis,

NOTE Confidence: 0.8156753725
00:15:12.890 --> 00:15:14.612 even if 80% are mild because
NOTE Confidence: 0.8156753725
00:15:14.612 --> 00:15:16.169 the denominator is so high
NOTE Confidence: 0.8156753725
00:15:16.169 --> 00:15:17.549 of people being affected.
NOTE Confidence: 0.8156753725
00:15:17.550 --> 00:15:19.590 So it's not an insignificant issue,
NOTE Confidence: 0.8156753725
00:15:19.590 --> 00:15:20.910 it's still one we absolutely
NOTE Confidence: 0.8156753725
00:15:20.910 --> 00:15:22.230 have to be mindful of.
NOTE Confidence: 0.878707668666667
00:15:24.320 --> 00:15:26.368 When you know, we wanted to be careful
NOTE Confidence: 0.878707668666667
00:15:26.368 --> 00:15:28.298 when this data was initially coming
NOTE Confidence: 0.878707668666667
00:15:28.298 --> 00:15:30.344 out kind of tempering those relatively
NOTE Confidence: 0.878707668666667
00:15:30.402 --> 00:15:32.488 low numbers with the fact that the
NOTE Confidence: 0.878707668666667
00:15:32.488 --> 00:15:33.958 the denominators were still high.
NOTE Confidence: 0.878707668666667
00:15:33.958 --> 00:15:34.810 So this mattered.
NOTE Confidence: 0.878707668666667
00:15:34.810 --> 00:15:36.322 And of course there were a lot
NOTE Confidence: 0.878707668666667
00:15:36.322 --> 00:15:37.826 of folks at the time saying
NOTE Confidence: 0.878707668666667
00:15:37.826 --> 00:15:39.434 that we needed to be worrisome,
NOTE Confidence: 0.878707668666667

00:15:39.440 --> 00:15:42.164 worried as well because the COVID-19
NOTE Confidence: 0.878707668666667

00:15:42.164 --> 00:15:45.314 vaccine of course was also has had
NOTE Confidence: 0.878707668666667

00:15:45.314 --> 00:15:48.116 also shown to have some association
NOTE Confidence: 0.878707668666667

00:15:48.116 --> 00:15:50.299 with myocarditis in some series.
NOTE Confidence: 0.878707668666667

00:15:50.300 --> 00:15:53.099 And so here are three of which that are
NOTE Confidence: 0.878707668666667

00:15:53.099 --> 00:15:55.868 all describing myocarditis following.
NOTE Confidence: 0.878707668666667

00:15:55.870 --> 00:15:57.060 COVID-19 vaccination.
NOTE Confidence: 0.92259515

00:15:59.160 --> 00:16:00.910 Fortunately the the literature has
NOTE Confidence: 0.92259515

00:16:00.910 --> 00:16:03.379 really filled out over the last few
NOTE Confidence: 0.92259515

00:16:03.379 --> 00:16:05.359 months on this vaccine related issue.
NOTE Confidence: 0.92259515

00:16:05.360 --> 00:16:07.232 And when you look at it in its totality,
NOTE Confidence: 0.92259515

00:16:07.240 --> 00:16:09.522 it shows somewhere on the order of
NOTE Confidence: 0.92259515

00:16:09.522 --> 00:16:12.826 five to 12/5 to 13 or so cases per
NOTE Confidence: 0.92259515

00:16:12.826 --> 00:16:13.960 1,000,000 vaccinated individuals,
NOTE Confidence: 0.92259515

00:16:13.960 --> 00:16:17.290 a rate far lower than that that you see
NOTE Confidence: 0.92259515

00:16:17.290 --> 00:16:20.438 with COVID-19 associated myocarditis.

NOTE Confidence: 0.92259515
00:16:20.440 --> 00:16:22.715 Again, especially because of the
NOTE Confidence: 0.92259515
00:16:22.715 --> 00:16:24.535 ubiquity of COVID-19 infections,
NOTE Confidence: 0.92259515
00:16:24.540 --> 00:16:26.556 men were certainly at a higher rate
NOTE Confidence: 0.92259515
00:16:26.556 --> 00:16:28.990 in most of these series and nearly.
NOTE Confidence: 0.92259515
00:16:28.990 --> 00:16:29.838 All of these cases,
NOTE Confidence: 0.92259515
00:16:29.838 --> 00:16:31.590 this is the really important take home point,
NOTE Confidence: 0.92259515
00:16:31.590 --> 00:16:34.649 nearly all of them had complete resolution.
NOTE Confidence: 0.92259515
00:16:34.650 --> 00:16:36.720 This stands in stark contradiction to
NOTE Confidence: 0.92259515
00:16:36.720 --> 00:16:39.189 what we see with COVID-19 associated
NOTE Confidence: 0.92259515
00:16:39.189 --> 00:16:41.744 myocarditis where the Florida examples
NOTE Confidence: 0.92259515
00:16:41.744 --> 00:16:44.666 are almost invariably associated with some
NOTE Confidence: 0.92259515
00:16:44.666 --> 00:16:47.306 compromise in long term cardiac function.
NOTE Confidence: 0.92259515
00:16:47.310 --> 00:16:49.050 So these cases that have been
NOTE Confidence: 0.92259515
00:16:49.050 --> 00:16:50.210 reported related to vaccine,
NOTE Confidence: 0.92259515
00:16:50.210 --> 00:16:52.166 almost all of them are mild,
NOTE Confidence: 0.92259515

00:16:52.170 --> 00:16:54.420 almost all of them resolved and
NOTE Confidence: 0.92259515

00:16:54.420 --> 00:16:56.329 almost and virtually none of
NOTE Confidence: 0.92259515

00:16:56.329 --> 00:16:58.029 them had long term sequella.
NOTE Confidence: 0.92259515

00:16:58.030 --> 00:16:59.530 So the bottom line here.
NOTE Confidence: 0.92259515

00:16:59.530 --> 00:17:02.057 Is that it's 100 times more common
NOTE Confidence: 0.92259515

00:17:02.057 --> 00:17:03.787 to get myocarditis associated
NOTE Confidence: 0.92259515

00:17:03.787 --> 00:17:06.079 with active COVID-19 infection?
NOTE Confidence: 0.92259515

00:17:06.080 --> 00:17:08.131 And it tends to be associated with
NOTE Confidence: 0.92259515

00:17:08.131 --> 00:17:09.743 some degree of myocardial change
NOTE Confidence: 0.92259515

00:17:09.743 --> 00:17:12.088 either by way of imaging or by
NOTE Confidence: 0.92259515

00:17:12.088 --> 00:17:14.219 cardiac function about half the time.
NOTE Confidence: 0.92259515

00:17:14.220 --> 00:17:17.013 So there's really no question here when
NOTE Confidence: 0.92259515

00:17:17.013 --> 00:17:20.556 you stack up the the risk benefits of
NOTE Confidence: 0.92259515

00:17:20.556 --> 00:17:23.590 vaccine over active infection with COVID-19.
NOTE Confidence: 0.92259515

00:17:23.590 --> 00:17:26.398 So we come back to our index case
NOTE Confidence: 0.92259515

00:17:26.398 --> 00:17:29.564 despite the relatively low risk of

NOTE Confidence: 0.92259515

00:17:29.564 --> 00:17:31.944 having vaccine associated myocarditis.

NOTE Confidence: 0.92259515

00:17:31.950 --> 00:17:34.085 This did appear to be an excellent

NOTE Confidence: 0.92259515

00:17:34.085 --> 00:17:36.053 example of vaccine associated myocarditis

NOTE Confidence: 0.92259515

00:17:36.053 --> 00:17:38.528 because of the strong temporal

NOTE Confidence: 0.92259515

00:17:38.528 --> 00:17:40.770 relationship between development of symptoms,

NOTE Confidence: 0.92259515

00:17:40.770 --> 00:17:44.406 the clear histopathology in this case

NOTE Confidence: 0.92259515

00:17:44.410 --> 00:17:46.960 and the temporal relationship obviously

NOTE Confidence: 0.92259515

00:17:46.960 --> 00:17:49.244 to the vaccine active myocarditis.

NOTE Confidence: 0.92259515

00:17:49.244 --> 00:17:52.260 But the good news is that the literature

NOTE Confidence: 0.92259515

00:17:52.327 --> 00:17:54.336 is quite clear on the fact that.

NOTE Confidence: 0.92259515

00:17:54.340 --> 00:17:56.986 These people do not appear to have

NOTE Confidence: 0.92259515

00:17:56.986 --> 00:17:58.830 long-term sequella associated with these,

NOTE Confidence: 0.92259515

00:17:58.830 --> 00:18:02.484 so prognostically this is a very good

NOTE Confidence: 0.92259515

00:18:02.490 --> 00:18:04.190 indication. So that's diagnosed.

NOTE Confidence: 0.92259515

00:18:04.190 --> 00:18:07.909 This case was signed out as active mixed

NOTE Confidence: 0.92259515

00:18:07.909 --> 00:18:10.093 lymphocytic escena philic myocarditis

NOTE Confidence: 0.92259515

00:18:10.093 --> 00:18:13.200 associated with the recent vaccination.

NOTE Confidence: 0.92259515

00:18:13.200 --> 00:18:13.708 All right.

NOTE Confidence: 0.92259515

00:18:13.708 --> 00:18:15.486 We're going to change gears a little

NOTE Confidence: 0.92259515

00:18:15.486 --> 00:18:17.438 bit and talk about a different topic,

NOTE Confidence: 0.92259515

00:18:17.440 --> 00:18:19.120 one of cardiac tumors,

NOTE Confidence: 0.92259515

00:18:19.120 --> 00:18:21.220 heart tumors and specifically we're

NOTE Confidence: 0.92259515

00:18:21.220 --> 00:18:23.634 going to talk about some of the

NOTE Confidence: 0.92259515

00:18:23.634 --> 00:18:25.855 changes that we've seen in the last

NOTE Confidence: 0.92259515

00:18:25.855 --> 00:18:27.871 couple of years come from the W,

NOTE Confidence: 0.92259515

00:18:27.880 --> 00:18:30.280 the New W Joe classification.

NOTE Confidence: 0.92259515

00:18:30.280 --> 00:18:31.104 To kick this off,

NOTE Confidence: 0.92259515

00:18:31.104 --> 00:18:32.979 we'll again do so by way of vignette.

NOTE Confidence: 0.92259515

00:18:32.980 --> 00:18:35.200 The case is that of a 43 year old woman

NOTE Confidence: 0.92259515

00:18:35.259 --> 00:18:37.759 who presented with recurrent ventricular

NOTE Confidence: 0.92259515

00:18:37.759 --> 00:18:39.759 tachycardia causing syncopal episodes.

NOTE Confidence: 0.92259515
00:18:39.760 --> 00:18:41.832 She was found to have a 5
NOTE Confidence: 0.92259515
00:18:41.832 --> 00:18:43.010 centimeter mass involving her.
NOTE Confidence: 0.92259515
00:18:43.010 --> 00:18:44.468 Left ventricular free wall and you
NOTE Confidence: 0.92259515
00:18:44.468 --> 00:18:46.369 can see it down there at the apex.
NOTE Confidence: 0.92259515
00:18:46.370 --> 00:18:48.938 She was subsequently referred to surgical
NOTE Confidence: 0.92259515
00:18:48.938 --> 00:18:51.010 resection for this symptomatic mass.
NOTE Confidence: 0.92259515
00:18:51.010 --> 00:18:52.946 Obviously a mass down there at the apex.
NOTE Confidence: 0.92259515
00:18:52.950 --> 00:18:54.633 Pretty well circumscribed
NOTE Confidence: 0.92259515
00:18:54.633 --> 00:18:56.877 tan white in appearance.
NOTE Confidence: 0.92259515
00:18:56.880 --> 00:18:59.250 Here it is the surgical resection
NOTE Confidence: 0.92259515
00:18:59.250 --> 00:19:01.280 cut along its short axis,
NOTE Confidence: 0.92259515
00:19:01.280 --> 00:19:03.140 somewhat homogeneous, tan,
NOTE Confidence: 0.92259515
00:19:03.140 --> 00:19:05.000 yellow in appearance.
NOTE Confidence: 0.92259515
00:19:05.000 --> 00:19:06.872 Not a lot of variability as
NOTE Confidence: 0.92259515
00:19:06.872 --> 00:19:08.660 we look through the tissue.
NOTE Confidence: 0.893708615714286

00:19:08.660 --> 00:19:10.536 Under the microscope, what do we see?

NOTE Confidence: 0.893708615714286

00:19:10.540 --> 00:19:11.926 Well, we see kind of an

NOTE Confidence: 0.893708615714286

00:19:11.926 --> 00:19:13.031 amalgamation of things, right.

NOTE Confidence: 0.893708615714286

00:19:13.031 --> 00:19:14.264 There's probably some

NOTE Confidence: 0.893708615714286

00:19:14.264 --> 00:19:15.908 cardiac muscle down there.

NOTE Confidence: 0.893708615714286

00:19:15.910 --> 00:19:16.990 There's certainly big blood

NOTE Confidence: 0.893708615714286

00:19:16.990 --> 00:19:18.070 vessels running through it,

NOTE Confidence: 0.893708615714286

00:19:18.070 --> 00:19:20.240 lots of collagen and fibrosis.

NOTE Confidence: 0.893708615714286

00:19:20.240 --> 00:19:21.536 So we take a closer look.

NOTE Confidence: 0.893708615714286

00:19:21.540 --> 00:19:24.025 What we see are these peculiar bundles

NOTE Confidence: 0.893708615714286

00:19:24.025 --> 00:19:26.460 of smooth muscle that inner are

NOTE Confidence: 0.893708615714286

00:19:26.460 --> 00:19:28.635 interposed between these very enlarged,

NOTE Confidence: 0.893708615714286

00:19:28.640 --> 00:19:30.720 very atypical cardiac myocytes,

NOTE Confidence: 0.893708615714286

00:19:30.720 --> 00:19:31.350 blood vessels,

NOTE Confidence: 0.893708615714286

00:19:31.350 --> 00:19:33.576 the occasional nerve running through it,

NOTE Confidence: 0.893708615714286

00:19:33.576 --> 00:19:36.566 just kind of a a random or

NOTE Confidence: 0.893708615714286
00:19:36.566 --> 00:19:38.590 motley assortment of tissue.
NOTE Confidence: 0.893708615714286
00:19:38.590 --> 00:19:40.690 Presenting as a mass in the free
NOTE Confidence: 0.893708615714286
00:19:40.690 --> 00:19:42.689 wall of the left ventricle.
NOTE Confidence: 0.893708615714286
00:19:42.690 --> 00:19:44.909 So anytime we see a cardiac mass,
NOTE Confidence: 0.893708615714286
00:19:44.910 --> 00:19:46.583 it probably behooves us to at least
NOTE Confidence: 0.893708615714286
00:19:46.583 --> 00:19:48.695 have in our mind what the general
NOTE Confidence: 0.893708615714286
00:19:48.695 --> 00:19:50.365 epidemiology of these cardiac masses.
NOTE Confidence: 0.893708615714286
00:19:50.370 --> 00:19:52.086 It helps us narrow our differential,
NOTE Confidence: 0.893708615714286
00:19:52.090 --> 00:19:53.650 helps us triage the tissue,
NOTE Confidence: 0.893708615714286
00:19:53.650 --> 00:19:54.889 how we're going to be handle it.
NOTE Confidence: 0.893708615714286
00:19:54.890 --> 00:19:57.104 And the important point here is
NOTE Confidence: 0.893708615714286
00:19:57.104 --> 00:19:58.990 to understand that the vast,
NOTE Confidence: 0.893708615714286
00:19:58.990 --> 00:20:00.232 vast, vast majority,
NOTE Confidence: 0.893708615714286
00:20:00.232 --> 00:20:03.640 majority of masses that arise in the heart.
NOTE Confidence: 0.893708615714286
00:20:03.640 --> 00:20:06.244 Are the result of progression of
NOTE Confidence: 0.893708615714286

00:20:06.244 --> 00:20:07.980 metastatic cancer metastatic disease.
NOTE Confidence: 0.893708615714286

00:20:07.980 --> 00:20:09.912 So the first question on your mind
NOTE Confidence: 0.893708615714286

00:20:09.912 --> 00:20:11.289 whenever presented with a heart
NOTE Confidence: 0.893708615714286

00:20:11.289 --> 00:20:13.025 tumor should really be what is the
NOTE Confidence: 0.893708615714286

00:20:13.025 --> 00:20:14.248 patient's oncologic history because
NOTE Confidence: 0.893708615714286

00:20:14.248 --> 00:20:16.102 that conclude you into the diagnosis
NOTE Confidence: 0.893708615714286

00:20:16.102 --> 00:20:18.360 of vast majority of the time.
NOTE Confidence: 0.893708615714286

00:20:18.360 --> 00:20:20.892 So more on the order of four to 8% of
NOTE Confidence: 0.893708615714286

00:20:20.892 --> 00:20:22.524 stage 4 malignancies involve the heart.
NOTE Confidence: 0.893708615714286

00:20:22.530 --> 00:20:24.190 That's an incredibly high percentage
NOTE Confidence: 0.893708615714286

00:20:24.190 --> 00:20:26.291 given the burden of high stage
NOTE Confidence: 0.893708615714286

00:20:26.291 --> 00:20:28.196 oncologic disease in our population.
NOTE Confidence: 0.893708615714286

00:20:28.200 --> 00:20:29.880 So this is something you're going to see,
NOTE Confidence: 0.893708615714286

00:20:29.880 --> 00:20:31.746 you're going to see metastatic disease
NOTE Confidence: 0.893708615714286

00:20:31.746 --> 00:20:33.748 with some regularity in all of course.
NOTE Confidence: 0.893708615714286

00:20:33.750 --> 00:20:35.262 Are definitionally malignant.

NOTE Confidence: 0.893708615714286

00:20:35.262 --> 00:20:38.286 Primary heart tumors obviously can be

NOTE Confidence: 0.893708615714286

00:20:38.286 --> 00:20:40.876 dichotomized into either benign or malignant.

NOTE Confidence: 0.893708615714286

00:20:40.880 --> 00:20:42.120 And if we were to just take a

NOTE Confidence: 0.893708615714286

00:20:42.120 --> 00:20:43.729 look at that sliver and ask what

NOTE Confidence: 0.893708615714286

00:20:43.729 --> 00:20:44.984 percentage are benign or malignant,

NOTE Confidence: 0.893708615714286

00:20:44.990 --> 00:20:47.974 well turns out that the benign outnumber the

NOTE Confidence: 0.893708615714286

00:20:47.974 --> 00:20:50.266 malignant primary cardiac tumors about 12:50.

NOTE Confidence: 0.893708615714286

00:20:50.266 --> 00:20:52.474 So if you have a benign cardiac tumor,

NOTE Confidence: 0.893708615714286

00:20:52.480 --> 00:20:55.650 you're weight primary cardiac tumor.

NOTE Confidence: 0.893708615714286

00:20:55.650 --> 00:20:57.490 If you have a primary heart cardiac tumor,

NOTE Confidence: 0.893708615714286

00:20:57.490 --> 00:20:59.540 you are more than likely

NOTE Confidence: 0.893708615714286

00:20:59.540 --> 00:21:01.590 to have a benign neoplasm.

NOTE Confidence: 0.893708615714286

00:21:01.590 --> 00:21:02.499 With that said,

NOTE Confidence: 0.893708615714286

00:21:02.499 --> 00:21:04.317 just because it is histologically benign

NOTE Confidence: 0.893708615714286

00:21:04.317 --> 00:21:06.469 does not mean that it will be clinically.

NOTE Confidence: 0.893708615714286

00:21:06.470 --> 00:21:07.205 Tonight the heart,
NOTE Confidence: 0.893708615714286

00:21:07.205 --> 00:21:08.920 as we'll see in a few slides,
NOTE Confidence: 0.893708615714286

00:21:08.920 --> 00:21:10.224 is an incredibly precarious
NOTE Confidence: 0.893708615714286

00:21:10.224 --> 00:21:11.854 location for tumors to arise,
NOTE Confidence: 0.893708615714286

00:21:11.860 --> 00:21:13.404 and it's an incredibly
NOTE Confidence: 0.893708615714286

00:21:13.404 --> 00:21:15.334 sensitive place to occupy space.
NOTE Confidence: 0.893708615714286

00:21:15.340 --> 00:21:17.664 It has access to the systemic blood
NOTE Confidence: 0.893708615714286

00:21:17.664 --> 00:21:19.532 supply so dangerous sequella can
NOTE Confidence: 0.893708615714286

00:21:19.532 --> 00:21:21.557 happen even from benign processes,
NOTE Confidence: 0.893708615714286

00:21:21.560 --> 00:21:22.706 as we'll see.
NOTE Confidence: 0.893708615714286

00:21:22.706 --> 00:21:24.616 The malignant tumors are obviously
NOTE Confidence: 0.893708615714286

00:21:24.616 --> 00:21:26.335 all problematic for their propensity
NOTE Confidence: 0.893708615714286

00:21:26.335 --> 00:21:28.421 to not only do all the things
NOTE Confidence: 0.893708615714286

00:21:28.486 --> 00:21:29.738 benign tumors can do,
NOTE Confidence: 0.893708615714286

00:21:29.740 --> 00:21:33.304 but they also invade and progress as they go.
NOTE Confidence: 0.893708615714286

00:21:33.310 --> 00:21:35.466 So with respect to the metastatic tumors,

NOTE Confidence: 0.893708615714286

00:21:35.470 --> 00:21:37.702 why do we see such a high burden of

NOTE Confidence: 0.893708615714286

00:21:37.702 --> 00:21:39.150 metastatic disease to the heart?

