

WEBVTT

NOTE duration: "00:04:52.166"

NOTE Confidence: 0.98195267

00:00:04.720 --> 00:00:06.339 It has become very clear

NOTE Confidence: 0.98195267

00:00:06.559 --> 00:00:08.480 that aging is not just

NOTE Confidence: 0.98195267

00:00:08.480 --> 00:00:10.000 fait accompli. Aging is a

NOTE Confidence: 0.98195267

00:00:10.000 --> 00:00:11.059 malleable process.

NOTE Confidence: 0.9971924

00:00:11.599 --> 00:00:13.360 And it turns out that

NOTE Confidence: 0.9971924

00:00:13.360 --> 00:00:14.820 almost every intervention

NOTE Confidence: 0.97075737

00:00:16.395 --> 00:00:18.495 that extends lifespan and reduces

NOTE Confidence: 0.97075737

00:00:18.635 --> 00:00:20.095 disease burden in animals

NOTE Confidence: 0.9763794

00:00:20.635 --> 00:00:22.255 is a metabolic intervention.

NOTE Confidence: 0.99035645

00:00:22.954 --> 00:00:24.095 But there are also

NOTE Confidence: 0.99902344

00:00:24.475 --> 00:00:24.975 molecular

NOTE Confidence: 0.99902344

00:00:25.515 --> 00:00:26.015 pathways

NOTE Confidence: 0.9975586

00:00:26.555 --> 00:00:27.375 and sensors

NOTE Confidence: 0.9920044

00:00:27.994 --> 00:00:29.460 in the body that sense

NOTE Confidence: 0.9920044

00:00:29.699 --> 00:00:31.460 the energy that is available
NOTE Confidence: 0.9920044
00:00:31.460 --> 00:00:32.120 to cells.
NOTE Confidence: 0.9972168
00:00:32.500 --> 00:00:33.879 And if those are targeted,
NOTE Confidence: 0.95166016
00:00:34.180 --> 00:00:35.399 that extends lifespan.
NOTE Confidence: 0.9958191
00:00:36.100 --> 00:00:37.699 And when that happens, one
NOTE Confidence: 0.9958191
00:00:37.699 --> 00:00:38.739 of the things that's really
NOTE Confidence: 0.9958191
00:00:38.739 --> 00:00:40.180 exciting is that the immune
NOTE Confidence: 0.9958191
00:00:40.180 --> 00:00:40.680 system,
NOTE Confidence: 0.98856026
00:00:41.059 --> 00:00:43.300 which basically resides also in
NOTE Confidence: 0.98856026
00:00:43.300 --> 00:00:44.360 every organ,
NOTE Confidence: 0.9995117
00:00:45.335 --> 00:00:46.235 is rewired
NOTE Confidence: 0.96636355
00:00:46.775 --> 00:00:48.775 to have greater ability to
NOTE Confidence: 0.96636355
00:00:48.775 --> 00:00:50.635 repair the damage that occurs
NOTE Confidence: 0.96636355
00:00:50.775 --> 00:00:52.875 with age. So immuno metabolism
NOTE Confidence: 0.96636355
00:00:53.015 --> 00:00:54.695 or this interaction between these
NOTE Confidence: 0.96636355
00:00:54.695 --> 00:00:56.455 two systems, we think, has

NOTE Confidence: 0.96636355
00:00:56.455 --> 00:00:57.335 a lot of potential in
NOTE Confidence: 0.96636355
00:00:57.335 --> 00:00:58.935 terms of understanding the basic
NOTE Confidence: 0.96636355
00:00:58.935 --> 00:01:00.600 biology of the aging process.
NOTE Confidence: 0.9470215
00:01:04.200 --> 00:01:05.400 So we are interested in
NOTE Confidence: 0.9470215
00:01:05.400 --> 00:01:07.180 these two phenomenas where
NOTE Confidence: 0.95356333
00:01:07.720 --> 00:01:09.640 the thymus, this organ that
NOTE Confidence: 0.95356333
00:01:09.640 --> 00:01:11.319 produces protective t cells in
NOTE Confidence: 0.95356333
00:01:11.319 --> 00:01:13.159 the body that controls infections,
NOTE Confidence: 0.95356333
00:01:13.159 --> 00:01:14.095 but we also know it
NOTE Confidence: 0.95356333
00:01:14.095 --> 00:01:15.075 controls cancers.
NOTE Confidence: 0.9649251
00:01:15.935 --> 00:01:17.295 What happens is that this
NOTE Confidence: 0.9649251
00:01:17.295 --> 00:01:18.755 organ ages so fast.
NOTE Confidence: 0.9843084
00:01:19.055 --> 00:01:20.175 By the age of forty
NOTE Confidence: 0.9843084
00:01:20.175 --> 00:01:21.935 five, in a healthy human
NOTE Confidence: 0.9843084
00:01:21.935 --> 00:01:22.435 being,
NOTE Confidence: 0.99934894