NOTE Confidence: 0.893708615714286

00:21:39.150 --> 00:21:39.471 Well,

NOTE Confidence: 0.893708615714286

00:21:39.471 --> 00:21:41.076 there's lots of different ways

NOTE Confidence: 0.893708615714286

00:21:41.076 --> 00:21:42.706 that metastatic tumors can travel

NOTE Confidence: 0.893708615714286

00:21:42.706 --> 00:21:43.850 to involve the heart.

NOTE Confidence: 0.893708615714286

00:21:43.850 --> 00:21:45.901 And the tumors that we see getting

NOTE Confidence: 0.893708615714286

00:21:45.901 --> 00:21:47.710 there are things that obviously,

NOTE Confidence: 0.893708615714286

00:21:47.710 --> 00:21:49.820 sensibly common sense actually are

NOTE Confidence: 0.893708615714286

00:21:49.820 --> 00:21:52.425 from epithelial tumors that arise in

NOTE Confidence: 0.893708615714286

00:21:52.425 --> 00:21:54.545 the neighboring structures and organs.

NOTE Confidence: 0.893708615714286

00:21:54.550 --> 00:21:56.734 Breast cancer, lung cancer,

NOTE Confidence: 0.893708615714286

00:21:56.734 --> 00:21:57.826 esophageal cancer,

NOTE Confidence: 0.83480655

00:21:57.830 --> 00:22:00.470 all the neighboring organs to the heart can

NOTE Confidence: 0.83480655

00:22:00.470 --> 00:22:02.165 potentially infiltrate in and invade the

NOTE Confidence: 0.83480655

00:22:02.165 --> 00:22:04.240 heart via a number of different mechanisms.

NOTE Confidence: 0.83480655

00:22:04.240 --> 00:22:06.400 Melanoma is a kind of a curious example,

NOTE Confidence: 0.83480655

00:22:06.400 --> 00:22:08.712 though. It takes the lion's share of tumors

NOTE Confidence: 0.83480655

00:22:08.712 --> 00:22:10.739 when we're looking at specific types,

NOTE Confidence: 0.83480655

00:22:10.740 --> 00:22:14.478 obviously, and it, for peculiar reasons,

NOTE Confidence: 0.83480655

00:22:14.480 --> 00:22:15.712 is intensely cardio atropic.

NOTE Confidence: 0.83480655

00:22:15.712 --> 00:22:17.560 About half of the metastatic lesions

NOTE Confidence: 0.83480655

00:22:17.616 --> 00:22:19.360 we see that the heart are from Melanoma

NOTE Confidence: 0.83480655

00:22:19.360 --> 00:22:21.180 and in some cases it can be a cult.

NOTE Confidence: 0.83480655

00:22:21.180 --> 00:22:23.870 It's one of the few places we can see a

NOTE Confidence: 0.83480655

00:22:23.940 --> 00:22:26.700 cult presentation of malignant Melanoma.

NOTE Confidence: 0.83480655

00:22:26.700 --> 00:22:29.660 So uveal Melanoma, subungual melanomas,

NOTE Confidence: 0.83480655

00:22:29.660 --> 00:22:32.215 even rectal melanomas have all been reported

NOTE Confidence: 0.83480655

00:22:32.215 --> 00:22:34.159 metastasizing to the heart and 1st.

NOTE Confidence: 0.83480655

00:22:34.160 --> 00:22:36.060 Showing symptoms because of their

NOTE Confidence: 0.83480655

00:22:36.060 --> 00:22:37.960 cardiac involvement because of the

NOTE Confidence: 0.83480655

00:22:38.021 --> 00:22:39.140 occult primary site.

NOTE Confidence: 0.83480655

00:22:39.140 --> 00:22:41.835 They get their via four primary ways.

NOTE Confidence: 0.83480655

00:22:41.840 --> 00:22:43.495 Those four primary routes include

NOTE Confidence: 0.83480655

00:22:43.495 --> 00:22:45.150 direct extension like this example

NOTE Confidence: 0.83480655

00:22:45.206 --> 00:22:47.078 of a lung cancer eating its way not

NOTE Confidence: 0.83480655

00:22:47.078 --> 00:22:48.620 only through the lung prank comma,

NOTE Confidence: 0.83480655

00:22:48.620 --> 00:22:49.988 but into the mediastinum,

NOTE Confidence: 0.83480655

00:22:49.988 --> 00:22:51.698 through the pericardium and into

NOTE Confidence: 0.83480655

00:22:51.698 --> 00:22:53.319 the anterior heart muscle.

NOTE Confidence: 0.83480655

00:22:53.320 --> 00:22:54.848 As you see here,

NOTE Confidence: 0.83480655

00:22:54.848 --> 00:22:56.376 hematogenous seeding can occur,

NOTE Confidence: 0.83480655

00:22:56.380 --> 00:22:58.605 obviously the hearts receiving the

NOTE Confidence: 0.83480655

00:22:58.605 --> 00:23:00.830 entire body's systemics return and

NOTE Confidence: 0.83480655

00:23:00.901 --> 00:23:02.911 then putting blood all the way

NOTE Confidence: 0.83480655

00:23:02.911 --> 00:23:04.840 out into the systemic circuit.

NOTE Confidence: 0.83480655

00:23:04.840 --> 00:23:06.248 So it's going to be seeing all the
NOTE Confidence: 0.83480655

00:23:06.248 --> 00:23:07.499 blood that runs through our body,
NOTE Confidence: 0.83480655

00:23:07.500 --> 00:23:08.916 any tumor cells that are traveling
NOTE Confidence: 0.83480655

00:23:08.916 --> 00:23:09.388 through that.
NOTE Confidence: 0.83480655

00:23:09.390 --> 00:23:11.791 But have the potential of seeding in
NOTE Confidence: 0.83480655

00:23:11.791 --> 00:23:14.369 the heart and growing there and so
NOTE Confidence: 0.83480655

00:23:14.369 --> 00:23:16.589 you can get these cannonball type
NOTE Confidence: 0.83480655

00:23:16.663 --> 00:23:19.015 lesions from hematogenous spread
NOTE Confidence: 0.83480655

00:23:19.015 --> 00:23:20.779 of epithelial malignancies.
NOTE Confidence: 0.83480655

00:23:20.780 --> 00:23:23.258 Here's another example of this case
NOTE Confidence: 0.83480655

00:23:23.258 --> 00:23:24.910 of metastatic malignant Melanoma,
NOTE Confidence: 0.83480655

00:23:24.910 --> 00:23:26.950 obvious because of the dark brown
NOTE Confidence: 0.83480655

00:23:26.950 --> 00:23:28.764 pigmentation of the numerous tumor
NOTE Confidence: 0.83480655

00:23:28.764 --> 00:23:30.749 deposits depositing not only within
NOTE Confidence: 0.83480655

00:23:30.749 --> 00:23:31.543 the endocardium,
NOTE Confidence: 0.83480655

00:23:31.550 --> 00:23:32.702 myocardium and epicardium kind

NOTE Confidence: 0.83480655

00:23:32.702 --> 00:23:34.142 of all three layers there,

NOTE Confidence: 0.83480655

00:23:34.150 --> 00:23:35.980 but also existing as tumor thrombus

NOTE Confidence: 0.83480655

00:23:35.980 --> 00:23:38.183 that you can visualize up here in

NOTE Confidence: 0.83480655

00:23:38.183 --> 00:23:39.728 the right ventricular outflow tract,

NOTE Confidence: 0.83480655

00:23:39.730 --> 00:23:41.745 obstructing outflow of the right

NOTE Confidence: 0.83480655

00:23:41.745 --> 00:23:43.760 ventricle into the pulmonary artery

NOTE Confidence: 0.83480655

00:23:43.820 --> 00:23:45.636 and mechanistically explaining this

NOTE Confidence: 0.83480655

00:23:45.636 --> 00:23:47.906 patient's death in this instance.

NOTE Confidence: 0.83480655

00:23:47.910 --> 00:23:49.410 Lymphatics are also a mechanism

NOTE Confidence: 0.83480655

00:23:49.410 --> 00:23:51.228 or a mechanistic route that tumors

NOTE Confidence: 0.83480655

00:23:51.228 --> 00:23:52.800 can use to involve the heart.

NOTE Confidence: 0.83480655

00:23:52.800 --> 00:23:55.050 The heart has a relatively extensive

NOTE Confidence: 0.83480655

00:23:55.050 --> 00:23:56.550 lymphatic lymphatic plexus that

NOTE Confidence: 0.83480655

00:23:56.609 --> 00:23:58.209 runs through the pericardium.

NOTE Confidence: 0.83480655

00:23:58.210 --> 00:24:00.610 Plugging of those lymphatics can cause

NOTE Confidence: 0.83480655

00:24:00.610 --> 00:24:02.190 profound and pronounced pericardial
NOTE Confidence: 0.83480655

00:24:02.190 --> 00:24:04.165 effusions like in this example,
NOTE Confidence: 0.83480655

00:24:04.170 --> 00:24:06.270 and you can see the lymphatic drainage
NOTE Confidence: 0.83480655

00:24:06.270 --> 00:24:08.301 on the epicardial surface or the
NOTE Confidence: 0.83480655

00:24:08.301 --> 00:24:10.096 visceral pericardial surface of the
NOTE Confidence: 0.83480655

00:24:10.096 --> 00:24:12.259 heart presenting this kind of fuzzy
NOTE Confidence: 0.83480655

00:24:12.259 --> 00:24:13.303 bordered pericardial appearance
NOTE Confidence: 0.83480655

00:24:13.303 --> 00:24:15.412 because of all the infiltration
NOTE Confidence: 0.83480655

00:24:15.412 --> 00:24:18.067 by tumor of those lymphatics.
NOTE Confidence: 0.83480655

00:24:18.070 --> 00:24:20.062 Intraluminal extension is kind of a
NOTE Confidence: 0.83480655

00:24:20.062 --> 00:24:21.833 unique way of metastatic malignancies
NOTE Confidence: 0.83480655

00:24:21.833 --> 00:24:23.768 can involve the heart muscle.
NOTE Confidence: 0.83480655

00:24:23.770 --> 00:24:25.480 Take for instance this example
NOTE Confidence: 0.83480655

00:24:25.480 --> 00:24:26.848 of renal cell carcinoma,
NOTE Confidence: 0.83480655

00:24:26.850 --> 00:24:28.542 clear cell renal cell carcinoma arising
NOTE Confidence: 0.83480655

00:24:28.542 --> 00:24:30.609 in the inferior pole of the left kidney,

NOTE Confidence: 0.83480655

00:24:30.610 --> 00:24:33.590 there coming up into the renal vein,

NOTE Confidence: 0.83480655

00:24:33.590 --> 00:24:34.930 across into the IVC,

NOTE Confidence: 0.83480655

00:24:34.930 --> 00:24:36.750 then up to involve the heart and

NOTE Confidence: 0.83480655

00:24:36.812 --> 00:24:38.744 sure enough there it exists like

NOTE Confidence: 0.83480655

00:24:38.744 --> 00:24:40.664 a serpent coming through the IVC

NOTE Confidence: 0.83480655

00:24:40.664 --> 00:24:42.362 into the right ventricle where it

NOTE Confidence: 0.83480655

00:24:42.362 --> 00:24:44.306 can then obstruct again the right

NOTE Confidence: 0.83480655

00:24:44.306 --> 00:24:46.026 ventricular outflow tract and cause

NOTE Confidence: 0.83480655

00:24:46.026 --> 00:24:47.808 what would clinically manifest.

NOTE Confidence: 0.83480655

00:24:47.810 --> 00:24:50.156 Has a large saddle and saddle

NOTE Confidence: 0.83480655

00:24:50.156 --> 00:24:50.938 pulmonary embolus.

NOTE Confidence: 0.818437776666667

00:24:53.180 --> 00:24:55.256 So with respect to cardiac tumors,

NOTE Confidence: 0.818437776666667

00:24:55.260 --> 00:24:57.078 we've seen a number of changes

NOTE Confidence: 0.818437776666667

00:24:57.078 --> 00:24:58.709 over the last decade or so.

NOTE Confidence: 0.818437776666667

00:24:58.710 --> 00:25:01.278 The 2015 classification was a relatively

NOTE Confidence: 0.818437776666667

00:25:01.278 --> 00:25:03.969 truncated list of tumors that you see
NOTE Confidence: 0.818437776666667

00:25:03.969 --> 00:25:06.090 here that over the next six years
NOTE Confidence: 0.818437776666667

00:25:06.158 --> 00:25:08.174 would expand in the literature and
NOTE Confidence: 0.818437776666667

00:25:08.174 --> 00:25:10.879 cause The Who to update and revise,
NOTE Confidence: 0.818437776666667

00:25:10.879 --> 00:25:13.597 adding to a number of lesions,
NOTE Confidence: 0.818437776666667

00:25:13.600 --> 00:25:15.679 adding the number of lesions to this
NOTE Confidence: 0.818437776666667

00:25:15.679 --> 00:25:17.722 list rather as well as updating
NOTE Confidence: 0.818437776666667

00:25:17.722 --> 00:25:19.894 some of our understanding of the
NOTE Confidence: 0.818437776666667

00:25:19.894 --> 00:25:21.319 pathobiology and the treatment
NOTE Confidence: 0.818437776666667

00:25:21.319 --> 00:25:22.994 of the other cardiac tumors.
NOTE Confidence: 0.818437776666667

00:25:23.000 --> 00:25:23.284 Existed.
NOTE Confidence: 0.818437776666667

00:25:23.284 --> 00:25:25.556 The tumors that are shown here in green
NOTE Confidence: 0.818437776666667

00:25:25.556 --> 00:25:27.709 are ones that have seen such updates.
NOTE Confidence: 0.818437776666667

00:25:27.710 --> 00:25:29.250 There's been an important updates
NOTE Confidence: 0.818437776666667

00:25:29.250 --> 00:25:30.790 in terms of our diagnosis,
NOTE Confidence: 0.818437776666667

00:25:30.790 --> 00:25:32.200 how we make our diagnosis,

NOTE Confidence: 0.818437776666667
00:25:32.200 --> 00:25:33.968 some important new stains,
NOTE Confidence: 0.818437776666667
00:25:33.968 --> 00:25:36.620 some new nomenclature in some instances,
NOTE Confidence: 0.818437776666667
00:25:36.620 --> 00:25:38.300 as well as the treatment.
NOTE Confidence: 0.818437776666667
00:25:38.300 --> 00:25:41.084 And then the red Allegion shown in red
NOTE Confidence: 0.818437776666667
00:25:41.084 --> 00:25:43.654 here represent new lesions that are newly
NOTE Confidence: 0.818437776666667
00:25:43.654 --> 00:25:47.110 described in this 2021 classification.
NOTE Confidence: 0.818437776666667
00:25:47.110 --> 00:25:48.901 I'm going to take you through just a few
NOTE Confidence: 0.818437776666667
00:25:48.901 --> 00:25:50.867 of the updates that have been seen here.
NOTE Confidence: 0.818437776666667
00:25:50.870 --> 00:25:52.564 We'll start with some of the green
NOTE Confidence: 0.818437776666667
00:25:52.564 --> 00:25:54.313 ones and then we'll get into some
NOTE Confidence: 0.818437776666667
00:25:54.313 --> 00:25:55.765 of the new entities as well.
NOTE Confidence: 0.818437776666667
00:25:55.770 --> 00:25:57.933 One of the the lesions that have
NOTE Confidence: 0.818437776666667
00:25:57.933 --> 00:26:00.310 seen some important updates in our
NOTE Confidence: 0.818437776666667
00:26:00.310 --> 00:26:02.158 understanding is the so-called
NOTE Confidence: 0.818437776666667
00:26:02.158 --> 00:26:03.082 papillary fibroelastoma.
NOTE Confidence: 0.818437776666667

00:26:03.090 --> 00:26:05.146 This is a tumor that's long been recognized.

NOTE Confidence: 0.8184377766666667

00:26:05.150 --> 00:26:06.950 We've first recognized these in

NOTE Confidence: 0.8184377766666667

00:26:06.950 --> 00:26:08.030 the early 1900s.

NOTE Confidence: 0.8184377766666667

00:26:08.030 --> 00:26:10.406 So it's no news that we're seeing them,

NOTE Confidence: 0.8184377766666667

00:26:10.410 --> 00:26:12.282 but our understanding of them has

NOTE Confidence: 0.8184377766666667

00:26:12.282 --> 00:26:13.847 seen some really remarkable advances

NOTE Confidence: 0.8184377766666667

00:26:13.847 --> 00:26:15.674 over the last five and six years

NOTE Confidence: 0.8184377766666667

00:26:15.674 --> 00:26:17.070 that have been introduced.

NOTE Confidence: 0.8184377766666667

00:26:17.070 --> 00:26:19.450 Largely by the increasing use

NOTE Confidence: 0.8184377766666667

00:26:19.450 --> 00:26:21.354 of digital droplet PCR,

NOTE Confidence: 0.8184377766666667

00:26:21.360 --> 00:26:24.517 enabling us to look at very posse

NOTE Confidence: 0.8184377766666667

00:26:24.517 --> 00:26:27.598 cellular specimens in a very detailed way.

NOTE Confidence: 0.8184377766666667

00:26:27.600 --> 00:26:29.035 The posse cellularity of these

NOTE Confidence: 0.8184377766666667

00:26:29.035 --> 00:26:30.900 specimens has long precluded us from

NOTE Confidence: 0.8184377766666667

00:26:30.900 --> 00:26:32.420 understanding the molecular biology.

NOTE Confidence: 0.8184377766666667

00:26:32.420 --> 00:26:34.256 But because of these newer technologies,

NOTE Confidence: 0.818437776666667

00:26:34.260 --> 00:26:36.762 we now understand that they do

NOTE Confidence: 0.818437776666667

00:26:36.762 --> 00:26:38.430 actually harbor oncogenic drivers

NOTE Confidence: 0.818437776666667

00:26:38.501 --> 00:26:40.811 and so simply aren't only explained

NOTE Confidence: 0.818437776666667

00:26:40.811 --> 00:26:42.796 by reactive and athelia processes

NOTE Confidence: 0.818437776666667

00:26:42.796 --> 00:26:44.696 that happen in the heart.

NOTE Confidence: 0.818437776666667

00:26:44.700 --> 00:26:46.030 We also understand because of

NOTE Confidence: 0.818437776666667

00:26:46.030 --> 00:26:47.666 advances in imaging that these are

NOTE Confidence: 0.818437776666667

00:26:47.666 --> 00:26:49.190 way more common than cardiac myxoma.

NOTE Confidence: 0.818437776666667

00:26:49.190 --> 00:26:51.241 So the dictum long held the cardiac

NOTE Confidence: 0.818437776666667

00:26:51.241 --> 00:26:53.293 myxomas where the most common primary

NOTE Confidence: 0.818437776666667

00:26:53.293 --> 00:26:55.148 cardiac tumor not so papillary

NOTE Confidence: 0.818437776666667

00:26:55.148 --> 00:26:56.792 fibroelastoma is are now recognized

NOTE Confidence: 0.818437776666667

00:26:56.792 --> 00:26:59.268 to be the most common as they're seen

NOTE Confidence: 0.818437776666667

00:26:59.268 --> 00:27:02.256 twice as commonly as cardiac myxomas.

NOTE Confidence: 0.818437776666667

00:27:02.260 --> 00:27:03.856 And again that that advance was

NOTE Confidence: 0.818437776666667

00:27:03.856 --> 00:27:05.627 made possible because of our better
NOTE Confidence: 0.818437776666667

00:27:05.627 --> 00:27:07.267 imaging technology and our better
NOTE Confidence: 0.818437776666667

00:27:07.267 --> 00:27:08.879 understanding that these two should
NOTE Confidence: 0.818437776666667

00:27:08.879 --> 00:27:10.619 be considered in the same neoplastic
NOTE Confidence: 0.818437776666667

00:27:10.619 --> 00:27:13.498 paradigm that cardiac myxomas are.
NOTE Confidence: 0.818437776666667

00:27:13.500 --> 00:27:15.418 They tend to arise on cardiac valves,
NOTE Confidence: 0.818437776666667

00:27:15.420 --> 00:27:17.030 most commonly the closing surfaces,
NOTE Confidence: 0.818437776666667

00:27:17.030 --> 00:27:18.758 but they're not restricted to such.
NOTE Confidence: 0.818437776666667

00:27:18.760 --> 00:27:20.782 They can happen on any endocardium
NOTE Confidence: 0.818437776666667

00:27:20.782 --> 00:27:21.456 line surface.
NOTE Confidence: 0.818437776666667

00:27:21.460 --> 00:27:22.513 They're typically incidental,
NOTE Confidence: 0.818437776666667

00:27:22.513 --> 00:27:24.268 but they can occasionally be
NOTE Confidence: 0.818437776666667

00:27:24.268 --> 00:27:25.664 associated with symptoms because
NOTE Confidence: 0.818437776666667

00:27:25.664 --> 00:27:27.259 the tumor itself can embolize.
NOTE Confidence: 0.818437776666667

00:27:27.260 --> 00:27:28.860 You can envision those little
NOTE Confidence: 0.818437776666667

00:27:28.860 --> 00:27:30.140 papillary fronds breaking off

NOTE Confidence: 0.818437776666667

00:27:30.140 --> 00:27:31.640 and embolizing downstream.

NOTE Confidence: 0.818437776666667

00:27:31.640 --> 00:27:33.170 Or there can be adherent surface

NOTE Confidence: 0.818437776666667

00:27:33.170 --> 00:27:34.720 thrombus like you see down here,

NOTE Confidence: 0.818437776666667

00:27:34.720 --> 00:27:37.378 this red tissue in its core,

NOTE Confidence: 0.818437776666667

00:27:37.380 --> 00:27:39.138 a little mitoses of thrombi that

NOTE Confidence: 0.818437776666667

00:27:39.138 --> 00:27:41.306 can come off and then embolize

NOTE Confidence: 0.818437776666667

00:27:41.306 --> 00:27:43.178 downstream and potentially cause.

NOTE Confidence: 0.818437776666667

00:27:43.180 --> 00:27:44.344 Rather devastating.

NOTE Confidence: 0.818437776666667

00:27:44.344 --> 00:27:44.926 Sequela,

NOTE Confidence: 0.818437776666667

00:27:44.926 --> 00:27:46.090 limit schemonia,

NOTE Confidence: 0.573788988

00:27:46.090 --> 00:27:48.370 CNS events, Tia or strokes,

NOTE Confidence: 0.573788988

00:27:48.370 --> 00:27:49.498 even heart attacks.

NOTE Confidence: 0.573788988

00:27:49.498 --> 00:27:52.254 In some instances they're said to have

NOTE Confidence: 0.573788988

00:27:52.254 --> 00:27:54.690 C anemone or ponpon like appearance,

NOTE Confidence: 0.573788988

00:27:54.690 --> 00:27:56.060 and a couple of examples

NOTE Confidence: 0.573788988

00:27:56.060 --> 00:27:57.430 of those are shown here.
NOTE Confidence: 0.573788988

00:27:57.430 --> 00:27:59.530 I happen to really like photographing
NOTE Confidence: 0.573788988

00:27:59.530 --> 00:28:00.930 of these particular tumors.
NOTE Confidence: 0.573788988

00:28:00.930 --> 00:28:02.510 I think they're they're incredibly
NOTE Confidence: 0.573788988

00:28:02.510 --> 00:28:03.496 photogenic, rather beautiful.
NOTE Confidence: 0.573788988

00:28:03.496 --> 00:28:05.827 They look like little flowers or little
NOTE Confidence: 0.573788988

00:28:05.827 --> 00:28:07.810 daisies in a field to me and again you.
NOTE Confidence: 0.573788988

00:28:07.810 --> 00:28:08.962 I think you can understand why
NOTE Confidence: 0.573788988

00:28:08.962 --> 00:28:10.361 they have this sea anemone type
NOTE Confidence: 0.573788988

00:28:10.361 --> 00:28:11.537 appearance or ponpon appearance.
NOTE Confidence: 0.573788988

00:28:11.540 --> 00:28:13.298 They look like little buzzy shrubs.
NOTE Confidence: 0.573788988

00:28:13.300 --> 00:28:15.357 Almost growing off of valves now,
NOTE Confidence: 0.573788988

00:28:15.357 --> 00:28:16.946 sometimes when you get these at the
NOTE Confidence: 0.573788988

00:28:16.946 --> 00:28:18.239 grossing bench or when a surgeon
NOTE Confidence: 0.573788988

00:28:18.239 --> 00:28:19.704 encounters one of these at the time
NOTE Confidence: 0.573788988

00:28:19.704 --> 00:28:20.859 of surgery that was unbeknownst

NOTE Confidence: 0.573788988

00:28:20.859 --> 00:28:22.688 to them before they went in,

NOTE Confidence: 0.573788988

00:28:22.688 --> 00:28:24.933 they'll sometimes mistake them for

NOTE Confidence: 0.573788988

00:28:24.933 --> 00:28:28.417 myxomas and the reason being is shown here.

NOTE Confidence: 0.573788988

00:28:28.420 --> 00:28:30.156 When they're taken out of an aqueous medium,

NOTE Confidence: 0.573788988

00:28:30.160 --> 00:28:31.959 they tend to collapse all on themselves

NOTE Confidence: 0.573788988

00:28:31.959 --> 00:28:33.608 and they look like little myxoid

NOTE Confidence: 0.573788988

00:28:33.608 --> 00:28:35.264 masses or little solid masses that

NOTE Confidence: 0.573788988

00:28:35.264 --> 00:28:37.046 are sitting there in the heart or

NOTE Confidence: 0.573788988

00:28:37.046 --> 00:28:38.512 sitting there on the grossing bench.

NOTE Confidence: 0.573788988

00:28:38.512 --> 00:28:40.480 The trick is to take them and put

NOTE Confidence: 0.573788988

00:28:40.532 --> 00:28:42.338 them in formal and water or alcohol.

NOTE Confidence: 0.573788988

00:28:42.340 --> 00:28:43.440 And when you do so,

NOTE Confidence: 0.573788988

00:28:43.440 --> 00:28:44.745 all those papillary fronds come

NOTE Confidence: 0.573788988

00:28:44.745 --> 00:28:46.626 out and you see the nice little

NOTE Confidence: 0.573788988

00:28:46.626 --> 00:28:48.198 pom pom like nature of these.

NOTE Confidence: 0.573788988

00:28:48.200 --> 00:28:49.440 And so it's really,
NOTE Confidence: 0.573788988

00:28:49.440 --> 00:28:51.660 that can be an incredibly helpful clue.
NOTE Confidence: 0.573788988

00:28:51.660 --> 00:28:53.286 If you get a little myxoid
NOTE Confidence: 0.573788988

00:28:53.286 --> 00:28:54.099 bulgery looking thing,
NOTE Confidence: 0.573788988

00:28:54.100 --> 00:28:56.773 you just drop it in a cup of formalin,
NOTE Confidence: 0.573788988

00:28:56.780 --> 00:28:57.788 shake it up a little bit and
NOTE Confidence: 0.573788988

00:28:57.788 --> 00:28:58.480 if you see these.
NOTE Confidence: 0.573788988

00:28:58.480 --> 00:29:00.260 Well, papillary fronds unfurl.
NOTE Confidence: 0.573788988

00:29:00.260 --> 00:29:02.930 You have the diagnosis even before
NOTE Confidence: 0.573788988

00:29:03.004 --> 00:29:05.536 you put it underneath the microscope.
NOTE Confidence: 0.573788988

00:29:05.540 --> 00:29:07.521 Now I mentioned that the heart is
NOTE Confidence: 0.573788988

00:29:07.521 --> 00:29:09.274 a precarious place for tumors to
NOTE Confidence: 0.573788988

00:29:09.274 --> 00:29:10.972 arise and nowhere is that more
NOTE Confidence: 0.573788988

00:29:10.972 --> 00:29:12.714 evident than in this slide on the
NOTE Confidence: 0.573788988

00:29:12.714 --> 00:29:14.326 left here we have an echocardiogram
NOTE Confidence: 0.573788988

00:29:14.326 --> 00:29:15.678 showing a papillary fibroelastoma

NOTE Confidence: 0.573788988

00:29:15.678 --> 00:29:17.599 arising on an aortic valve cusp.

NOTE Confidence: 0.573788988

00:29:17.600 --> 00:29:19.592 And then you can see on the right

NOTE Confidence: 0.573788988

00:29:19.592 --> 00:29:21.819 side the gross correlate to that

NOTE Confidence: 0.573788988

00:29:21.819 --> 00:29:23.899 echocardiogram that nicely shows the

NOTE Confidence: 0.573788988

00:29:23.899 --> 00:29:25.983 proximity of that papillary fibroelastoma

NOTE Confidence: 0.573788988

00:29:25.983 --> 00:29:27.993 to the right coronary ostium.

NOTE Confidence: 0.573788988

00:29:28.000 --> 00:29:29.918 It doesn't take a lot of imagination

NOTE Confidence: 0.573788988

00:29:29.918 --> 00:29:32.189 to picture piece of that tumor or a

NOTE Confidence: 0.573788988

00:29:32.189 --> 00:29:33.904 piece of adherent thrombus breaking off

NOTE Confidence: 0.573788988

00:29:33.904 --> 00:29:36.016 and then having ready access to the right.

NOTE Confidence: 0.573788988

00:29:36.020 --> 00:29:36.634 Coronary ostium,

NOTE Confidence: 0.573788988

00:29:36.634 --> 00:29:38.476 where it could embolize down and

NOTE Confidence: 0.573788988

00:29:38.476 --> 00:29:40.097 potentially cause a fatal heart attack.

NOTE Confidence: 0.818502987142857

00:29:42.360 --> 00:29:45.150 They do have a propensity or

NOTE Confidence: 0.818502987142857

00:29:45.150 --> 00:29:47.832 are commonly seen arising from

NOTE Confidence: 0.818502987142857

00:29:47.832 --> 00:29:50.028 damaged endocardial surfaces.
NOTE Confidence: 0.818502987142857

00:29:50.030 --> 00:29:52.112 This really led to the original
NOTE Confidence: 0.818502987142857

00:29:52.112 --> 00:29:53.923 hypothesis that these were the
NOTE Confidence: 0.818502987142857

00:29:53.923 --> 00:29:55.718 result of a reactive phenomenon.
NOTE Confidence: 0.818502987142857

00:29:55.720 --> 00:29:57.388 The two situations where we commonly
NOTE Confidence: 0.818502987142857

00:29:57.388 --> 00:30:00.034 will see them is in the setting of
NOTE Confidence: 0.818502987142857

00:30:00.034 --> 00:30:01.138 post inflammatory valvulopathy,
NOTE Confidence: 0.818502987142857

00:30:01.140 --> 00:30:02.784 like this example of post traumatic
NOTE Confidence: 0.818502987142857

00:30:02.784 --> 00:30:04.349 valve disease as shown over here
NOTE Confidence: 0.818502987142857

00:30:04.349 --> 00:30:05.819 on the left side of the slide.
NOTE Confidence: 0.818502987142857

00:30:05.820 --> 00:30:07.557 The other time we see them is when the
NOTE Confidence: 0.818502987142857

00:30:07.557 --> 00:30:09.378 heart has been surgically intervened upon.
NOTE Confidence: 0.818502987142857

00:30:09.380 --> 00:30:10.976 This example over here on the
NOTE Confidence: 0.818502987142857

00:30:10.976 --> 00:30:12.430 right is a younger woman.
NOTE Confidence: 0.818502987142857

00:30:12.430 --> 00:30:14.860 Who had undergone a subaortic septal
NOTE Confidence: 0.818502987142857

00:30:14.860 --> 00:30:16.480 myectomy procedure to palliate

NOTE Confidence: 0.818502987142857
00:30:16.544 --> 00:30:18.479 her hypertrophic cardiomyopathy.
NOTE Confidence: 0.818502987142857
00:30:18.480 --> 00:30:19.990 About three years after she
NOTE Confidence: 0.818502987142857
00:30:19.990 --> 00:30:20.896 had that procedure,
NOTE Confidence: 0.818502987142857
00:30:20.900 --> 00:30:23.220 she presented with aphasia
NOTE Confidence: 0.818502987142857
00:30:23.220 --> 00:30:24.960 and difficulty walking.
NOTE Confidence: 0.818502987142857
00:30:24.960 --> 00:30:26.470 An echocardiogram and scan of
NOTE Confidence: 0.818502987142857
00:30:26.470 --> 00:30:27.980 her brain revealed that indeed,
NOTE Confidence: 0.818502987142857
00:30:27.980 --> 00:30:29.318 she not only had a stroke,
NOTE Confidence: 0.818502987142857
00:30:29.320 --> 00:30:32.113 but also appeared to have one or
NOTE Confidence: 0.818502987142857
00:30:32.113 --> 00:30:33.755 more papillary fibroelastoma is
NOTE Confidence: 0.818502987142857
00:30:33.755 --> 00:30:35.993 growing in the region of resection
NOTE Confidence: 0.818502987142857
00:30:35.993 --> 00:30:38.230 along the subaortic septal myectomy.
NOTE Confidence: 0.818502987142857
00:30:38.230 --> 00:30:40.702 The surgeon went in to remove these out
NOTE Confidence: 0.818502987142857
00:30:40.702 --> 00:30:43.361 they she kept having strokes despite
NOTE Confidence: 0.818502987142857
00:30:43.361 --> 00:30:45.329 and TI's despite anticoagulation.
NOTE Confidence: 0.818502987142857

00:30:45.330 --> 00:30:47.112 When the surgeon engaged the left
NOTE Confidence: 0.818502987142857

00:30:47.112 --> 00:30:48.300 ventricular outflow tract and
NOTE Confidence: 0.818502987142857

00:30:48.355 --> 00:30:50.005 looked at the prior resection site,
NOTE Confidence: 0.818502987142857

00:30:50.010 --> 00:30:51.690 he said that it looked like a ****
NOTE Confidence: 0.818502987142857

00:30:51.690 --> 00:30:53.082 carpet in there and again you can kind
NOTE Confidence: 0.818502987142857

00:30:53.082 --> 00:30:54.750 of see why it looks like a flyfisherman.
NOTE Confidence: 0.818502987142857

00:30:54.750 --> 00:30:57.230 I spilled this tackle box onto the table.
NOTE Confidence: 0.818502987142857

00:30:57.230 --> 00:30:59.214 52 discrete papillary fibroelastoma
NOTE Confidence: 0.818502987142857

00:30:59.214 --> 00:31:02.190 were resected from the left ventricular
NOTE Confidence: 0.818502987142857

00:31:02.264 --> 00:31:04.208 outflow tract that day and again
NOTE Confidence: 0.818502987142857

00:31:04.208 --> 00:31:06.546 it was all along that previous
NOTE Confidence: 0.818502987142857

00:31:06.546 --> 00:31:08.486 region of damaged endocardium.
NOTE Confidence: 0.818502987142857

00:31:08.490 --> 00:31:09.352 All right.
NOTE Confidence: 0.818502987142857

00:31:09.352 --> 00:31:12.369 The next tumor is the cardiac myxoma.
NOTE Confidence: 0.818502987142857

00:31:12.370 --> 00:31:14.484 The prefix mixer coming from the Greek,
NOTE Confidence: 0.818502987142857

00:31:14.490 --> 00:31:15.550 meaning mucousy or slimy.

NOTE Confidence: 0.818502987142857
00:31:15.550 --> 00:31:18.159 And I can think of no better image to
NOTE Confidence: 0.818502987142857
00:31:18.159 --> 00:31:20.406 illustrate that than this one shown here.
NOTE Confidence: 0.818502987142857
00:31:20.410 --> 00:31:22.538 My daughter when she was four years old,
NOTE Confidence: 0.818502987142857
00:31:22.540 --> 00:31:23.620 whenever she would see this
NOTE Confidence: 0.818502987142857
00:31:23.620 --> 00:31:24.484 picture on my laptop,
NOTE Confidence: 0.818502987142857
00:31:24.490 --> 00:31:25.680 she would say daddy's looking
NOTE Confidence: 0.818502987142857
00:31:25.680 --> 00:31:26.870 at his heart booger again.
NOTE Confidence: 0.818502987142857
00:31:26.870 --> 00:31:28.748 And I think that's an incredibly
NOTE Confidence: 0.818502987142857
00:31:28.748 --> 00:31:30.000 appropriate and APT description
NOTE Confidence: 0.818502987142857
00:31:30.058 --> 00:31:31.528 of this tumor because it does.
NOTE Confidence: 0.818502987142857
00:31:31.530 --> 00:31:32.670 It looks mucousy or slimy,
NOTE Confidence: 0.818502987142857
00:31:32.670 --> 00:31:34.490 and that's why they have this name.
NOTE Confidence: 0.818502987142857
00:31:34.490 --> 00:31:35.196 They're benign.
NOTE Confidence: 0.818502987142857
00:31:35.196 --> 00:31:36.608 They are not malignant,
NOTE Confidence: 0.818502987142857
00:31:36.610 --> 00:31:38.338 nor do they undergo malignant degeneration.
NOTE Confidence: 0.818502987142857

00:31:38.340 --> 00:31:40.386 They have no malignant potential prior
NOTE Confidence: 0.818502987142857

00:31:40.386 --> 00:31:42.629 reports of myxomas that have undergone.
NOTE Confidence: 0.818502987142857

00:31:42.630 --> 00:31:43.562 Malignant degeneration,
NOTE Confidence: 0.818502987142857

00:31:43.562 --> 00:31:44.494 in hindsight,
NOTE Confidence: 0.818502987142857

00:31:44.494 --> 00:31:46.358 probably just represent denovo
NOTE Confidence: 0.818502987142857

00:31:46.358 --> 00:31:48.049 malignancies and myxoid sarcomas
NOTE Confidence: 0.818502987142857

00:31:48.049 --> 00:31:50.143 that were unrecognized at the time.
NOTE Confidence: 0.818502987142857

00:31:50.150 --> 00:31:51.665 They most commonly arise in
NOTE Confidence: 0.818502987142857

00:31:51.665 --> 00:31:52.877 the hearts left atrium,
NOTE Confidence: 0.818502987142857

00:31:52.880 --> 00:31:54.020 but they've been described
NOTE Confidence: 0.818502987142857

00:31:54.020 --> 00:31:55.730 in any Chamber of the heart.
NOTE Confidence: 0.818502987142857

00:31:55.730 --> 00:31:57.596 They're said to be a primitive
NOTE Confidence: 0.818502987142857

00:31:57.596 --> 00:31:58.529 multipotential mesenchymal origin,
NOTE Confidence: 0.818502987142857

00:31:58.530 --> 00:32:00.290 which is of course an incredibly fancy way,
NOTE Confidence: 0.818502987142857

00:32:00.290 --> 00:32:01.712 as you all know of saying we have no
NOTE Confidence: 0.818502987142857

00:32:01.712 --> 00:32:03.265 idea where these things are coming from.

NOTE Confidence: 0.818502987142857
00:32:03.270 --> 00:32:04.985 Probably cardiac stem cells are
NOTE Confidence: 0.818502987142857
00:32:04.985 --> 00:32:07.409 somewhere in in the in the heart.
NOTE Confidence: 0.818502987142857
00:32:07.410 --> 00:32:09.354 That's not heart muscle.
NOTE Confidence: 0.818502987142857
00:32:09.354 --> 00:32:11.642 About 5% of these are associated
NOTE Confidence: 0.818502987142857
00:32:11.642 --> 00:32:13.282 with so-called syndrome myxoma or
NOTE Confidence: 0.818502987142857
00:32:13.282 --> 00:32:15.368 the Carney complex and we'll talk a
NOTE Confidence: 0.818502987142857
00:32:15.368 --> 00:32:17.747 little bit more about that in just a moment.
NOTE Confidence: 0.818502987142857
00:32:17.750 --> 00:32:19.549 But they can also obstruct an embolize
NOTE Confidence: 0.818502987142857
00:32:19.549 --> 00:32:21.786 just like we saw with other heart tumors.
NOTE Confidence: 0.818502987142857
00:32:21.790 --> 00:32:22.806 Obstruction obviously is a
NOTE Confidence: 0.818502987142857
00:32:22.806 --> 00:32:24.330 pretty easy thing to think about.
NOTE Confidence: 0.867405822857143
00:32:24.330 --> 00:32:25.730 We'll talk about that in a second.
NOTE Confidence: 0.867405822857143
00:32:25.730 --> 00:32:27.402 Embolization can occur particularly
NOTE Confidence: 0.867405822857143
00:32:27.402 --> 00:32:29.910 when the myxomas have a phenotype
NOTE Confidence: 0.867405822857143
00:32:29.972 --> 00:32:31.847 that's more friable or crumbly.
NOTE Confidence: 0.867405822857143

00:32:31.850 --> 00:32:33.659 You can see this image on the bottom where

NOTE Confidence: 0.867405822857143

00:32:33.659 --> 00:32:35.646 it has a more villiform type architecture.

NOTE Confidence: 0.867405822857143

00:32:35.650 --> 00:32:37.729 You can again in envision pretty easily

NOTE Confidence: 0.867405822857143

00:32:37.729 --> 00:32:39.939 how that tumor is it's beating around.