00:01:23.215 --> 00:01:24.815 almost eighty five percent of
NOTE Confidence: 0.99934894

00:01:24.815 --> 00:01:25.875 the human thymus
NOTE Confidence: 0.989417

00:01:26.450 --> 00:01:27.670 is made up of fat.
NOTE Confidence: 0.989417

00:01:27.969 --> 00:01:28.850 So it's an organ that's
NOTE Confidence: 0.989417

00:01:28.850 --> 00:01:30.049 supposed to produce immune cells,
NOTE Confidence: 0.989417

00:01:30.049 --> 00:01:30.930 but it has now fat
NOTE Confidence: 0.989417

00:01:30.930 --> 00:01:31.829 cells in it.
NOTE Confidence: 0.9913018

00:01:32.209 --> 00:01:33.569 And the other end of
NOTE Confidence: 0.9913018

00:01:33.569 --> 00:01:35.490 the spectrum is the fat
NOTE Confidence: 0.9913018

00:01:35.490 --> 00:01:37.970 itself. The adipose tissue expands
NOTE Confidence: 0.9913018

00:01:37.970 --> 00:01:39.295 with age. Even if you
NOTE Confidence: 0.9913018

00:01:39.295 --> 00:01:41.134 maintain your normal body mass
NOTE Confidence: 0.9913018

00:01:41.134 --> 00:01:42.575 index, the fat that increases
NOTE Confidence: 0.9913018

00:01:42.575 --> 00:01:43.774 is called the visceral fat,
NOTE Confidence: 0.9913018

00:01:43.774 --> 00:01:44.975 the fat that lines our
NOTE Confidence: 0.9913018

00:01:44.975 --> 00:01:46.274 organs, internal organs.

NOTE Confidence: 0.9367879
00:01:47.854 --> 00:01:49.534 And what happens, very unique
NOTE Confidence: 0.9367879
00:01:49.534 --> 00:01:50.975 in this situation with aging,
NOTE Confidence: 0.9367879
00:01:50.975 --> 00:01:51.540 is that
NOTE Confidence: 0.99594724
00:01:52.020 --> 00:01:53.800 as that fat is expanding,
NOTE Confidence: 0.9962269
00:01:54.340 --> 00:01:55.700 the things that expand inside
NOTE Confidence: 0.9962269
00:01:55.700 --> 00:01:57.060 the fat are the immune
NOTE Confidence: 0.9962269
00:01:57.060 --> 00:01:57.560 cells.
NOTE Confidence: 0.9342288
00:01:58.420 --> 00:01:59.460 So on the other hand,
NOTE Confidence: 0.9342288
00:01:59.460 --> 00:02:01.140 you have thymus where it's
NOTE Confidence: 0.9342288
00:02:01.140 --> 00:02:02.180 supposed to produce the immune
NOTE Confidence: 0.9342288
00:02:02.180 --> 00:02:03.140 cells. It has now fat
NOTE Confidence: 0.9342288
00:02:03.140 --> 00:02:04.580 cells expanding in it. And
NOTE Confidence: 0.9342288
00:02:04.580 --> 00:02:05.655 then you have an adipose
NOTE Confidence: 0.9342288
00:02:05.655 --> 00:02:07.095 tissue whose whole purpose is
NOTE Confidence: 0.9342288
00:02:07.095 --> 00:02:08.235 to control metabolism,
NOTE Confidence: 0.9647042

00:02:08.695 --> 00:02:10.135 has now this excessive immune
NOTE Confidence: 0.9647042

00:02:10.135 --> 00:02:10.875 cell infiltration.
NOTE Confidence: 0.9626116

00:02:11.575 --> 00:02:13.435 And what's now becoming clearer
NOTE Confidence: 0.9626116

00:02:13.495 --> 00:02:14.235 is that
NOTE Confidence: 0.9786784

00:02:14.535 --> 00:02:15.595 both these processes
NOTE Confidence: 0.9849609

00:02:16.135 --> 00:02:18.590 actually converge to produce inflammation,
NOTE Confidence: 0.9796753

00:02:19.130 --> 00:02:20.410 which is now one of
NOTE Confidence: 0.9796753

00:02:20.410 --> 00:02:22.270 the central features that controls
NOTE Confidence: 0.9796753

00:02:22.410 --> 00:02:24.570 degenerative changes that happen with
NOTE Confidence: 0.9796753