NOTE Confidence: 0.867405822857143

00:32:39.940 --> 00:32:42.112 In the cardiac cycle could potentially

NOTE Confidence: 0.867405822857143

00:32:42.112 --> 00:32:44.061 break off an embolize downstream

NOTE Confidence: 0.867405822857143

00:32:44.061 --> 00:32:46.261 obstruction obviously comes from large

NOTE Confidence: 0.867405822857143

00:32:46.261 --> 00:32:48.870 myxomas or myxomas that occupy space.

NOTE Confidence: 0.867405822857143

00:32:48.870 --> 00:32:50.142 Here's an example of such and

NOTE Confidence: 0.867405822857143

00:32:50.142 --> 00:32:51.479 if you have your phone available

NOTE Confidence: 0.867405822857143

00:32:51.479 --> 00:32:53.247 you can point it at the QR code.

NOTE Confidence: 0.867405822857143

00:32:53.250 --> 00:32:55.164 This is a technology we've been

NOTE Confidence: 0.867405822857143

00:32:55.164 --> 00:32:57.172 working on perfecting at Mayo over

NOTE Confidence: 0.867405822857143

00:32:57.172 --> 00:32:59.188 the last couple of years called

NOTE Confidence: 0.867405822857143

00:32:59.188 --> 00:33:00.895 photogrammetry of specimens and we've

NOTE Confidence: 0.867405822857143

00:33:00.895 --> 00:33:02.845 taken our several 1000 cases that

NOTE Confidence: 0.867405822857143

00:33:02.845 --> 00:33:04.826 are in our museum collection and we

NOTE Confidence: 0.867405822857143

00:33:04.826 --> 00:33:06.531 we're working on scanning those into

NOTE Confidence: 0.867405822857143

00:33:06.531 --> 00:33:08.187 a digital database that allows you

NOTE Confidence: 0.867405822857143

00:33:08.187 --> 00:33:09.948 to interact with the gross specimen.

NOTE Confidence: 0.867405822857143

00:33:09.950 --> 00:33:10.910 In the old days,

NOTE Confidence: 0.867405822857143

00:33:10.910 --> 00:33:12.110 obviously you could carry buckets

NOTE Confidence: 0.867405822857143

00:33:12.110 --> 00:33:13.404 to conferences and everybody could

NOTE Confidence: 0.867405822857143

00:33:13.404 --> 00:33:15.367 Don gloves or or not in some cases

NOTE Confidence: 0.867405822857143

00:33:15.367 --> 00:33:17.039 and fish things out of a bucket and

NOTE Confidence: 0.867405822857143

00:33:17.040 --> 00:33:18.416 look at them and get a good feel

NOTE Confidence: 0.867405822857143

00:33:18.416 --> 00:33:19.499 for the gross pathology.

NOTE Confidence: 0.867405822857143

00:33:19.500 --> 00:33:20.825 That's obviously frowned on today

NOTE Confidence: 0.867405822857143

00:33:20.825 --> 00:33:22.580 for a whole variety of reasons.

NOTE Confidence: 0.867405822857143

00:33:22.580 --> 00:33:23.868 This is the next best thing though.

NOTE Confidence: 0.867405822857143

00:33:23.870 --> 00:33:24.905 This allows you to interact

NOTE Confidence: 0.867405822857143

00:33:24.905 --> 00:33:26.240 with the organ on your phone,
NOTE Confidence: 0.867405822857143

00:33:26.240 --> 00:33:27.370 you can spin it around,
NOTE Confidence: 0.867405822857143

00:33:27.370 --> 00:33:29.386 you can zoom into things and you can
NOTE Confidence: 0.867405822857143

00:33:29.386 --> 00:33:31.787 see in this case a large left atrial
NOTE Confidence: 0.867405822857143

00:33:31.787 --> 00:33:34.130 tumor and quite easily how it can fall
NOTE Confidence: 0.867405822857143

00:33:34.130 --> 00:33:36.067 down and ball valve over that mitral
NOTE Confidence: 0.867405822857143

00:33:36.067 --> 00:33:38.149 valve orifice and obstruct flow from
NOTE Confidence: 0.867405822857143

00:33:38.149 --> 00:33:40.657 the left atrium into the left ventricle.
NOTE Confidence: 0.765932376666667

00:33:43.210 --> 00:33:44.188 Underneath the microscope,
NOTE Confidence: 0.765932376666667

00:33:44.188 --> 00:33:46.144 the lesional cell that we're looking
NOTE Confidence: 0.765932376666667

00:33:46.144 --> 00:33:48.164 for to seal the diagnosis is the
NOTE Confidence: 0.765932376666667

00:33:48.164 --> 00:33:49.550 so-called myxoma or lipidic cell.
NOTE Confidence: 0.765932376666667

00:33:49.550 --> 00:33:51.938 These cells occur singly or in
NOTE Confidence: 0.765932376666667

00:33:51.938 --> 00:33:53.470 small clusters, small cords,
NOTE Confidence: 0.765932376666667

00:33:53.470 --> 00:33:55.660 a little groups or little little
NOTE Confidence: 0.765932376666667

00:33:55.660 --> 00:33:58.130 tumor giant cells as can be seen here.

NOTE Confidence: 0.765932376666667

00:33:58.130 --> 00:34:00.176 They're bland, they're often spindle shaped,

NOTE Confidence: 0.765932376666667

00:34:00.180 --> 00:34:02.790 they can be multi nucleated as you see there.

NOTE Confidence: 0.765932376666667

00:34:02.790 --> 00:34:04.876 The curious thing about these and one

NOTE Confidence: 0.765932376666667

00:34:04.876 --> 00:34:06.132 of the differentiating properties

NOTE Confidence: 0.765932376666667

00:34:06.132 --> 00:34:08.253 that you can use to separate them

NOTE Confidence: 0.765932376666667

00:34:08.253 --> 00:34:09.794 from fibroblasts is the fact that

NOTE Confidence: 0.765932376666667

00:34:09.794 --> 00:34:11.482 they tend to ring up around small

NOTE Confidence: 0.765932376666667

00:34:11.482 --> 00:34:13.714 intratumoral vessels like you see here.

NOTE Confidence: 0.765932376666667

00:34:13.720 --> 00:34:15.920 On the right sided photomicrograph,

NOTE Confidence: 0.765932376666667

00:34:15.920 --> 00:34:17.616 the tumor cells are all kind of holding

NOTE Confidence: 0.765932376666667

00:34:17.616 --> 00:34:19.027 hands around a small capillary and

NOTE Confidence: 0.765932376666667

00:34:19.027 --> 00:34:20.443 that's exactly what these things do.

NOTE Confidence: 0.765932376666667

00:34:20.450 --> 00:34:22.664 These little nascent vessels kind of

NOTE Confidence: 0.765932376666667

00:34:22.664 --> 00:34:25.247 form and it's unclear what role the

NOTE Confidence: 0.765932376666667

00:34:25.247 --> 00:34:27.323 maxima cells play in forming those,

NOTE Confidence: 0.765932376666667

00:34:27.330 --> 00:34:28.890 those, those, those blood vessels.
NOTE Confidence: 0.765932376666667

00:34:28.890 --> 00:34:30.330 Some people have hypothesized that
NOTE Confidence: 0.765932376666667

00:34:30.330 --> 00:34:32.135 they're part in part responsible for
NOTE Confidence: 0.765932376666667

00:34:32.135 --> 00:34:33.407 those intratumoral blood vessels,
NOTE Confidence: 0.765932376666667

00:34:33.410 --> 00:34:35.573 but they can break and hemorrhage into
NOTE Confidence: 0.765932376666667

00:34:35.573 --> 00:34:38.166 the tumor as the tumor is beating about
NOTE Confidence: 0.765932376666667

00:34:38.166 --> 00:34:40.214 in cosmics almost to start rapidly
NOTE Confidence: 0.765932376666667

00:34:40.214 --> 00:34:42.494 increasing in size in some instance.
NOTE Confidence: 0.765932376666667

00:34:42.500 --> 00:34:44.978 We mentioned that about 5% of
NOTE Confidence: 0.765932376666667

00:34:44.978 --> 00:34:46.410 cardiac maximas were associated
NOTE Confidence: 0.765932376666667

00:34:46.410 --> 00:34:48.200 with the so-called Carney complex,
NOTE Confidence: 0.765932376666667

00:34:48.200 --> 00:34:51.140 so named for Doctor Aiden Carney who
NOTE Confidence: 0.765932376666667

00:34:51.140 --> 00:34:53.462 while well into his 90s at this point
NOTE Confidence: 0.765932376666667

00:34:53.462 --> 00:34:55.052 is still an active pathologist who
NOTE Confidence: 0.765932376666667

00:34:55.052 --> 00:34:57.372 comes to work every day at Mayo Clinic.
NOTE Confidence: 0.765932376666667

00:34:57.380 --> 00:34:58.760 He lives in a building attached,

NOTE Confidence: 0.765932376666667
00:34:58.760 --> 00:35:00.720 so he's able to come no matter
NOTE Confidence: 0.765932376666667
00:35:00.720 --> 00:35:02.821 what the weather is and he's an
NOTE Confidence: 0.765932376666667
00:35:02.821 --> 00:35:04.013 absolute force of nature.
NOTE Confidence: 0.765932376666667
00:35:04.020 --> 00:35:06.750 He is a an inspiration to all of us I
NOTE Confidence: 0.765932376666667
00:35:06.829 --> 00:35:10.197 think his ability to put things together to
NOTE Confidence: 0.765932376666667
00:35:10.197 --> 00:35:12.688 problem solve and to kind of sort through.
NOTE Confidence: 0.765932376666667
00:35:12.688 --> 00:35:12.970 Puzzles,
NOTE Confidence: 0.765932376666667
00:35:12.970 --> 00:35:13.596 diagnostic puzzles,
NOTE Confidence: 0.765932376666667
00:35:13.596 --> 00:35:15.787 is unlike anybody else I've ever met.
NOTE Confidence: 0.765932376666667
00:35:15.790 --> 00:35:17.982 And so I always try to give him
NOTE Confidence: 0.765932376666667
00:35:17.982 --> 00:35:19.964 credit for the amazing work that
NOTE Confidence: 0.765932376666667
00:35:19.964 --> 00:35:22.508 he's done over the decades and the
NOTE Confidence: 0.765932376666667
00:35:22.508 --> 00:35:24.688 amazing patterns that he recognized.
NOTE Confidence: 0.765932376666667
00:35:24.690 --> 00:35:26.232 And one of those patterns was
NOTE Confidence: 0.765932376666667
00:35:26.232 --> 00:35:27.003 the Carney complex,
NOTE Confidence: 0.765932376666667

00:35:27.010 --> 00:35:29.585 this peculiar association of these
NOTE Confidence: 0.765932376666667

00:35:29.585 --> 00:35:31.156 heart tumors. Endocrinopathies.
NOTE Confidence: 0.765932376666667

00:35:31.156 --> 00:35:33.300 Things like Cushing syndromes,
NOTE Confidence: 0.765932376666667

00:35:33.300 --> 00:35:34.080 thyroid problems,
NOTE Confidence: 0.765932376666667

00:35:34.080 --> 00:35:36.420 things of that nature and skin.
NOTE Confidence: 0.765932376666667

00:35:36.420 --> 00:35:38.500 Lentigo noses on the skin.
NOTE Confidence: 0.765932376666667

00:35:38.500 --> 00:35:40.702 Lentigo noses are unusual in that
NOTE Confidence: 0.765932376666667

00:35:40.702 --> 00:35:42.575 the freckling occurs about the
NOTE Confidence: 0.765932376666667

00:35:42.575 --> 00:35:44.260 Vermilion border of the lips,
NOTE Confidence: 0.765932376666667

00:35:44.260 --> 00:35:46.155 where the lips interface with
NOTE Confidence: 0.765932376666667

00:35:46.155 --> 00:35:48.520 the rest of the the face.
NOTE Confidence: 0.765932376666667

00:35:48.520 --> 00:35:50.634 That's an unusual place to have freckling,
NOTE Confidence: 0.765932376666667

00:35:50.640 --> 00:35:52.635 even if you're a a freckled person.
NOTE Confidence: 0.765932376666667

00:35:52.640 --> 00:35:53.604 But be freckled person.
NOTE Confidence: 0.765932376666667

00:35:53.604 --> 00:35:55.363 And so if you see freckling of
NOTE Confidence: 0.765932376666667

00:35:55.363 --> 00:35:56.947 the mucus membranes are about the

NOTE Confidence: 0.765932376666667

00:35:56.947 --> 00:35:58.220 Vermilion border of the lips,

NOTE Confidence: 0.765932376666667

00:35:58.220 --> 00:36:00.155 a syndromic context should should

NOTE Confidence: 0.765932376666667

00:36:00.155 --> 00:36:01.316 come to mind,

NOTE Confidence: 0.765932376666667

00:36:01.320 --> 00:36:03.030 or should prompt you to at

NOTE Confidence: 0.765932376666667

00:36:03.030 --> 00:36:03.885 least consider that.

NOTE Confidence: 0.765932376666667

00:36:03.890 --> 00:36:06.092 Carney complex is has now been

NOTE Confidence: 0.765932376666667

00:36:06.092 --> 00:36:08.072 established to be the result

NOTE Confidence: 0.765932376666667

00:36:08.072 --> 00:36:10.262 of underlying mutations in the

NOTE Confidence: 0.765932376666667

00:36:10.262 --> 00:36:12.410 1A regulatory subunit of the

NOTE Confidence: 0.765932376666667

00:36:12.410 --> 00:36:14.573 protein kinase A or PRK R1A gene.

NOTE Confidence: 0.765932376666667

00:36:14.573 --> 00:36:16.751 And that has played an important

NOTE Confidence: 0.765932376666667

00:36:16.751 --> 00:36:18.919 role diagnostically in us being able

NOTE Confidence: 0.765932376666667

00:36:18.919 --> 00:36:20.953 to separate out myxomas that are

NOTE Confidence: 0.765932376666667

00:36:20.953 --> 00:36:22.945 associated with Carney complex from

NOTE Confidence: 0.765932376666667

00:36:22.945 --> 00:36:24.930 those that are indeed nonsyndromic.

NOTE Confidence: 0.765932376666667

00:36:24.930 --> 00:36:26.673 It's important to do so because the
NOTE Confidence: 0.765932376666667

00:36:26.673 --> 00:36:28.060 recurrence rate is obviously higher
NOTE Confidence: 0.765932376666667

00:36:28.060 --> 00:36:29.824 for people who carry the syndrome,
NOTE Confidence: 0.724371878

00:36:29.830 --> 00:36:31.860 but there's also familial implications.
NOTE Confidence: 0.724371878

00:36:31.860 --> 00:36:34.394 So first degree relatives need to be
NOTE Confidence: 0.724371878

00:36:34.394 --> 00:36:36.272 screened for underlying Carney complex
NOTE Confidence: 0.724371878

00:36:36.272 --> 00:36:38.444 when an index case is identified.
NOTE Confidence: 0.724371878

00:36:38.450 --> 00:36:40.193 Another important clue to the fact that
NOTE Confidence: 0.724371878

00:36:40.193 --> 00:36:41.988 you might be dealing with the Carney
NOTE Confidence: 0.724371878

00:36:41.988 --> 00:36:43.870 complex is a non left atrial myxoma.
NOTE Confidence: 0.724371878

00:36:43.870 --> 00:36:45.760 While let Carney complex myxomas
NOTE Confidence: 0.724371878

00:36:45.760 --> 00:36:47.650 are most commonly left atrial,
NOTE Confidence: 0.724371878

00:36:47.650 --> 00:36:50.330 if you have a non left atrial myxoma it is
NOTE Confidence: 0.724371878

00:36:50.396 --> 00:36:53.267 far more likely to be in a syndromic context.
NOTE Confidence: 0.724371878

00:36:53.270 --> 00:36:55.078 So if you see a myxoma coming from
NOTE Confidence: 0.724371878

00:36:55.078 --> 00:36:56.548 anywhere other than the left atrium,

NOTE Confidence: 0.724371878

00:36:56.550 --> 00:36:58.360 you should definitely look into

NOTE Confidence: 0.724371878

00:36:58.360 --> 00:37:00.170 the patient's history and consider

NOTE Confidence: 0.724371878

00:37:00.225 --> 00:37:01.870 a diagnosis of Carney complex.

NOTE Confidence: 0.724371878

00:37:01.870 --> 00:37:04.102 Now how can we as pathologists render a

NOTE Confidence: 0.724371878

00:37:04.102 --> 00:37:06.072 diagnosis of Carney complex or suggest

NOTE Confidence: 0.724371878

00:37:06.072 --> 00:37:08.430 that tactfully other than saying look more?

NOTE Confidence: 0.724371878

00:37:08.430 --> 00:37:09.182 Carefully at your patient,

NOTE Confidence: 0.724371878

00:37:09.182 --> 00:37:10.310 look at the freckling and those

NOTE Confidence: 0.724371878

00:37:10.351 --> 00:37:10.840 type of things.

NOTE Confidence: 0.724371878

00:37:10.840 --> 00:37:12.982 Well an immunohistochemical stain has come

NOTE Confidence: 0.724371878

00:37:12.982 --> 00:37:15.860 to the fore over the last several years

NOTE Confidence: 0.724371878

00:37:15.860 --> 00:37:18.692 that really helps carry the way there.

NOTE Confidence: 0.724371878

00:37:18.692 --> 00:37:22.280 So looking for protein expression of PR KR1A,

NOTE Confidence: 0.724371878

00:37:22.280 --> 00:37:24.980 no patient with Carney complex will

NOTE Confidence: 0.724371878

00:37:24.980 --> 00:37:27.550 exhibit retained expression of PR KR1A.

NOTE Confidence: 0.724371878

00:37:27.550 --> 00:37:29.755 They all have a lesional cell loss.

NOTE Confidence: 0.724371878

00:37:29.760 --> 00:37:31.700 Fortunately because these things

NOTE Confidence: 0.724371878

00:37:31.700 --> 00:37:34.125 are clonal obviously and result

NOTE Confidence: 0.724371878

00:37:34.125 --> 00:37:36.373 from biallelic PR KR1A loss,

NOTE Confidence: 0.724371878

00:37:36.373 --> 00:37:38.479 you get nice background inflammation that.

NOTE Confidence: 0.724371878

00:37:38.480 --> 00:37:40.616 Stains with the PRK R1A protein,

NOTE Confidence: 0.724371878

00:37:40.620 --> 00:37:43.260 but the neoplastic cells themselves

NOTE Confidence: 0.724371878

00:37:43.260 --> 00:37:45.372 will be absent expression.

NOTE Confidence: 0.724371878

00:37:45.380 --> 00:37:47.308 PR KR1A loss can be seen by allelic

NOTE Confidence: 0.724371878

00:37:47.308 --> 00:37:49.329 loss can be seen in sporadic myxoma.

NOTE Confidence: 0.724371878

00:37:49.330 --> 00:37:52.039 So it's not definitive for a diagnosis

NOTE Confidence: 0.724371878

00:37:52.039 --> 00:37:54.414 of Carney complex but you can

NOTE Confidence: 0.724371878

00:37:54.414 --> 00:37:56.694 essentially exclude it if you have

NOTE Confidence: 0.724371878

00:37:56.694 --> 00:37:58.192 positive PR KR1A standard staining,

NOTE Confidence: 0.724371878

00:37:58.192 --> 00:37:59.860 you don't have to worry about

NOTE Confidence: 0.724371878

00:37:59.912 --> 00:38:01.697 Carney complex in those individuals.

NOTE Confidence: 0.724371878

00:38:01.700 --> 00:38:05.316 So that was another update to these tumors.

NOTE Confidence: 0.724371878

00:38:05.320 --> 00:38:08.421 Another tumor that was updated was that

NOTE Confidence: 0.724371878

00:38:08.421 --> 00:38:10.280 cardiac undifferentiated pleomorphic sarcoma.

NOTE Confidence: 0.724371878

00:38:10.280 --> 00:38:12.905 This is the most common cardiac sarcoma

NOTE Confidence: 0.724371878

00:38:12.905 --> 00:38:15.660 that we see arising in the heart.

NOTE Confidence: 0.724371878

00:38:15.660 --> 00:38:18.012 They tend to arise in the left atrium

NOTE Confidence: 0.724371878

00:38:18.012 --> 00:38:20.527 and are referred to in some literature

NOTE Confidence: 0.724371878

00:38:20.527 --> 00:38:22.850 as intimal sarcomas of the heart.

NOTE Confidence: 0.724371878

00:38:22.850 --> 00:38:25.635 The term intimal sarcoma itself

NOTE Confidence: 0.724371878

00:38:25.635 --> 00:38:28.430 was really basically put out there

NOTE Confidence: 0.724371878

00:38:28.430 --> 00:38:30.530 because of the relationship these

NOTE Confidence: 0.724371878

00:38:30.530 --> 00:38:32.950 have with pulmonary artery in table

NOTE Confidence: 0.724371878

00:38:32.950 --> 00:38:35.745 sarcomas in that they both are shown

NOTE Confidence: 0.724371878

00:38:35.745 --> 00:38:37.730 to exhibit MDM 2 amplification.

NOTE Confidence: 0.724371878

00:38:37.730 --> 00:38:39.614 Now of course that is not

NOTE Confidence: 0.724371878

00:38:39.614 --> 00:38:40.870 a lineage specific marker.
NOTE Confidence: 0.724371878

00:38:40.870 --> 00:38:43.670 MDM 2 amplification is seen in a host
NOTE Confidence: 0.724371878

00:38:43.670 --> 00:38:45.769 of neoplasms aside from INTIMAL.
NOTE Confidence: 0.724371878

00:38:45.770 --> 00:38:46.986 Sarcomas and these undifferentiated
NOTE Confidence: 0.724371878

00:38:46.986 --> 00:38:49.061 tumors can be seen in liposarcomas and
NOTE Confidence: 0.724371878

00:38:49.061 --> 00:38:50.897 in a whole variety of other things as well.
NOTE Confidence: 0.724371878

00:38:50.900 --> 00:38:53.154 So being that it's not lineage specific,
NOTE Confidence: 0.724371878

00:38:53.160 --> 00:38:55.338 The Who recognized that and basically
NOTE Confidence: 0.724371878

00:38:55.338 --> 00:38:57.878 lumped all of these into undifferentiated
NOTE Confidence: 0.724371878

00:38:57.878 --> 00:39:00.428 pleomorphic tumors rather than calling
NOTE Confidence: 0.724371878

00:39:00.428 --> 00:39:02.660 intimal sarcomas of the heart.
NOTE Confidence: 0.724371878

00:39:02.660 --> 00:39:04.893 Also important to note that the heart
NOTE Confidence: 0.724371878

00:39:04.893 --> 00:39:06.419 technically doesn't have an intima.
NOTE Confidence: 0.724371878

00:39:06.420 --> 00:39:08.850 It has an endocardium which while
NOTE Confidence: 0.724371878

00:39:08.850 --> 00:39:11.068 contiguous with the vascular intima
NOTE Confidence: 0.724371878

00:39:11.068 --> 00:39:12.637 is biologically distinct.

NOTE Confidence: 0.724371878

00:39:12.640 --> 00:39:14.100 The survival of this tumor,

NOTE Confidence: 0.724371878

00:39:14.100 --> 00:39:16.207 regardless of what you call it is.

NOTE Confidence: 0.724371878

00:39:16.210 --> 00:39:17.680 4.

NOTE Confidence: 0.724371878

00:39:17.680 --> 00:39:18.540 Cardiac angiosarcoma,

NOTE Confidence: 0.724371878

00:39:18.540 --> 00:39:21.980 as these are also persist in The Who,

NOTE Confidence: 0.724371878

00:39:21.980 --> 00:39:24.028 they haven't seen much in the way of

NOTE Confidence: 0.724371878

00:39:24.028 --> 00:39:25.546 updates other than basically there

NOTE Confidence: 0.724371878

00:39:25.546 --> 00:39:27.454 hasn't been many updates with them.

NOTE Confidence: 0.724371878

00:39:27.460 --> 00:39:28.700 Recurrent molecular genetic findings

NOTE Confidence: 0.724371878

00:39:28.700 --> 00:39:29.940 had not been seen.

NOTE Confidence: 0.836747295714286

00:39:29.940 --> 00:39:31.695 They remained the most common

NOTE Confidence: 0.836747295714286

00:39:31.695 --> 00:39:33.450 cardiac sarcoma that exhibits some

NOTE Confidence: 0.836747295714286

00:39:33.512 --> 00:39:35.488 specific lineage of differentiation,

NOTE Confidence: 0.836747295714286

00:39:35.490 --> 00:39:37.566 specifically that of endothelium.

NOTE Confidence: 0.836747295714286

00:39:37.566 --> 00:39:40.680 It consists of malignant endothelial cells.

NOTE Confidence: 0.836747295714286

00:39:40.680 --> 00:39:42.282 Obviously it takes on all the
NOTE Confidence: 0.836747295714286

00:39:42.282 --> 00:39:43.999 morphologies that we can see arising.
NOTE Confidence: 0.836747295714286

00:39:44.000 --> 00:39:45.760 In extra cardiovascular places,
NOTE Confidence: 0.836747295714286

00:39:45.760 --> 00:39:47.960 we can see epithelioid angiosarcoma.
NOTE Confidence: 0.836747295714286

00:39:47.960 --> 00:39:50.044 Spindle cell angiosarcoma as
NOTE Confidence: 0.836747295714286

00:39:50.044 --> 00:39:52.128 the whole diagnostic range.
NOTE Confidence: 0.836747295714286

00:39:52.130 --> 00:39:53.690 Bright contrast is seen on imaging,
NOTE Confidence: 0.836747295714286

00:39:53.690 --> 00:39:55.580 which often helps our imaging
NOTE Confidence: 0.836747295714286

00:39:55.580 --> 00:39:57.470 colleagues to identify and diagnose
NOTE Confidence: 0.836747295714286

00:39:57.531 --> 00:39:59.505 these prior to tissue being taken.
NOTE Confidence: 0.836747295714286

00:39:59.510 --> 00:40:01.766 They tend to occur in many young men.
NOTE Confidence: 0.836747295714286

00:40:01.770 --> 00:40:03.330 Dramatic presentations can occur.
NOTE Confidence: 0.836747295714286

00:40:03.330 --> 00:40:05.670 One of the more unfortunate cases
NOTE Confidence: 0.836747295714286

00:40:05.732 --> 00:40:07.916 I've seen over the years was on a
NOTE Confidence: 0.836747295714286

00:40:07.916 --> 00:40:09.882 Christmas Eve 26 year old expected
NOTE Confidence: 0.836747295714286

00:40:09.882 --> 00:40:11.647 father presented with a single

NOTE Confidence: 0.836747295714286
00:40:11.647 --> 00:40:14.115 bad syncopal episode and was found
NOTE Confidence: 0.836747295714286
00:40:14.115 --> 00:40:16.165 to have a hemorrhagic pericardial
NOTE Confidence: 0.836747295714286
00:40:16.239 --> 00:40:18.547 effusion that harbored angiosarcoma.
NOTE Confidence: 0.836747295714286
00:40:18.550 --> 00:40:19.264 Cells in it.
NOTE Confidence: 0.836747295714286
00:40:19.264 --> 00:40:20.930 It was just a awful and devastating
NOTE Confidence: 0.836747295714286
00:40:20.981 --> 00:40:22.193 story because these affect
NOTE Confidence: 0.836747295714286
00:40:22.193 --> 00:40:23.708 young people in their prime.
NOTE Confidence: 0.836747295714286
00:40:23.710 --> 00:40:24.532 They're incredibly sad.
NOTE Confidence: 0.836747295714286
00:40:24.532 --> 00:40:25.628 There's very little that
NOTE Confidence: 0.836747295714286
00:40:25.628 --> 00:40:26.909 can be done for them.
NOTE Confidence: 0.836747295714286
00:40:26.910 --> 00:40:28.582 Cardiac transplant is obviously
NOTE Confidence: 0.836747295714286
00:40:28.582 --> 00:40:30.254 difficult because immunosuppression in
NOTE Confidence: 0.836747295714286
00:40:30.254 --> 00:40:32.484 the face of an aggressive malignancy
NOTE Confidence: 0.836747295714286
00:40:32.484 --> 00:40:34.159 is never an optimal solution.
NOTE Confidence: 0.836747295714286
00:40:34.160 --> 00:40:36.428 And radiotherapy is virtually off the
NOTE Confidence: 0.836747295714286

00:40:36.428 --> 00:40:38.830 table because of how sensitive the
NOTE Confidence: 0.836747295714286

00:40:38.830 --> 00:40:41.278 heart is to external beam radiation.
NOTE Confidence: 0.836747295714286

00:40:41.280 --> 00:40:43.674 A number of molecular genetic findings
NOTE Confidence: 0.836747295714286

00:40:43.674 --> 00:40:45.792 have been described in Angiosarcoma's today,
NOTE Confidence: 0.836747295714286

00:40:45.792 --> 00:40:47.619 but important as I mentioned up top,
NOTE Confidence: 0.836747295714286

00:40:47.620 --> 00:40:50.574 none are recurrent and none are diagnostic.
NOTE Confidence: 0.836747295714286

00:40:50.580 --> 00:40:51.912 None have really been shown to
NOTE Confidence: 0.836747295714286

00:40:51.912 --> 00:40:53.704 have much in the way of prognostic
NOTE Confidence: 0.836747295714286

00:40:53.704 --> 00:40:55.124 significance other than the fact
NOTE Confidence: 0.836747295714286

00:40:55.124 --> 00:40:56.805 that some trisomies have shown
NOTE Confidence: 0.836747295714286

00:40:56.805 --> 00:40:57.870 some increased survival,
NOTE Confidence: 0.836747295714286

00:40:57.870 --> 00:40:58.830 but we're talking on the
NOTE Confidence: 0.836747295714286

00:40:58.830 --> 00:40:59.598 order of weeks there,
NOTE Confidence: 0.836747295714286

00:40:59.600 --> 00:41:02.285 which aren't clinically
NOTE Confidence: 0.836747295714286

00:41:02.285 --> 00:41:04.970 a significant finding.
NOTE Confidence: 0.836747295714286

00:41:04.970 --> 00:41:06.462 Conduction system hamartoma represents

NOTE Confidence: 0.836747295714286
00:41:06.462 --> 00:41:09.240 another update that The Who has provided.
NOTE Confidence: 0.836747295714286
00:41:09.240 --> 00:41:10.668 This is an update to the condition
NOTE Confidence: 0.836747295714286
00:41:10.668 --> 00:41:12.045 that has been formally referred
NOTE Confidence: 0.836747295714286
00:41:12.045 --> 00:41:13.489 to as histiocytic cardiomyopathy.
NOTE Confidence: 0.836747295714286
00:41:13.490 --> 00:41:15.550 These are hamartomatous proliferations of
NOTE Confidence: 0.836747295714286
00:41:15.550 --> 00:41:18.136 Purkinje cells or the cells conduction
NOTE Confidence: 0.836747295714286
00:41:18.136 --> 00:41:20.426 or the hearts conduction apparatus.
NOTE Confidence: 0.836747295714286
00:41:20.430 --> 00:41:22.050 The proliferation of those Purkinje
NOTE Confidence: 0.836747295714286
00:41:22.050 --> 00:41:24.035 cells which are located in the
NOTE Confidence: 0.836747295714286
00:41:24.035 --> 00:41:25.600 endocardium can make the heart
NOTE Confidence: 0.836747295714286
00:41:25.600 --> 00:41:27.535 have a hyper trabeculated or non
NOTE Confidence: 0.836747295714286
00:41:27.535 --> 00:41:28.787 compacted type of appearance.
NOTE Confidence: 0.836747295714286
00:41:28.790 --> 00:41:30.482 They can grow all through the
NOTE Confidence: 0.836747295714286
00:41:30.482 --> 00:41:32.453 heart muscle and even up and onto
NOTE Confidence: 0.836747295714286
00:41:32.453 --> 00:41:33.763 the surface of the valves.
NOTE Confidence: 0.836747295714286

00:41:33.770 --> 00:41:35.765 These are recognized to be associated with.
NOTE Confidence: 0.836747295714286

00:41:35.770 --> 00:41:36.338 NU FB.
NOTE Confidence: 0.836747295714286

00:41:36.338 --> 00:41:38.326 11 mutations and the name was changed
NOTE Confidence: 0.836747295714286

00:41:38.326 --> 00:41:40.026 from CARDIOMYOPATHIES because they
NOTE Confidence: 0.836747295714286

00:41:40.026 --> 00:41:42.276 aren't in fact a cardiomyopathy,
NOTE Confidence: 0.836747295714286

00:41:42.280 --> 00:41:44.665 but rather a clonal proliferation
NOTE Confidence: 0.836747295714286

00:41:44.665 --> 00:41:46.573 of these Purkinje cells.
NOTE Confidence: 0.836747295714286

00:41:46.580 --> 00:41:48.680 Most individuals with these
NOTE Confidence: 0.836747295714286

00:41:48.680 --> 00:41:50.780 are present in childhood.
NOTE Confidence: 0.836747295714286

00:41:50.780 --> 00:41:51.068 Unfortunately,
NOTE Confidence: 0.836747295714286

00:41:51.068 --> 00:41:53.084 about a fifth of them present with
NOTE Confidence: 0.836747295714286

00:41:53.084 --> 00:41:54.399 sudden infant Death syndrome,
NOTE Confidence: 0.836747295714286

00:41:54.400 --> 00:41:56.540 which again highlights the importance
NOTE Confidence: 0.836747295714286

00:41:56.540 --> 00:41:59.040 for investigative work and autopsy work.
NOTE Confidence: 0.836747295714286

00:41:59.040 --> 00:42:01.176 In looking at these cases of
NOTE Confidence: 0.836747295714286

00:42:01.176 --> 00:42:02.600 sudden infant death syndrome,

NOTE Confidence: 0.836747295714286
00:42:02.600 --> 00:42:06.426 identifying germline FDU FB11 mutations
NOTE Confidence: 0.836747295714286
00:42:06.426 --> 00:42:09.036 is obviously a critical thing.
NOTE Confidence: 0.836747295714286
00:42:09.040 --> 00:42:11.272 Another new and new entity that
NOTE Confidence: 0.836747295714286
00:42:11.272 --> 00:42:13.198 was described and entered into
NOTE Confidence: 0.836747295714286
00:42:13.198 --> 00:42:15.430 The Who as the so-called hamartoma
NOTE Confidence: 0.836747295714286
00:42:15.430 --> 00:42:17.200 of mature cardiac myocytes.
NOTE Confidence: 0.836747295714286
00:42:17.200 --> 00:42:19.786 These are somewhat curious lesions that
NOTE Confidence: 0.836747295714286
00:42:19.786 --> 00:42:22.059 present as somewhat poorly circumscribed
NOTE Confidence: 0.836747295714286
00:42:22.059 --> 00:42:24.915 yellow tan lesions in the myocardium.
NOTE Confidence: 0.836747295714286
00:42:24.920 --> 00:42:26.400 They can make the myocardium
NOTE Confidence: 0.836747295714286
00:42:26.400 --> 00:42:27.880 look asymmetrically thick and so
NOTE Confidence: 0.836747295714286
00:42:27.935 --> 00:42:29.801 they're often the lesion is often
NOTE Confidence: 0.836747295714286
00:42:29.801 --> 00:42:31.045 confused with other conditions
NOTE Confidence: 0.836747295714286
00:42:31.095 --> 00:42:32.699 that cause asymmetric thickening,
NOTE Confidence: 0.836747295714286
00:42:32.700 --> 00:42:35.285 like genetic heart muscle disease
NOTE Confidence: 0.836747295714286

00:42:35.285 --> 00:42:36.836 or hypertrophic cardiomyopathy.

NOTE Confidence: 0.82103677875

00:42:36.840 --> 00:42:39.184 The lesions themselves consist of a kind of.

NOTE Confidence: 0.82103677875

00:42:39.190 --> 00:42:40.994 Unusual collection of cardiac

NOTE Confidence: 0.82103677875

00:42:40.994 --> 00:42:43.249 myocytes that are absolutely huge.

NOTE Confidence: 0.82103677875

00:42:43.250 --> 00:42:44.360 How huge you might ask?

NOTE Confidence: 0.82103677875

00:42:44.360 --> 00:42:45.890 Well, these were taken at

NOTE Confidence: 0.82103677875

00:42:45.890 --> 00:42:46.808 the same magnification.

NOTE Confidence: 0.82103677875

00:42:46.810 --> 00:42:48.476 One on the bottom is the normal

NOTE Confidence: 0.82103677875

00:42:48.476 --> 00:42:49.443 myocardium that's adjacent to

NOTE Confidence: 0.82103677875

00:42:49.443 --> 00:42:50.709 this lesion and the heart muscle.

NOTE Confidence: 0.82103677875

00:42:50.710 --> 00:42:52.420 Myocytes that are taken within the

NOTE Confidence: 0.82103677875

00:42:52.420 --> 00:42:54.184 lesion are shown above and you can

NOTE Confidence: 0.82103677875

00:42:54.184 --> 00:42:56.105 see that they can be 10 to 15 times

NOTE Confidence: 0.82103677875

00:42:56.105 --> 00:42:57.719 the size of normal cardiac myosin.

NOTE Confidence: 0.82103677875

00:42:57.720 --> 00:42:59.128 It's like elephant myocardium

NOTE Confidence: 0.82103677875

00:42:59.128 --> 00:43:00.888 occurring in the heart muscle.

NOTE Confidence: 0.82103677875

00:43:00.890 --> 00:43:02.235 It is not electrically contiguous

NOTE Confidence: 0.82103677875

00:43:02.235 --> 00:43:03.930 with the rest of the heart.

NOTE Confidence: 0.82103677875

00:43:03.930 --> 00:43:06.016 So these do appear to be somewhat

NOTE Confidence: 0.82103677875

00:43:06.016 --> 00:43:08.371 tumoral in nature and can obstruct and

NOTE Confidence: 0.82103677875

00:43:08.371 --> 00:43:10.471 cause all kinds of nasty complications.

NOTE Confidence: 0.82103677875

00:43:10.480 --> 00:43:11.560 There are a few other hammer

NOTE Confidence: 0.82103677875

00:43:11.560 --> 00:43:12.680 Tomas that we're also mentioned,

NOTE Confidence: 0.82103677875

00:43:12.680 --> 00:43:13.868 the so-called lipomatous hamartoma

NOTE Confidence: 0.82103677875

00:43:13.868 --> 00:43:15.056 at the AV valves,

NOTE Confidence: 0.82103677875

00:43:15.060 --> 00:43:16.962 fat fatty deposits or like Puma

NOTE Confidence: 0.82103677875

00:43:16.962 --> 00:43:18.919 like lesions in the AV valves.

NOTE Confidence: 0.82103677875

00:43:18.920 --> 00:43:20.738 And then the so-called mesenchymal hammer,

NOTE Confidence: 0.82103677875

00:43:20.740 --> 00:43:22.470 cardiac hammer Toma which consists

NOTE Confidence: 0.82103677875

00:43:22.470 --> 00:43:24.200 of an amalgamation of different

NOTE Confidence: 0.82103677875

00:43:24.254 --> 00:43:25.879 tissues occurring in the heart,

NOTE Confidence: 0.82103677875

00:43:25.880 --> 00:43:28.540 namely fat, collagen, blood vessels,
NOTE Confidence: 0.82103677875

00:43:28.540 --> 00:43:32.440 nerves and bundles of smooth muscle.
NOTE Confidence: 0.82103677875

00:43:32.440 --> 00:43:33.464 Does that sound familiar?
NOTE Confidence: 0.82103677875

00:43:33.464 --> 00:43:33.720 Well,
NOTE Confidence: 0.82103677875

00:43:33.720 --> 00:43:35.264 those are the things we saw at the
NOTE Confidence: 0.82103677875

00:43:35.264 --> 00:43:37.157 top in our index case or our vignette.
NOTE Confidence: 0.82103677875

00:43:37.160 --> 00:43:40.750 So this case, act two was indeed a case of.
NOTE Confidence: 0.82103677875

00:43:40.750 --> 00:43:44.058 Amazonka, Amal. Cardiac hamartoma.
NOTE Confidence: 0.82103677875

00:43:44.060 --> 00:43:47.007 All right, we've reached the third act.
NOTE Confidence: 0.82103677875

00:43:47.010 --> 00:43:47.658 Cardiac amyloidosis.
NOTE Confidence: 0.82103677875

00:43:47.658 --> 00:43:49.926 Our vignette to lead us into this
NOTE Confidence: 0.82103677875

00:43:49.926 --> 00:43:52.265 final topic is a 73 year old woman
NOTE Confidence: 0.82103677875

00:43:52.265 --> 00:43:53.561 with symptomatic aortic valve
NOTE Confidence: 0.82103677875

00:43:53.561 --> 00:43:55.531 stenosis and chronic A-fib was
NOTE Confidence: 0.82103677875

00:43:55.531 --> 00:43:57.107 undergoing aortic valve replacement.
NOTE Confidence: 0.82103677875

00:43:57.110 --> 00:43:58.898 At the same time she underwent

NOTE Confidence: 0.82103677875

00:43:58.898 --> 00:44:00.593 amputation of her left atrial

NOTE Confidence: 0.82103677875

00:44:00.593 --> 00:44:02.788 appendage to prevent thrombosis and

NOTE Confidence: 0.82103677875

00:44:02.788 --> 00:44:04.544 for appropriate bypass cannulation.