00:02:24.570 --> 00:02:25.070 age.
NOTE Confidence: 0.9841657

00:02:28.970 --> 00:02:30.350 What we're trying to do
NOTE Confidence: 0.9841657

00:02:30.570 --> 00:02:31.470 is to
NOTE Confidence: 0.99902344

00:02:32.724 --> 00:02:33.465 really understand
NOTE Confidence: 0.98514813

00:02:33.845 --> 00:02:35.364 what are the mechanisms that
NOTE Confidence: 0.98514813

00:02:35.364 --> 00:02:36.965 are now dormant in humans
NOTE Confidence: 0.98514813

00:02:36.965 --> 00:02:37.845 that are living in the

NOTE Confidence: 0.98514813
00:02:37.845 --> 00:02:39.685 modern world. Because when we
NOTE Confidence: 0.98514813
00:02:39.685 --> 00:02:41.065 hit these dormant pathways,
NOTE Confidence: 0.9523926
00:02:41.845 --> 00:02:43.364 it actually extends lifespan in
NOTE Confidence: 0.9523926
00:02:43.364 --> 00:02:43.864 animals.
NOTE Confidence: 0.9906982
00:02:44.810 --> 00:02:45.930 Calorie restriction is a very
NOTE Confidence: 0.9906982
00:02:45.930 --> 00:02:47.550 good example of it. Okay?
NOTE Confidence: 0.9906982
00:02:47.849 --> 00:02:49.049 If you reduce the amount
NOTE Confidence: 0.9906982
00:02:49.049 --> 00:02:50.430 of calories that you're consuming,
NOTE Confidence: 0.9857422
00:02:50.970 --> 00:02:52.830 now there are adaptive mechanisms
NOTE Confidence: 0.9312391
00:02:53.290 --> 00:02:54.489 that we never actually have
NOTE Confidence: 0.9312391
00:02:54.489 --> 00:02:55.769 to utilize in our modern
NOTE Confidence: 0.9312391
00:02:55.769 --> 00:02:57.069 life that are now upregulated.
NOTE Confidence: 0.9729004
00:02:58.090 --> 00:02:59.290 Okay? And we want to
NOTE Confidence: 0.9729004
00:02:59.290 --> 00:03:00.190 harness that.
NOTE Confidence: 0.96501607
00:03:00.565 --> 00:03:01.764 So we're very much interested
NOTE Confidence: 0.96501607

00:03:01.764 --> 00:03:03.044 in nature. So there is
NOTE Confidence: 0.96501607

00:03:03.044 --> 00:03:04.565 this species that lives in
NOTE Confidence: 0.96501607

00:03:04.565 --> 00:03:06.505 the desert in Middle East.
NOTE Confidence: 0.96501607

00:03:06.805 --> 00:03:08.084 It's very unique in the
NOTE Confidence: 0.96501607

00:03:08.084 --> 00:03:09.285 sense that it lives close
NOTE Confidence: 0.96501607

00:03:09.285 --> 00:03:10.905 to six times longer
NOTE Confidence: 0.9182129

00:03:11.285 --> 00:03:12.185 in the desert.
NOTE Confidence: 0.98349607

00:03:12.565 --> 00:03:14.325 And this species of golden
NOTE Confidence: 0.98349607

00:03:14.325 --> 00:03:16.610 spiny mouse is extremely resilient
NOTE Confidence: 0.97906494

00:03:17.230 --> 00:03:18.689 to age related decline.
NOTE Confidence: 0.9624721

00:03:19.629 --> 00:03:20.930 And we're trying to understand
NOTE Confidence: 0.9624721

00:03:21.069 --> 00:03:21.810 what is
NOTE Confidence: 0.99174803

00:03:22.269 --> 00:03:23.790 present in this species that
NOTE Confidence: 0.99174803

00:03:23.790 --> 00:03:25.329 is now dormant in us.
NOTE Confidence: 0.9265625

00:03:28.815 --> 00:03:30.514 So the hope obviously is
NOTE Confidence: 0.92414737