NOTE Confidence: 0.82103677875

00:44:04.550 --> 00:44:06.506 Underneath the microscope we see a

NOTE Confidence: 0.82103677875

00:44:06.506 --> 00:44:07.810 pretty normal appearing myocardium,

NOTE Confidence: 0.82103677875

00:44:07.810 --> 00:44:08.740 but the interstitium does seem

NOTE Confidence: 0.82103677875

00:44:08.740 --> 00:44:10.050 to be a little bit expanded.

NOTE Confidence: 0.82103677875

00:44:10.050 --> 00:44:11.390 There's some acellular substance

NOTE Confidence: 0.82103677875

00:44:11.390 --> 00:44:12.730 there in the interstitium.

NOTE Confidence: 0.82103677875

00:44:12.730 --> 00:44:14.728 It's a little bit pale looking,

NOTE Confidence: 0.82103677875

00:44:14.730 --> 00:44:15.807 could be collagen,

NOTE Confidence: 0.82103677875

00:44:15.807 --> 00:44:17.961 could be something else special stain

NOTE Confidence: 0.82103677875

00:44:17.961 --> 00:44:19.926 sulfated lesion Blues tends to stain.

NOTE Confidence: 0.82103677875

00:44:19.930 --> 00:44:21.990 The Mucopolysaccharide matrix of amyloid,

NOTE Confidence: 0.82103677875

00:44:21.990 --> 00:44:23.855 a seafoam green color certainly

NOTE Confidence: 0.82103677875

00:44:23.855 --> 00:44:25.720 indicates that we might be
NOTE Confidence: 0.82103677875

00:44:25.793 --> 00:44:27.917 dealing with cardiac amyloidosis.
NOTE Confidence: 0.82103677875

00:44:27.920 --> 00:44:29.472 What is cardiac amyloidosis?
NOTE Confidence: 0.82103677875

00:44:29.472 --> 00:44:29.860 Well,
NOTE Confidence: 0.82103677875

00:44:29.860 --> 00:44:32.266 the term amyloid itself comes
NOTE Confidence: 0.82103677875

00:44:32.266 --> 00:44:34.900 from the Latin meaning starch amyloid.
NOTE Confidence: 0.82103677875

00:44:34.900 --> 00:44:37.350 It consists of a misfolded
NOTE Confidence: 0.82103677875

00:44:37.350 --> 00:44:38.330 extracellular protein.
NOTE Confidence: 0.82103677875

00:44:38.330 --> 00:44:39.476 When I say that it's misfolded,
NOTE Confidence: 0.82103677875

00:44:39.480 --> 00:44:41.115 it's depositing as anti parallel
NOTE Confidence: 0.82103677875

00:44:41.115 --> 00:44:43.196 beta pleated sheets in the cardiac
NOTE Confidence: 0.82103677875

00:44:43.196 --> 00:44:44.724 interstitium in the extracellular
NOTE Confidence: 0.82103677875

00:44:44.724 --> 00:44:46.252 space of any tissue,
NOTE Confidence: 0.82103677875

00:44:46.260 --> 00:44:47.870 as it were ultra structurally
NOTE Confidence: 0.82103677875

00:44:47.870 --> 00:44:49.766 those fibrils are somewhere on the
NOTE Confidence: 0.82103677875

00:44:49.766 --> 00:44:51.376 order of 7 1/2 to 10 nanometers

NOTE Confidence: 0.82103677875
00:44:51.376 --> 00:44:53.079 in size and are non branching,
NOTE Confidence: 0.82103677875
00:44:53.080 --> 00:44:54.484 helping to separate them
NOTE Confidence: 0.82103677875
00:44:54.484 --> 00:44:55.537 from collagen fibers.
NOTE Confidence: 0.82103677875
00:44:55.540 --> 00:44:55.856 Importantly,
NOTE Confidence: 0.82103677875
00:44:55.856 --> 00:44:57.436 because of that secondary structure
NOTE Confidence: 0.82103677875
00:44:57.436 --> 00:44:59.080 of the beta pleated sheets,
NOTE Confidence: 0.82103677875
00:44:59.080 --> 00:45:01.255 they can bind the intercalating
NOTE Confidence: 0.82103677875
00:45:01.255 --> 00:45:02.560 dye Congo red,
NOTE Confidence: 0.82103677875
00:45:02.560 --> 00:45:04.963 and when they do so they can buy refrige.
NOTE Confidence: 0.82103677875
00:45:04.970 --> 00:45:06.728 With an apple green birefringence platter
NOTE Confidence: 0.82103677875
00:45:06.728 --> 00:45:08.807 and as we'll see in a few moments.
NOTE Confidence: 0.82103677875
00:45:08.810 --> 00:45:10.390 Likewise cross beta diffraction
NOTE Confidence: 0.82103677875
00:45:10.390 --> 00:45:12.760 can be seen on X-ray diffraction
NOTE Confidence: 0.82103677875
00:45:12.828 --> 00:45:14.790 spectroscopy and this is not
NOTE Confidence: 0.82103677875
00:45:14.790 --> 00:45:16.010 a protein specific disease.
NOTE Confidence: 0.82103677875

00:45:16.010 --> 00:45:19.290 In fact us humans make 31 proteins that
NOTE Confidence: 0.82103677875

00:45:19.290 --> 00:45:22.387 are recognized to have a myogenic potential.
NOTE Confidence: 0.82103677875

00:45:22.390 --> 00:45:24.970 All you need for a protein to have a myogenic
NOTE Confidence: 0.764466759583334

00:45:25.031 --> 00:45:27.355 potential is have that protein have the
NOTE Confidence: 0.764466759583334

00:45:27.355 --> 00:45:29.909 propensity to form these beta pleated sheets.
NOTE Confidence: 0.764466759583334

00:45:29.910 --> 00:45:31.758 So that can happen because of an
NOTE Confidence: 0.764466759583334

00:45:31.758 --> 00:45:33.189 intrinsic property of the protein,
NOTE Confidence: 0.764466759583334

00:45:33.190 --> 00:45:35.180 the proteins amino acid constituency.
NOTE Confidence: 0.764466759583334

00:45:35.180 --> 00:45:37.028 Naturally makes it want to do that.
NOTE Confidence: 0.764466759583334

00:45:37.030 --> 00:45:38.974 And in which case we can see the disease
NOTE Confidence: 0.764466759583334

00:45:38.974 --> 00:45:40.743 manifest with aging or when the proteins
NOTE Confidence: 0.764466759583334

00:45:40.743 --> 00:45:42.539 in high concentrations it can be the
NOTE Confidence: 0.764466759583334

00:45:42.539 --> 00:45:44.021 result of an underlying genetic mutation
NOTE Confidence: 0.764466759583334

00:45:44.021 --> 00:45:46.200 that changes the amino acid structure
NOTE Confidence: 0.764466759583334

00:45:46.200 --> 00:45:48.130 and makes it more amyloidogenic.
NOTE Confidence: 0.764466759583334

00:45:48.130 --> 00:45:50.314 And then of course we can have proteolytic

NOTE Confidence: 0.764466759583334

00:45:50.314 --> 00:45:51.989 remodeling of the precursor protein.

NOTE Confidence: 0.764466759583334

00:45:51.990 --> 00:45:53.994 So a post transcriptional process that

NOTE Confidence: 0.764466759583334

00:45:53.994 --> 00:45:56.508 makes the protein more likely to deposit

NOTE Confidence: 0.764466759583334

00:45:56.508 --> 00:45:58.740 in these beta pleated sheet configurations.

NOTE Confidence: 0.764466759583334

00:45:58.740 --> 00:46:01.108 Of the 31 types we recognized in humans,

NOTE Confidence: 0.764466759583334

00:46:01.110 --> 00:46:02.976 13 of them have been described

NOTE Confidence: 0.764466759583334

00:46:02.976 --> 00:46:04.660 as occurring in the heart.

NOTE Confidence: 0.764466759583334

00:46:04.660 --> 00:46:07.936 Despite that these top 2A TR&L

NOTE Confidence: 0.764466759583334

00:46:07.936 --> 00:46:09.751 type transthyretin and light chain

NOTE Confidence: 0.764466759583334

00:46:09.751 --> 00:46:11.579 amyloid take the lion share.

NOTE Confidence: 0.764466759583334

00:46:11.580 --> 00:46:13.602 98% of cardiac amyloid is accounted

NOTE Confidence: 0.764466759583334

00:46:13.602 --> 00:46:15.929 for by these two protein types.

NOTE Confidence: 0.764466759583334

00:46:15.930 --> 00:46:17.562 It was long thought that light

NOTE Confidence: 0.764466759583334

00:46:17.562 --> 00:46:19.196 chain amyloid was the most common

NOTE Confidence: 0.764466759583334

00:46:19.196 --> 00:46:20.904 type that we see in the heart.

NOTE Confidence: 0.764466759583334

00:46:20.910 --> 00:46:23.290 But we now recognize because of better
NOTE Confidence: 0.764466759583334

00:46:23.290 --> 00:46:25.161 imaging modalities that assess for
NOTE Confidence: 0.764466759583334

00:46:25.161 --> 00:46:27.136 transthyretin amyloidosis more awareness of
NOTE Confidence: 0.764466759583334

00:46:27.136 --> 00:46:29.590 the condition and some detailed studies,
NOTE Confidence: 0.764466759583334

00:46:29.590 --> 00:46:31.613 some of which we've been working on
NOTE Confidence: 0.764466759583334

00:46:31.613 --> 00:46:33.976 at Mayo of older non selected autopsy
NOTE Confidence: 0.764466759583334

00:46:33.976 --> 00:46:36.542 material that a TTR amyloid is is
NOTE Confidence: 0.764466759583334

00:46:36.542 --> 00:46:38.654 actually far more common than the
NOTE Confidence: 0.764466759583334

00:46:38.654 --> 00:46:41.030 light chain variety and it increases as
NOTE Confidence: 0.764466759583334

00:46:41.030 --> 00:46:43.544 you get older in fact an individuals
NOTE Confidence: 0.764466759583334

00:46:43.544 --> 00:46:46.250 over 90 nearly or little more.
NOTE Confidence: 0.764466759583334

00:46:46.250 --> 00:46:49.466 And 1/3 of individuals will have
NOTE Confidence: 0.764466759583334

00:46:49.466 --> 00:46:50.538 cardiac amyloidosis.
NOTE Confidence: 0.764466759583334

00:46:50.540 --> 00:46:54.544 They'll have TTR amyloid within their heart.
NOTE Confidence: 0.764466759583334

00:46:54.550 --> 00:46:56.722 This obviously the the the other
NOTE Confidence: 0.764466759583334

00:46:56.722 --> 00:46:59.090 dictum that is been held over the

NOTE Confidence: 0.764466759583334

00:46:59.090 --> 00:47:01.010 years is that this was exclusively

NOTE Confidence: 0.764466759583334

00:47:01.079 --> 00:47:02.287 a disease among men,

NOTE Confidence: 0.764466759583334

00:47:02.290 --> 00:47:03.815 largely because our our screening

NOTE Confidence: 0.764466759583334

00:47:03.815 --> 00:47:05.694 bias has been toward the symptoms

NOTE Confidence: 0.764466759583334

00:47:05.694 --> 00:47:07.759 men exhibit with this type of heart

NOTE Confidence: 0.764466759583334

00:47:07.759 --> 00:47:09.707 disease and has ignored the symptoms

NOTE Confidence: 0.764466759583334

00:47:09.707 --> 00:47:11.663 women present with with this disease.

NOTE Confidence: 0.764466759583334

00:47:11.670 --> 00:47:14.064 When you carefully look for at

NOTE Confidence: 0.764466759583334

00:47:14.064 --> 00:47:15.660 the myocardium 4 amyloidosis,

NOTE Confidence: 0.764466759583334

00:47:15.660 --> 00:47:18.378 what you find is that there actually is not.

NOTE Confidence: 0.764466759583334

00:47:18.380 --> 00:47:20.964 This is not exclusively a disease of men,

NOTE Confidence: 0.764466759583334

00:47:20.970 --> 00:47:23.970 but women too are affected by this disease.

NOTE Confidence: 0.764466759583334

00:47:23.970 --> 00:47:25.320 Certainly there is a male.

NOTE Confidence: 0.764466759583334

00:47:25.320 --> 00:47:27.078 That election for the disease usually

NOTE Confidence: 0.764466759583334

00:47:27.078 --> 00:47:29.171 2 to one when you look between

NOTE Confidence: 0.764466759583334

00:47:29.171 --> 00:47:30.606 70 and 90 for instance.
NOTE Confidence: 0.764466759583334

00:47:30.610 --> 00:47:32.710 But women do still get this
NOTE Confidence: 0.764466759583334

00:47:32.710 --> 00:47:34.110 disease and not insignificantly
NOTE Confidence: 0.764466759583334

00:47:34.171 --> 00:47:36.067 given how common the disease is,
NOTE Confidence: 0.764466759583334

00:47:36.070 --> 00:47:38.018 like we mentioned before.
NOTE Confidence: 0.764466759583334

00:47:38.018 --> 00:47:39.966 The properties of amyloid,
NOTE Confidence: 0.764466759583334

00:47:39.970 --> 00:47:41.657 as I discussed with the residents at
NOTE Confidence: 0.764466759583334

00:47:41.657 --> 00:47:42.950 our teaching conference this morning,
NOTE Confidence: 0.764466759583334

00:47:42.950 --> 00:47:45.110 do allow you to to at least get
NOTE Confidence: 0.764466759583334

00:47:45.110 --> 00:47:47.341 hints at it by light microscopy
NOTE Confidence: 0.764466759583334

00:47:47.341 --> 00:47:49.366 before you do special staining.
NOTE Confidence: 0.764466759583334

00:47:49.370 --> 00:47:50.614 Differentiating it from collagen
NOTE Confidence: 0.764466759583334

00:47:50.614 --> 00:47:51.547 can be difficult,
NOTE Confidence: 0.764466759583334

00:47:51.550 --> 00:47:53.434 but some of the differentiating features
NOTE Confidence: 0.764466759583334

00:47:53.434 --> 00:47:55.534 are that collagen tends to be more
NOTE Confidence: 0.764466759583334

00:47:55.534 --> 00:47:57.106 fibrillar and amyloid tends to crack.

NOTE Confidence: 0.764466759583334

00:47:57.110 --> 00:47:59.973 It creates linear cracks all through that

NOTE Confidence: 0.764466759583334

00:47:59.973 --> 00:48:03.960 homogeneous or glassy extracellular protein.

NOTE Confidence: 0.764466759583334

00:48:03.960 --> 00:48:05.710 Course special staining with Congo

NOTE Confidence: 0.764466759583334

00:48:05.710 --> 00:48:07.460 red intercalates that beta pleated

NOTE Confidence: 0.764466759583334

00:48:07.515 --> 00:48:08.910 sheet structure stains the tissue

NOTE Confidence: 0.764466759583334

00:48:08.910 --> 00:48:11.151 red and then when you put it between

NOTE Confidence: 0.764466759583334

00:48:11.151 --> 00:48:12.735 cross polarized light it will tend

NOTE Confidence: 0.764466759583334

00:48:12.735 --> 00:48:14.452 to manifest with a birefringent

NOTE Confidence: 0.764466759583334

00:48:14.452 --> 00:48:16.630 pattern that is often apple green

NOTE Confidence: 0.792152646

00:48:16.695 --> 00:48:18.220 or yellow green in colour.

NOTE Confidence: 0.792152646

00:48:18.220 --> 00:48:20.356 Other stains can be employed here.

NOTE Confidence: 0.792152646

00:48:20.360 --> 00:48:21.758 Congo red can be a technically

NOTE Confidence: 0.792152646

00:48:21.758 --> 00:48:23.257 challenging stand to do things like

NOTE Confidence: 0.792152646

00:48:23.257 --> 00:48:24.811 methyl Violet and sulfated El Shablu

NOTE Confidence: 0.792152646

00:48:24.811 --> 00:48:26.294 which we've already talked about can

NOTE Confidence: 0.792152646

00:48:26.294 --> 00:48:28.026 be very helpful in the heart because
NOTE Confidence: 0.792152646

00:48:28.026 --> 00:48:30.518 the amyloid protein stands out in such
NOTE Confidence: 0.792152646

00:48:30.518 --> 00:48:32.365 stark differential to the surrounding
NOTE Confidence: 0.792152646

00:48:32.365 --> 00:48:34.150 myocardium these stains are less.
NOTE Confidence: 0.792152646

00:48:34.150 --> 00:48:36.542 Hopeful in the kidney and the lung where
NOTE Confidence: 0.792152646

00:48:36.542 --> 00:48:38.410 there are the mucopolysaccharide that
NOTE Confidence: 0.792152646

00:48:38.410 --> 00:48:41.217 hangs around with amyloid is present as
NOTE Confidence: 0.792152646

00:48:41.283 --> 00:48:43.435 well normally and so you can get some
NOTE Confidence: 0.792152646

00:48:43.435 --> 00:48:47.070 loss of your specificity in those organs.
NOTE Confidence: 0.792152646

00:48:47.070 --> 00:48:48.744 None of the histologic patterns that
NOTE Confidence: 0.792152646

00:48:48.744 --> 00:48:50.732 we see with amyloid are sufficient to
NOTE Confidence: 0.792152646

00:48:50.732 --> 00:48:52.650 type them by way of light microscopy.
NOTE Confidence: 0.792152646

00:48:52.650 --> 00:48:54.522 Lots of different typing strategies have
NOTE Confidence: 0.792152646

00:48:54.522 --> 00:48:56.583 been employed over the years to figure
NOTE Confidence: 0.792152646

00:48:56.583 --> 00:48:58.850 out what protein is causal in these patients.
NOTE Confidence: 0.792152646

00:48:58.850 --> 00:49:00.482 Things like looking at the patient

NOTE Confidence: 0.792152646

00:49:00.482 --> 00:49:02.267 serum to get an understanding of

NOTE Confidence: 0.792152646

00:49:02.267 --> 00:49:04.514 whether or not they have free light

NOTE Confidence: 0.792152646

00:49:04.514 --> 00:49:06.436 chains has been employed, for instance.

NOTE Confidence: 0.792152646

00:49:06.436 --> 00:49:07.851 These are indirect measures of

NOTE Confidence: 0.792152646

00:49:07.851 --> 00:49:09.429 figuring out what the amyloid is.

NOTE Confidence: 0.792152646

00:49:09.430 --> 00:49:12.209 But because of the commonality of monoclonal

NOTE Confidence: 0.792152646

00:49:12.209 --> 00:49:14.190 gammopathy of undetermined significance,

NOTE Confidence: 0.792152646

00:49:14.190 --> 00:49:15.490 these do not always correlate

NOTE Confidence: 0.792152646

00:49:15.490 --> 00:49:17.170 with the amyloid type that we see.

NOTE Confidence: 0.792152646

00:49:17.170 --> 00:49:19.306 Lots of people out there who are in

NOTE Confidence: 0.792152646

00:49:19.306 --> 00:49:21.559 their 90s who have a gammopathy that's

NOTE Confidence: 0.792152646

00:49:21.560 --> 00:49:24.492 seemingly completely idiosyncratic and

NOTE Confidence: 0.792152646

00:49:24.492 --> 00:49:28.385 unrelated to the fact that they have

NOTE Confidence: 0.792152646

00:49:28.385 --> 00:49:30.325 potentially TTR amyloid underneath.

NOTE Confidence: 0.792152646

00:49:30.330 --> 00:49:32.850 Immunostains have long been used.

NOTE Confidence: 0.792152646

00:49:32.850 --> 00:49:34.746 Anybody who's tried to do immunostains
NOTE Confidence: 0.792152646

00:49:34.746 --> 00:49:36.646 to type amyloid can attest to
NOTE Confidence: 0.792152646

00:49:36.646 --> 00:49:38.086 the difficulty in doing so.
NOTE Confidence: 0.792152646

00:49:38.090 --> 00:49:40.390 Obviously on the pro side,
NOTE Confidence: 0.792152646

00:49:40.390 --> 00:49:42.025 we're all familiar with Immunostains
NOTE Confidence: 0.792152646

00:49:42.025 --> 00:49:43.333 from a diagnostic standpoint
NOTE Confidence: 0.792152646

00:49:43.333 --> 00:49:44.747 and as a rapid turnaround,
NOTE Confidence: 0.792152646

00:49:44.750 --> 00:49:46.458 we all have the equipment to do
NOTE Confidence: 0.792152646

00:49:46.458 --> 00:49:48.209 immunostains and most of our clinical labs.
NOTE Confidence: 0.792152646

00:49:48.210 --> 00:49:49.284 The problem is that if you're
NOTE Confidence: 0.792152646

00:49:49.284 --> 00:49:50.550 going to get really type specific,
NOTE Confidence: 0.792152646

00:49:50.550 --> 00:49:52.278 you kind of need large antibody
NOTE Confidence: 0.792152646

00:49:52.278 --> 00:49:53.810 panels for those rare cases,
NOTE Confidence: 0.792152646

00:49:53.810 --> 00:49:54.028 high,
NOTE Confidence: 0.792152646

00:49:54.028 --> 00:49:55.118 high background staining which causes
NOTE Confidence: 0.792152646

00:49:55.118 --> 00:49:56.769 you to look at a bunch of different

NOTE Confidence: 0.792152646

00:49:56.769 --> 00:49:57.910 stains and kind of say, well,

NOTE Confidence: 0.792152646

00:49:57.910 --> 00:49:59.670 I think this one might be staining more,

NOTE Confidence: 0.792152646

00:49:59.670 --> 00:50:00.720 not really sure.

NOTE Confidence: 0.792152646

00:50:00.720 --> 00:50:01.770 It's it's tough,

NOTE Confidence: 0.792152646

00:50:01.770 --> 00:50:03.430 and oftentimes there's kind of

NOTE Confidence: 0.792152646

00:50:03.430 --> 00:50:05.578 a wigi board involved in the

NOTE Confidence: 0.792152646

00:50:05.578 --> 00:50:07.270 interpretation of these things.

NOTE Confidence: 0.792152646

00:50:07.270 --> 00:50:09.230 So lots of papers out there that

NOTE Confidence: 0.792152646

00:50:09.230 --> 00:50:11.228 attest to how difficult this is.

NOTE Confidence: 0.792152646

00:50:11.230 --> 00:50:12.196 Enter mass spectrometry.

NOTE Confidence: 0.792152646

00:50:12.196 --> 00:50:14.450 This was a technology that was really

NOTE Confidence: 0.792152646

00:50:14.508 --> 00:50:16.848 pioneered by Mayo about a decade and 1/2 ago.

NOTE Confidence: 0.792152646

00:50:16.850 --> 00:50:19.050 Now it has the strength of being reliable

NOTE Confidence: 0.792152646

00:50:19.050 --> 00:50:21.428 and it's a direct measure of the protein.

NOTE Confidence: 0.792152646

00:50:21.430 --> 00:50:23.410 And so we can micro dissect out the tissue,

NOTE Confidence: 0.792152646

00:50:23.410 --> 00:50:25.042 send it through the mass spectrometer
NOTE Confidence: 0.792152646

00:50:25.042 --> 00:50:26.958 and get a very detailed report
NOTE Confidence: 0.792152646

00:50:26.958 --> 00:50:28.873 on the protein constituency of
NOTE Confidence: 0.792152646

00:50:28.873 --> 00:50:30.390 those laser microdissected areas.
NOTE Confidence: 0.792152646

00:50:30.390 --> 00:50:31.622 The problems, of course,
NOTE Confidence: 0.792152646

00:50:31.622 --> 00:50:33.470 is that it has limited availability.
NOTE Confidence: 0.792152646

00:50:33.470 --> 00:50:34.289 Really we're the,
NOTE Confidence: 0.792152646

00:50:34.289 --> 00:50:35.927 there's only two or three labs
NOTE Confidence: 0.792152646

00:50:35.927 --> 00:50:37.599 in the country that do this.
NOTE Confidence: 0.792152646

00:50:37.600 --> 00:50:39.634 And it has a higher cost obviously than any
NOTE Confidence: 0.792152646

00:50:39.634 --> 00:50:41.566 most chemistry or those types of things.
NOTE Confidence: 0.792152646

00:50:41.570 --> 00:50:43.746 The cost has been bending down now it's
NOTE Confidence: 0.792152646

00:50:43.746 --> 00:50:46.070 now well under \$1000 in the turn around
NOTE Confidence: 0.792152646

00:50:46.070 --> 00:50:48.208 time is usually around a week or so.
NOTE Confidence: 0.792152646

00:50:48.210 --> 00:50:50.400 The way it's done is you look for areas of
NOTE Confidence: 0.804428049444444

00:50:50.458 --> 00:50:52.810 Congo red tissue on a plastic embedded slide,

NOTE Confidence: 0.804428049444444

00:50:52.810 --> 00:50:54.628 you micro dissector color in where

NOTE Confidence: 0.804428049444444

00:50:54.628 --> 00:50:56.490 all the Congo red tissue is.

NOTE Confidence: 0.804428049444444

00:50:56.490 --> 00:50:58.720 You tell the computer to fire a laser at it,

NOTE Confidence: 0.804428049444444

00:50:58.720 --> 00:50:59.920 the laser gets fired,

NOTE Confidence: 0.804428049444444

00:50:59.920 --> 00:51:02.090 the tissue that's Congo red positive melts,

NOTE Confidence: 0.804428049444444

00:51:02.090 --> 00:51:04.706 gets dropped into a dye that dies then

NOTE Confidence: 0.804428049444444

00:51:04.706 --> 00:51:06.045 proteolytically digested putting an

NOTE Confidence: 0.804428049444444

00:51:06.045 --> 00:51:07.917 spectrometer and you get a proteomic.

NOTE Confidence: 0.804428049444444

00:51:07.920 --> 00:51:09.152 Spectrum, that's compared to

NOTE Confidence: 0.804428049444444

00:51:09.152 --> 00:51:10.384 the Swiss Pro database,

NOTE Confidence: 0.804428049444444

00:51:10.390 --> 00:51:12.358 which tells you the proteins in

NOTE Confidence: 0.804428049444444

00:51:12.358 --> 00:51:14.130 highest abundance in that sample,

NOTE Confidence: 0.804428049444444

00:51:14.130 --> 00:51:15.715 one that's amyloidogenic that's in

NOTE Confidence: 0.804428049444444

00:51:15.715 --> 00:51:17.740 highest abundance is the causal protein.

NOTE Confidence: 0.804428049444444

00:51:17.740 --> 00:51:19.396 It's pretty simple in that regard.

NOTE Confidence: 0.804428049444444

00:51:19.400 --> 00:51:20.774 There's there is an art of
NOTE Confidence: 0.804428049444444

00:51:20.774 --> 00:51:21.690 course to the interpretation,
NOTE Confidence: 0.804428049444444

00:51:21.690 --> 00:51:24.620 but it's a pretty straightforward
NOTE Confidence: 0.804428049444444

00:51:24.620 --> 00:51:27.550 from a conceptual standpoint assay.
NOTE Confidence: 0.804428049444444

00:51:27.550 --> 00:51:28.714 On the horizon,
NOTE Confidence: 0.804428049444444

00:51:28.714 --> 00:51:30.654 digital pathology offers some new
NOTE Confidence: 0.804428049444444

00:51:30.654 --> 00:51:32.708 avenues for us to explore here.
NOTE Confidence: 0.804428049444444

00:51:32.710 --> 00:51:33.913 Take for instance,
NOTE Confidence: 0.804428049444444

00:51:33.913 --> 00:51:35.918 this technology of discrete frequency
NOTE Confidence: 0.804428049444444

00:51:35.918 --> 00:51:37.254 infrared spectroscopy that we've
NOTE Confidence: 0.804428049444444

00:51:37.254 --> 00:51:39.150 been playing with a lot as of late.
NOTE Confidence: 0.804428049444444

00:51:39.150 --> 00:51:42.422 This is a digital image analysis of an
NOTE Confidence: 0.804428049444444

00:51:42.422 --> 00:51:44.918 unstained section of tissue that we had,
NOTE Confidence: 0.804428049444444

00:51:44.920 --> 00:51:48.385 that we then assess using this discrete
NOTE Confidence: 0.804428049444444

00:51:48.385 --> 00:51:49.870 frequency infrared spectroscopy.
NOTE Confidence: 0.804428049444444

00:51:49.870 --> 00:51:51.202 The spectral shifts that are seen

NOTE Confidence: 0.804428049444444

00:51:51.202 --> 00:51:52.620 in different areas of the tissue

NOTE Confidence: 0.804428049444444

00:51:52.620 --> 00:51:54.072 allow the computer to very accurately

NOTE Confidence: 0.804428049444444

00:51:54.072 --> 00:51:55.492 predict the type of tissue that

NOTE Confidence: 0.804428049444444

00:51:55.492 --> 00:51:56.824 it's looking at in different areas.

NOTE Confidence: 0.804428049444444

00:51:56.830 --> 00:51:57.289 And in fact,

NOTE Confidence: 0.804428049444444

00:51:57.289 --> 00:51:58.360 we can tell the computer to do

NOTE Confidence: 0.804428049444444

00:51:58.397 --> 00:51:59.109 all kinds of things.

NOTE Confidence: 0.804428049444444

00:51:59.110 --> 00:51:59.742 That information,

NOTE Confidence: 0.804428049444444

00:51:59.742 --> 00:52:01.954 take for instance this deep faked HD

NOTE Confidence: 0.804428049444444

00:52:01.954 --> 00:52:04.099 that the computer has generated in

NOTE Confidence: 0.804428049444444

00:52:04.099 --> 00:52:05.869 relation to the spectral fingerprint

NOTE Confidence: 0.804428049444444

00:52:05.924 --> 00:52:08.066 that it got from that unstained section.

NOTE Confidence: 0.804428049444444

00:52:08.070 --> 00:52:09.890 We could do the same thing with

NOTE Confidence: 0.804428049444444

00:52:09.890 --> 00:52:10.932 immunohistochemical markers and we're

NOTE Confidence: 0.804428049444444

00:52:10.932 --> 00:52:12.660 trying to do the same thing with amyloid,

NOTE Confidence: 0.804428049444444

00:52:12.660 --> 00:52:13.282 for instance.
NOTE Confidence: 0.804428049444444

00:52:13.282 --> 00:52:15.148 Take for instance those areas in
NOTE Confidence: 0.804428049444444

00:52:15.148 --> 00:52:17.216 in the boxes there that actually
NOTE Confidence: 0.804428049444444

00:52:17.216 --> 00:52:18.596 have amyloid in them.
NOTE Confidence: 0.804428049444444

00:52:18.600 --> 00:52:20.427 We've shown now that those areas do
NOTE Confidence: 0.804428049444444

00:52:20.427 --> 00:52:22.487 have a different spectral property than
NOTE Confidence: 0.804428049444444

00:52:22.487 --> 00:52:24.527 collagen and other extracellular proteins.
NOTE Confidence: 0.804428049444444

00:52:24.530 --> 00:52:26.672 And so with a very high degree of accuracy,
NOTE Confidence: 0.804428049444444

00:52:26.680 --> 00:52:28.244 we can distinguish amyloid.
NOTE Confidence: 0.804428049444444

00:52:28.244 --> 00:52:30.590 From other types of tissue that
NOTE Confidence: 0.804428049444444

00:52:30.665 --> 00:52:33.080 are in the heart and make a
NOTE Confidence: 0.804428049444444

00:52:33.080 --> 00:52:34.572 diagnosis of amyloidosis based
NOTE Confidence: 0.804428049444444

00:52:34.572 --> 00:52:36.507 off of those spectral shifts.
NOTE Confidence: 0.804428049444444

00:52:36.510 --> 00:52:37.586 More to the point,
NOTE Confidence: 0.804428049444444

00:52:37.586 --> 00:52:39.540 we think that the technology has the
NOTE Confidence: 0.804428049444444

00:52:39.540 --> 00:52:41.250 potential to be so specific that

NOTE Confidence: 0.804428049444444

00:52:41.250 --> 00:52:43.076 can even speciate the protein that's

NOTE Confidence: 0.804428049444444

00:52:43.076 --> 00:52:44.912 present in the tissue there between

NOTE Confidence: 0.804428049444444

00:52:44.912 --> 00:52:46.604 the different types of amyloidogenic

NOTE Confidence: 0.804428049444444

00:52:46.604 --> 00:52:49.190 proteins and may afford us a new Ave.

NOTE Confidence: 0.804428049444444

00:52:49.190 --> 00:52:51.350 beyond mass spectrometry by which

NOTE Confidence: 0.804428049444444

00:52:51.350 --> 00:52:53.078 we can type amyloid.

NOTE Confidence: 0.804428049444444

00:52:53.080 --> 00:52:54.766 Amyloid deposits in the tissue and

NOTE Confidence: 0.804428049444444

00:52:54.766 --> 00:52:56.503 lots of different ways can deposit

NOTE Confidence: 0.804428049444444

00:52:56.503 --> 00:52:58.189 in big clumps and nodular aggregates

NOTE Confidence: 0.804428049444444

00:52:58.189 --> 00:52:59.957 like you see there in between the

NOTE Confidence: 0.804428049444444

00:52:59.957 --> 00:53:01.396 cells where it kind of strangles

NOTE Confidence: 0.804428049444444

00:53:01.396 --> 00:53:01.948 the myocytes,

NOTE Confidence: 0.804428049444444

00:53:01.948 --> 00:53:03.880 you can understand why it has the

NOTE Confidence: 0.804428049444444

00:53:03.932 --> 00:53:05.556 effect that it does on hard on

NOTE Confidence: 0.804428049444444

00:53:05.556 --> 00:53:07.159 heart filling and then in a vascular

NOTE Confidence: 0.804428049444444

00:53:07.159 --> 00:53:09.002 sense as well it can fill up the
NOTE Confidence: 0.804428049444444

00:53:09.002 --> 00:53:10.688 blood vessels and cause a schematic
NOTE Confidence: 0.804428049444444

00:53:10.688 --> 00:53:11.650 microvascular disease as well.
NOTE Confidence: 0.804428049444444

00:53:11.650 --> 00:53:13.234 The problem is all different types
NOTE Confidence: 0.804428049444444

00:53:13.234 --> 00:53:15.189 of amyloid can have all of these
NOTE Confidence: 0.804428049444444

00:53:15.189 --> 00:53:16.887 patterns and so again that histologic
NOTE Confidence: 0.804428049444444

00:53:16.887 --> 00:53:18.697 pattern is just not enough for us to
NOTE Confidence: 0.804428049444444

00:53:18.697 --> 00:53:21.134 usually get to a type specific diagnosis.
NOTE Confidence: 0.804428049444444

00:53:21.134 --> 00:53:22.938 There is however one.
NOTE Confidence: 0.804428049444444

00:53:22.940 --> 00:53:24.845 Notable exception and that's the
NOTE Confidence: 0.804428049444444

00:53:24.845 --> 00:53:26.750 type of amyloid that results
NOTE Confidence: 0.832168341428572

00:53:26.813 --> 00:53:28.749 from atrial natriuretic factor,
NOTE Confidence: 0.832168341428572

00:53:28.750 --> 00:53:30.710 the protein that the atrial
NOTE Confidence: 0.832168341428572

00:53:30.710 --> 00:53:31.886 myocytes naturally produce.
NOTE Confidence: 0.832168341428572

00:53:31.890 --> 00:53:35.316 It produces an amyloid that is
NOTE Confidence: 0.832168341428572

00:53:35.316 --> 00:53:37.029 morphologically distinct from

NOTE Confidence: 0.832168341428572
00:53:37.030 --> 00:53:38.287 run-of-the-mill TRL Amala.
NOTE Confidence: 0.832168341428572
00:53:38.287 --> 00:53:40.382 Take for instance this example
NOTE Confidence: 0.832168341428572
00:53:40.382 --> 00:53:43.008 where we had two different amyloids.
NOTE Confidence: 0.832168341428572
00:53:43.010 --> 00:53:44.970 He's an A&F type amyloid on the right
NOTE Confidence: 0.832168341428572
00:53:44.970 --> 00:53:47.435 in the same part and you can start to
NOTE Confidence: 0.832168341428572
00:53:47.435 --> 00:53:49.320 appreciate some of the morphologic
NOTE Confidence: 0.832168341428572
00:53:49.320 --> 00:53:50.826 dissimilarities between them.
NOTE Confidence: 0.832168341428572
00:53:50.830 --> 00:53:52.588 The NF type amyloid is tends
NOTE Confidence: 0.832168341428572
00:53:52.588 --> 00:53:53.760 to be darker staining.
NOTE Confidence: 0.832168341428572
00:53:53.760 --> 00:53:55.410 Is to be more force,
NOTE Confidence: 0.832168341428572
00:53:55.410 --> 00:53:57.360 a little bit more cordlike and
NOTE Confidence: 0.832168341428572
00:53:57.360 --> 00:53:59.489 fibrillar than the A TTR amyloid.
NOTE Confidence: 0.832168341428572
00:53:59.490 --> 00:54:01.110 So NF type amyloid fortunately
NOTE Confidence: 0.832168341428572
00:54:01.110 --> 00:54:03.059 is something that we think we
NOTE Confidence: 0.832168341428572
00:54:03.059 --> 00:54:05.195 can pick up on just by its light
NOTE Confidence: 0.832168341428572

00:54:05.195 --> 00:54:06.150 microscopic appearance.
NOTE Confidence: 0.832168341428572

00:54:06.150 --> 00:54:08.033 And that's good because it turns out
NOTE Confidence: 0.832168341428572

00:54:08.033 --> 00:54:09.976 that the finding of ANF type amyloid
NOTE Confidence: 0.832168341428572

00:54:09.976 --> 00:54:11.590 does not come with the prognostic
NOTE Confidence: 0.832168341428572

00:54:11.649 --> 00:54:13.889 implications that other types of amyloid do.
NOTE Confidence: 0.832168341428572

00:54:13.890 --> 00:54:15.366 While it's more common in women,
NOTE Confidence: 0.832168341428572

00:54:15.370 --> 00:54:17.270 more common with older age,
NOTE Confidence: 0.832168341428572

00:54:17.270 --> 00:54:18.854 and more common in the setting
NOTE Confidence: 0.832168341428572

00:54:18.854 --> 00:54:19.646 of atrial fibrillation,
NOTE Confidence: 0.832168341428572

00:54:19.650 --> 00:54:21.960 it does not portend any difference
NOTE Confidence: 0.832168341428572

00:54:21.960 --> 00:54:22.730 in survival,
NOTE Confidence: 0.832168341428572

00:54:22.730 --> 00:54:23.846 any degree of disease.
NOTE Confidence: 0.832168341428572

00:54:23.846 --> 00:54:26.160 Recurrence in the form of Afib recurrence,
NOTE Confidence: 0.832168341428572

00:54:26.160 --> 00:54:27.666 any form of heart failure or
NOTE Confidence: 0.832168341428572

00:54:27.666 --> 00:54:28.419 anything like that.
NOTE Confidence: 0.832168341428572

00:54:28.420 --> 00:54:31.270 So if we see a NF type amyloid in the heart,

NOTE Confidence: 0.832168341428572
00:54:31.270 --> 00:54:32.590 we can basically write that
NOTE Confidence: 0.832168341428572
00:54:32.590 --> 00:54:34.120 off and not worry about it.
NOTE Confidence: 0.832168341428572
00:54:34.120 --> 00:54:36.090 And so not having the mass spec all of those,
NOTE Confidence: 0.832168341428572
00:54:36.090 --> 00:54:37.637 given how common this is seen in
NOTE Confidence: 0.832168341428572
00:54:37.637 --> 00:54:39.219 about half of atrial appendages,
NOTE Confidence: 0.832168341428572
00:54:39.220 --> 00:54:40.702 it's good that there's a feature
NOTE Confidence: 0.832168341428572
00:54:40.702 --> 00:54:42.412 that allows us to to pick that
NOTE Confidence: 0.832168341428572
00:54:42.412 --> 00:54:43.966 up and basically skirt it off to
NOTE Confidence: 0.832168341428572
00:54:44.025 --> 00:54:45.360 the side without incurring great
NOTE Confidence: 0.832168341428572
00:54:45.360 --> 00:54:47.132 costs on all of these cases.
NOTE Confidence: 0.832168341428572
00:54:47.132 --> 00:54:49.724 So back to our index case,
NOTE Confidence: 0.832168341428572
00:54:49.730 --> 00:54:50.900 this was the case again
NOTE Confidence: 0.832168341428572
00:54:50.900 --> 00:54:51.836 from the atrial appendage.
NOTE Confidence: 0.832168341428572
00:54:51.840 --> 00:54:53.184 I hope you'll note now that it
NOTE Confidence: 0.832168341428572
00:54:53.184 --> 00:54:54.939 has a bit of that course darkly
NOTE Confidence: 0.832168341428572

00:54:54.939 --> 00:54:56.067 staining character to it.
NOTE Confidence: 0.832168341428572

00:54:56.070 --> 00:54:57.390 And this is very indicative
NOTE Confidence: 0.832168341428572

00:54:57.390 --> 00:54:58.710 of a NF type amyloid.
NOTE Confidence: 0.832168341428572

00:54:58.710 --> 00:55:00.530 So given that morphologic appearance,
NOTE Confidence: 0.832168341428572

00:55:00.530 --> 00:55:03.932 we can make the diagnosis of isolated
NOTE Confidence: 0.832168341428572

00:55:03.932 --> 00:55:07.038 atrial amyloidosis of the A and appetite.
NOTE Confidence: 0.832168341428572

00:55:07.040 --> 00:55:08.720 So we've covered a lot of ground,
NOTE Confidence: 0.832168341428572

00:55:08.720 --> 00:55:10.220 a lot of disparate ground,
NOTE Confidence: 0.832168341428572

00:55:10.220 --> 00:55:11.816 lots of different topics this morning,
NOTE Confidence: 0.832168341428572

00:55:11.820 --> 00:55:13.656 all kind of with our common
NOTE Confidence: 0.832168341428572

00:55:13.656 --> 00:55:14.880 thread around heart disease,
NOTE Confidence: 0.832168341428572

00:55:14.880 --> 00:55:17.118 I guess more generically in our
NOTE Confidence: 0.832168341428572

00:55:17.118 --> 00:55:19.491 Valentine's Day theme, as it were.
NOTE Confidence: 0.832168341428572

00:55:19.491 --> 00:55:21.576 We talked about the cardiovascular
NOTE Confidence: 0.832168341428572

00:55:21.576 --> 00:55:23.090 implications of COVID-19,
NOTE Confidence: 0.832168341428572

00:55:23.090 --> 00:55:24.662 specifically from infection and

NOTE Confidence: 0.832168341428572
00:55:24.662 --> 00:55:27.020 vaccination and why the case for
NOTE Confidence: 0.832168341428572
00:55:27.086 --> 00:55:28.961 vaccination can clearly be made
NOTE Confidence: 0.832168341428572
00:55:28.961 --> 00:55:30.836 by the pathologic and imaging
NOTE Confidence: 0.832168341428572
00:55:30.898 --> 00:55:32.250 data that's out there.
NOTE Confidence: 0.832168341428572
00:55:32.250 --> 00:55:34.362 The new updates to the classification
NOTE Confidence: 0.832168341428572
00:55:34.362 --> 00:55:36.385 system for cardiac tumors as described
NOTE Confidence: 0.832168341428572
00:55:36.385 --> 00:55:38.617 by The Who and then some newer trends
NOTE Confidence: 0.832168341428572
00:55:38.678 --> 00:55:40.688 in the diagnosis of cardiac amyloid.
NOTE Confidence: 0.832168341428572
00:55:40.690 --> 00:55:43.049 I thank you all for this wonderful
NOTE Confidence: 0.832168341428572
00:55:43.049 --> 00:55:44.924 invitation and your very kind
NOTE Confidence: 0.832168341428572
00:55:44.924 --> 00:55:46.508 attention during this topic,
NOTE Confidence: 0.832168341428572
00:55:46.510 --> 00:55:48.280 which I recognize maybe foreign to
NOTE Confidence: 0.832168341428572
00:55:48.280 --> 00:55:49.165 many of you.
NOTE Confidence: 0.832168341428572
00:55:49.170 --> 00:55:50.280 So thank you very much.
NOTE Confidence: 0.890494409375
00:55:54.480 --> 00:55:56.920 I would be remiss if I didn't also
NOTE Confidence: 0.890494409375

00:55:56.920 --> 00:55:59.418 mention back at home my team of wonderful

NOTE Confidence: 0.890494409375

00:55:59.420 --> 00:56:00.924 cardiovascular pathologists that I

NOTE Confidence: 0.890494409375

00:56:00.924 --> 00:56:03.555 work with kind of a subdivision of

NOTE Confidence: 0.890494409375

00:56:03.555 --> 00:56:05.457 a thoracic pathology at Mayo Clinic.