00:03:30.895 --> 00:03:32.655 that these mechanisms that we're

NOTE Confidence: 0.92414737
00:03:32.655 --> 00:03:34.255 trying to understand that become
NOTE Confidence: 0.92414737
00:03:34.255 --> 00:03:35.555 dysfunctional with age
NOTE Confidence: 0.9554913
00:03:36.335 --> 00:03:37.855 and identify which ones are
NOTE Confidence: 0.9554913
00:03:37.855 --> 00:03:39.375 actually the drivers of that
NOTE Confidence: 0.9554913
00:03:39.375 --> 00:03:40.595 process of aging
NOTE Confidence: 0.98772323
00:03:40.975 --> 00:03:42.015 versus the ones that are
NOTE Confidence: 0.98772323
00:03:42.015 --> 00:03:42.835 just passengers.
NOTE Confidence: 0.98346627
00:03:43.730 --> 00:03:44.690 And one of the things
NOTE Confidence: 0.98346627
00:03:44.690 --> 00:03:46.050 that we have discovered along
NOTE Confidence: 0.98346627
00:03:46.050 --> 00:03:47.650 with several of our colleagues,
NOTE Confidence: 0.98346627
00:03:47.890 --> 00:03:48.870 across the world
NOTE Confidence: 0.95377606
00:03:49.330 --> 00:03:50.470 is a sensor
NOTE Confidence: 0.99975586
00:03:50.849 --> 00:03:51.989 in the immune system
NOTE Confidence: 0.91522217
00:03:52.849 --> 00:03:54.849 which senses damage. The sensor
NOTE Confidence: 0.91522217
00:03:54.849 --> 00:03:55.989 is called as the NLRP
NOTE Confidence: 0.91522217

00:03:56.050 --> 00:03:56.870 three inflammasome.
NOTE Confidence: 0.920166

00:03:57.170 --> 00:03:59.015 It's a long, long, complicated
NOTE Confidence: 0.920166

00:03:59.155 --> 00:03:59.655 name.
NOTE Confidence: 0.99679905

00:04:00.115 --> 00:04:01.715 But it is now becoming
NOTE Confidence: 0.99679905

00:04:01.715 --> 00:04:02.855 more and more clear
NOTE Confidence: 0.9851074

00:04:03.555 --> 00:04:04.035 that,
NOTE Confidence: 0.9691732

00:04:04.355 --> 00:04:05.635 as people are doing, you
NOTE Confidence: 0.9691732

00:04:05.635 --> 00:04:07.235 know, the omic studies in
NOTE Confidence: 0.9691732

00:04:07.235 --> 00:04:08.935 humans and in animals across,
NOTE Confidence: 0.8880615

00:04:09.475 --> 00:04:10.295 time span,
NOTE Confidence: 0.88991004

00:04:10.720 --> 00:04:12.800 that this mechanism, NLRP three,
NOTE Confidence: 0.88991004

00:04:12.800 --> 00:04:13.780 gets upregulated
NOTE Confidence: 0.95713586

00:04:14.080 --> 00:04:15.360 with age, something that we
NOTE Confidence: 0.95713586

00:04:15.360 --> 00:04:16.560 had been studying for close
NOTE Confidence: 0.95713586

00:04:16.560 --> 00:04:17.779 to fifteen years now.
NOTE Confidence: 0.9921875

00:04:18.240 --> 00:04:19.779 And if you lower it,

NOTE Confidence: 0.9512329
00:04:21.120 --> 00:04:22.080 you can not only extend
NOTE Confidence: 0.9512329
00:04:22.080 --> 00:04:23.200 lifespan in the animals, you
NOTE Confidence: 0.9512329
00:04:23.200 --> 00:04:24.020 actually reduce
NOTE Confidence: 0.9946289
00:04:24.320 --> 00:04:25.460 the onset of diseases.
NOTE Confidence: 0.9420166
00:04:27.015 --> 00:04:28.135 And good news is it's
NOTE Confidence: 0.9420166
00:04:28.135 --> 00:04:29.595 actually imminently druggable.
NOTE Confidence: 0.8659668
00:04:30.775 --> 00:04:32.075 So the hope obviously
NOTE Confidence: 0.97602767
00:04:32.455 --> 00:04:33.975 is that these mechanisms that
NOTE Confidence: 0.97602767
00:04:33.975 --> 00:04:35.515 we and others are discovering
NOTE Confidence: 0.97602767
00:04:35.815 --> 00:04:37.255 are eventually targetable. And if
NOTE Confidence: 0.97602767
00:04:37.255 --> 00:04:38.775 they are targetable, then whether
NOTE Confidence: 0.97602767
00:04:38.775 --> 00:04:40.135 that actually improves the health
NOTE Confidence: 0.97602767
00:04:40.135 --> 00:04:41.100 of older adults.
NOTE Confidence: 0.9657593
00:04:41.740 --> 00:04:43.260 And, obviously, you know, this
NOTE Confidence: 0.9657593
00:04:43.260 --> 00:04:44.400 has huge implications
NOTE Confidence: 0.9806858

00:04:44.700 --> 00:04:45.900 for for all of us

NOTE Confidence: 0.9806858

00:04:45.900 --> 00:04:47.440 because aging affects everyone.