NOTE Confidence: 0.890494409375

00:56:05.460 --> 00:56:06.764 These five individuals all

NOTE Confidence: 0.890494409375

00:56:06.764 --> 00:56:08.394 do cardiac pathology with me,

NOTE Confidence: 0.890494409375

00:56:08.400 --> 00:56:10.100 doctor Christine Aubrey, Andrew Lehman,

NOTE Confidence: 0.890494409375

00:56:10.100 --> 00:56:11.680 Melanie Boys and in Chino.

NOTE Confidence: 0.890494409375

00:56:11.680 --> 00:56:13.544 And without them none of what I talked

NOTE Confidence: 0.890494409375

00:56:13.544 --> 00:56:15.137 about today would even be possible.

NOTE Confidence: 0.890494409375

00:56:15.140 --> 00:56:18.038 So they are an amazing team of not just

NOTE Confidence: 0.890494409375

00:56:18.038 --> 00:56:19.920 colleagues, but very, very close friends.

NOTE Confidence: 0.890494409375

00:56:19.920 --> 00:56:21.648 And I love each and every one of them.

NOTE Confidence: 0.890494409375

00:56:21.650 --> 00:56:22.970 They all have my hearts.

NOTE Confidence: 0.890494409375

00:56:22.970 --> 00:56:23.828 As it were.

NOTE Confidence: 0.890494409375

00:56:23.828 --> 00:56:24.686 So thank you.

NOTE Confidence: 0.746804111666667
00:56:32.410 --> 00:56:33.430 I have a question.
NOTE Confidence: 0.746804111666667
00:56:33.430 --> 00:56:35.937 Can you just stand for the BRK to
NOTE Confidence: 0.746804111666667
00:56:35.937 --> 00:56:38.079 engage the violent loss in intra?
NOTE Confidence: 0.746804111666667
00:56:38.080 --> 00:56:39.941 You show us a fruitful picture, correct.
NOTE Confidence: 0.746804111666667
00:56:39.941 --> 00:56:42.398 I have tried twice in the press
NOTE Confidence: 0.746804111666667
00:56:42.400 --> 00:56:44.080 and it's very hard to intervene.
NOTE Confidence: 0.746804111666667
00:56:44.080 --> 00:56:45.753 So how can you tell us more
NOTE Confidence: 0.746804111666667
00:56:45.753 --> 00:56:46.770 about your experience with
NOTE Confidence: 0.746804111666667
00:56:46.770 --> 00:56:48.030 intracardiac so mad that I
NOTE Confidence: 0.763364018
00:56:48.040 --> 00:56:50.332 see. Yeah. The the titration for
NOTE Confidence: 0.763364018
00:56:50.332 --> 00:56:51.860 that antibody was challenging,
NOTE Confidence: 0.763364018
00:56:51.860 --> 00:56:52.468 very challenging.
NOTE Confidence: 0.763364018
00:56:52.468 --> 00:56:55.324 We spent a lot of time on the titration
NOTE Confidence: 0.763364018
00:56:55.324 --> 00:56:58.196 and we do recognize that in some organs,
NOTE Confidence: 0.763364018
00:56:58.200 --> 00:56:59.238 the breast is one of them.
NOTE Confidence: 0.763364018

00:56:59.240 --> 00:57:00.620 The skin has been another.
NOTE Confidence: 0.763364018

00:57:00.620 --> 00:57:01.448 Challenging place.
NOTE Confidence: 0.763364018

00:57:01.448 --> 00:57:03.932 We sometimes have to modify the
NOTE Confidence: 0.763364018

00:57:03.932 --> 00:57:05.163 titration characteristics until
NOTE Confidence: 0.763364018

00:57:05.163 --> 00:57:06.888 we get good background standing,
NOTE Confidence: 0.763364018

00:57:06.890 --> 00:57:07.952 solid background staining
NOTE Confidence: 0.763364018

00:57:07.952 --> 00:57:09.368 that we're comfortable with.
NOTE Confidence: 0.763364018

00:57:09.370 --> 00:57:11.232 So yeah, it it really is about
NOTE Confidence: 0.763364018

00:57:11.232 --> 00:57:12.030 antibody titration there.
NOTE Confidence: 0.671979911666667

00:57:16.160 --> 00:57:18.200 Joe, I asked questions with the
NOTE Confidence: 0.671979911666667

00:57:18.200 --> 00:57:20.831 new schema. Yeah, So what do we
NOTE Confidence: 0.671979911666667

00:57:20.831 --> 00:57:23.290 know about how we use don't use.
NOTE Confidence: 0.870632807272727

00:57:25.640 --> 00:57:26.985 Very little, very little has
NOTE Confidence: 0.870632807272727

00:57:26.985 --> 00:57:28.620 been known or studied about them.
NOTE Confidence: 0.870632807272727

00:57:28.620 --> 00:57:30.110 It's definitely a topic that
NOTE Confidence: 0.870632807272727

00:57:30.110 --> 00:57:31.600 needs to be looked into.

NOTE Confidence: 0.870632807272727
00:57:31.600 --> 00:57:32.617 Yeah. It's interesting.
NOTE Confidence: 0.870632807272727
00:57:32.617 --> 00:57:34.651 A lot of cardiac tumors tend
NOTE Confidence: 0.870632807272727
00:57:34.651 --> 00:57:36.719 to take on a myxoid character.
NOTE Confidence: 0.870632807272727
00:57:36.720 --> 00:57:40.066 And the hypothesis behind that has long
NOTE Confidence: 0.870632807272727
00:57:40.066 --> 00:57:42.800 been that basically cardiac tumors,
NOTE Confidence: 0.870632807272727
00:57:42.800 --> 00:57:44.280 more so than most tumors,
NOTE Confidence: 0.870632807272727
00:57:44.280 --> 00:57:46.790 are subject to constant mechanical
NOTE Confidence: 0.870632807272727
00:57:46.790 --> 00:57:48.596 and hemodynamic injury, right.
NOTE Confidence: 0.870632807272727
00:57:48.596 --> 00:57:49.780 They're basically in washing
NOTE Confidence: 0.870632807272727
00:57:49.780 --> 00:57:50.964 machines all day long.
NOTE Confidence: 0.870632807272727
00:57:50.970 --> 00:57:52.138 They're getting battered about.
NOTE Confidence: 0.870632807272727
00:57:52.138 --> 00:57:53.598 They're in an aqueous medium.
NOTE Confidence: 0.870632807272727
00:57:53.600 --> 00:57:55.095 They're serum elements that are
NOTE Confidence: 0.870632807272727
00:57:55.095 --> 00:57:57.236 transiting in and out of the tumor
NOTE Confidence: 0.870632807272727
00:57:57.236 --> 00:57:59.000 as these things are beaten around.
NOTE Confidence: 0.870632807272727

00:57:59.000 --> 00:58:00.760 And so people have attributed
NOTE Confidence: 0.870632807272727

00:58:00.760 --> 00:58:02.520 the myxoid nature of cardiac.
NOTE Confidence: 0.870632807272727

00:58:02.520 --> 00:58:03.712 Numbers to that effect.
NOTE Confidence: 0.870632807272727

00:58:03.712 --> 00:58:05.202 Whether that plays a role,
NOTE Confidence: 0.870632807272727

00:58:05.210 --> 00:58:06.266 I don't know,
NOTE Confidence: 0.870632807272727

00:58:06.266 --> 00:58:08.378 or whether it's the myxoma cells
NOTE Confidence: 0.870632807272727

00:58:08.378 --> 00:58:10.248 elaborating that music on their own.
NOTE Confidence: 0.870632807272727

00:58:10.250 --> 00:58:12.800 All good questions.
NOTE Confidence: 0.870632807272727

00:58:12.800 --> 00:58:14.092 It's very hard,
NOTE Confidence: 0.870632807272727

00:58:14.092 --> 00:58:14.488 very
NOTE Confidence: 0.531615550833333

00:58:14.500 --> 00:58:16.138 difficult identify that
NOTE Confidence: 0.531615550833333

00:58:16.138 --> 00:58:17.776 subnormal counter problem.
NOTE Confidence: 0.7166653325

00:58:18.540 --> 00:58:19.756 Indeed. Yeah. There's nothing,
NOTE Confidence: 0.7166653325

00:58:19.756 --> 00:58:20.972 nothing like that that's
NOTE Confidence: 0.7166653325

00:58:20.972 --> 00:58:22.080 normally in the heart.
NOTE Confidence: 0.7166653325

00:58:22.080 --> 00:58:24.240 You're exactly right.

NOTE Confidence: 0.7166653325

00:58:24.240 --> 00:58:26.850 It's real challenge. Yeah.

NOTE Confidence: 0.708245004615385

00:58:27.280 --> 00:58:29.702 When you spoke about the changes that

NOTE Confidence: 0.708245004615385

00:58:29.702 --> 00:58:31.958 they saw imaging on probably right.

NOTE Confidence: 0.708245004615385

00:58:31.960 --> 00:58:34.714 So the prevalence that of positive

NOTE Confidence: 0.708245004615385

00:58:34.714 --> 00:58:37.236 cases by imaging and their

NOTE Confidence: 0.708245004615385

00:58:37.236 --> 00:58:39.640 cases of positive myocarditis,

NOTE Confidence: 0.708245004615385

00:58:39.640 --> 00:58:42.660 they are not the same amount, correct.

NOTE Confidence: 0.708245004615385

00:58:42.660 --> 00:58:45.487 So any idea on what were they looking,

NOTE Confidence: 0.7106326345

00:58:45.500 --> 00:58:46.668 what are they seeing?

NOTE Confidence: 0.7106326345

00:58:46.668 --> 00:58:47.836 That's a great question.

NOTE Confidence: 0.7106326345

00:58:47.840 --> 00:58:49.875 So imaging diagnosis relating to

NOTE Confidence: 0.7106326345

00:58:49.875 --> 00:58:51.910 myocarditis are largely contingent upon

NOTE Confidence: 0.7106326345

00:58:51.966 --> 00:58:54.336 something called the Lake Louise criteria,

NOTE Confidence: 0.7106326345

00:58:54.340 --> 00:58:56.770 which in part related to delayed.

NOTE Confidence: 0.7106326345

00:58:56.770 --> 00:58:58.633 We'll get a line enhanced and host of things.

NOTE Confidence: 0.7106326345

00:58:58.640 --> 00:59:00.715 What they're saying on imaging

NOTE Confidence: 0.7106326345

00:59:00.715 --> 00:59:03.253 is that there's something in the

NOTE Confidence: 0.7106326345

00:59:03.253 --> 00:59:05.188 heart beyond just the normal.

NOTE Confidence: 0.7106326345

00:59:05.190 --> 00:59:07.686 Heart muscle that can be edema,

NOTE Confidence: 0.7106326345

00:59:07.690 --> 00:59:08.778 that can be inflammation,

NOTE Confidence: 0.7106326345

00:59:08.778 --> 00:59:10.768 that can be all kinds of different

NOTE Confidence: 0.7106326345

00:59:10.768 --> 00:59:13.120 things that are in that we don't have

NOTE Confidence: 0.7106326345

00:59:13.120 --> 00:59:14.946 biopsy correlates to all of those.

NOTE Confidence: 0.7106326345

00:59:14.950 --> 00:59:16.880 Those are studies that shockingly

NOTE Confidence: 0.7106326345

00:59:16.880 --> 00:59:18.424 have never been done.

NOTE Confidence: 0.7106326345

00:59:18.430 --> 00:59:20.110 There's a few correlative studies.

NOTE Confidence: 0.7106326345

00:59:20.110 --> 00:59:21.910 They represent really small series,

NOTE Confidence: 0.7106326345

00:59:21.910 --> 00:59:24.416 usually less than 10 cases where they

NOTE Confidence: 0.7106326345

00:59:24.416 --> 00:59:26.169 correlate imaging findings and biopsy.

NOTE Confidence: 0.7106326345

00:59:26.170 --> 00:59:28.486 But the the the take home

NOTE Confidence: 0.7106326345

00:59:28.486 --> 00:59:30.030 point there is there.

NOTE Confidence: 0.7106326345
00:59:30.030 --> 00:59:31.478 Could potentially be something
NOTE Confidence: 0.7106326345
00:59:31.478 --> 00:59:32.926 in that interstitium that
NOTE Confidence: 0.7106326345
00:59:32.926 --> 00:59:34.599 explains the imaging findings.
NOTE Confidence: 0.7106326345
00:59:34.600 --> 00:59:36.028 That simply isn't myocarditis.
NOTE Confidence: 0.7106326345
00:59:36.028 --> 00:59:37.813 It's something else that they're
NOTE Confidence: 0.7106326345
00:59:37.813 --> 00:59:39.048 detecting and attributing to
NOTE Confidence: 0.7106326345
00:59:39.048 --> 00:59:40.692 myocarditis just because of a lack
NOTE Confidence: 0.7106326345
00:59:40.692 --> 00:59:42.386 of knowing what on Earth it is.
NOTE Confidence: 0.7106326345
00:59:42.390 --> 00:59:45.110 We really lack those radiologic,
NOTE Confidence: 0.7106326345
00:59:45.110 --> 00:59:46.278 pathologic correlative studies that
NOTE Confidence: 0.7106326345
00:59:46.278 --> 00:59:48.030 would allow us to answer that.
NOTE Confidence: 0.7106326345
00:59:48.030 --> 00:59:49.860 It's something that's desperately needed.
NOTE Confidence: 0.89726859
00:59:52.000 --> 00:59:52.788 Get to work on.
NOTE Confidence: 0.842897118888889
00:59:55.100 --> 00:59:57.200 I guess the hard part is to
NOTE Confidence: 0.842897118888889
00:59:57.200 --> 00:59:59.476 actually get somebody to be willing
NOTE Confidence: 0.842897118888889

00:59:59.476 --> 01:00:01.990 to undergo a biopsy after they,
NOTE Confidence: 0.673421074

01:00:02.180 --> 01:00:03.158 correct? Correct. Yeah.
NOTE Confidence: 0.673421074

01:00:03.158 --> 01:00:05.784 I mean, the other way that you could
NOTE Confidence: 0.673421074

01:00:05.784 --> 01:00:07.771 potentially approach that is by much
NOTE Confidence: 0.673421074

01:00:07.771 --> 01:00:08.916 more rigorous autopsy recruitment
NOTE Confidence: 0.673421074

01:00:08.916 --> 01:00:10.524 of individuals at the end stage
NOTE Confidence: 0.673421074

01:00:10.524 --> 01:00:12.114 of life who exhibit most energy
NOTE Confidence: 0.673421074

01:00:12.114 --> 01:00:13.614 findings that you then look at.
NOTE Confidence: 0.673421074

01:00:13.620 --> 01:00:14.635 That would be another way
NOTE Confidence: 0.673421074

01:00:14.635 --> 01:00:15.960 of doing it because I agree.
NOTE Confidence: 0.673421074

01:00:15.960 --> 01:00:17.608 I think it's a hard sell to tell
NOTE Confidence: 0.673421074

01:00:17.608 --> 01:00:19.019 people that you're going to engage
NOTE Confidence: 0.673421074

01:00:19.019 --> 01:00:20.815 the jugular vein and go into their
NOTE Confidence: 0.673421074

01:00:20.815 --> 01:00:22.380 heart potentially caused by customer
NOTE Confidence: 0.673421074

01:00:22.380 --> 01:00:24.330 regurgitation and a host of other things.
NOTE Confidence: 0.673421074

01:00:24.330 --> 01:00:25.940 Just because you want to study this,

NOTE Confidence: 0.673421074

01:00:25.940 --> 01:00:27.460 yeah, it's a hard sell.

NOTE Confidence: 0.673421074

01:00:27.460 --> 01:00:29.300 So we gotta find other ways of doing.

NOTE Confidence: 0.673421074

01:00:29.300 --> 01:00:30.600 Certainly as imaging gets better,

NOTE Confidence: 0.673421074

01:00:30.600 --> 01:00:32.100 there's, there's animal models that

NOTE Confidence: 0.673421074

01:00:32.100 --> 01:00:33.600 we could potentially engage there.

NOTE Confidence: 0.673421074

01:00:33.600 --> 01:00:35.376 There there's other ways at this,

NOTE Confidence: 0.673421074

01:00:35.380 --> 01:00:35.950 but it's hard.

NOTE Confidence: 0.5930484

01:00:39.980 --> 01:00:40.370 You

NOTE Confidence: 0.59599298

01:00:42.830 --> 01:00:48.600 could have a international, yeah, in 2026.

NOTE Confidence: 0.59599298

01:00:48.600 --> 01:00:52.530 Call up that is the was cardiac

NOTE Confidence: 0.812308736666667

01:00:53.140 --> 01:00:55.776 it was only three or four. Yeah.

NOTE Confidence: 0.812308736666667

01:00:55.776 --> 01:00:59.480 And that and again, none of them were,

NOTE Confidence: 0.812308736666667

01:00:59.480 --> 01:01:01.956 none of them were what I would

NOTE Confidence: 0.812308736666667

01:01:01.956 --> 01:01:04.520 call cardiac cause of death per se.

NOTE Confidence: 0.812308736666667

01:01:04.520 --> 01:01:05.618 You know, mechanistically,

NOTE Confidence: 0.812308736666667

01:01:05.618 --> 01:01:08.180 the heart may have been the final

NOTE Confidence: 0.812308736666667

01:01:08.241 --> 01:01:10.486 nail in the coffin, so to speak,

NOTE Confidence: 0.812308736666667

01:01:10.486 --> 01:01:12.296 but from a causal standpoint,

NOTE Confidence: 0.812308736666667

01:01:12.300 --> 01:01:14.670 they're all COVID-19.

NOTE Confidence: 0.812308736666667

01:01:14.670 --> 01:01:15.890 Right. All of them.

NOTE Confidence: 0.934293913333333

01:01:18.820 --> 01:01:22.750 Very good question. Thank you.

NOTE Confidence: 0.8773363

01:01:24.010 --> 01:01:24.740 Thank you.

NOTE Confidence: 0.6148523

01:01:31.620 --> 01:01:32.610 Yes.