Science Magazine Podcast

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Promo

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Music

Interviewer – Edward Hurme

Finally today, I'm here with online news editor David Grimm, who's here to give us a rundown of some of the recent stories from our online daily news site. So David, in our first story we'll look at the first trial of using neural stem cells in children. So what exactly is this disease that these children were suffering from?

Interviewee – David Grimm

Well Edward, it's a very rare and fatal brain disease known as Pelizaeus-Merzbacher disease, if I'm saying that correctly. And basically this is a disease where people have a lot of trouble producing a protein called myelin. Myelin sort of forms this sheath around neurons, and it actually sort of insulates neurons and helps them transmit electrical signals between each other. And obviously that would be very important in children with this disease that lack this myelin because actually they have problems with cells called oligodendrocytes, which produce myelin. These children have a lot of trouble talking, walking, even breathing on their own, and they often die very prematurely. So what this new study is all about is trying to find a way, you know, with stem cells, can we somehow get myelin back into these kids? And researchers have actually been looking at this question for a long time. And what they've been trying to do is trying to find human stem cells that will generate these oligodendrocytes, which produce myelin. And they've done a lot of animal studies, and actually recently, they've isolated some stem cells that seem to really do the job well in mice. When they gave these stem cells to mice, 60-70% of the time, the cells became oligodendrocytes and began producing myelin.

Interviewer – Edward Hurme

So how do you actually go about treating this brain disease with stem cells? What did the researchers do to treat these boys?

Interviewee – David Grimm

Well so what they did, you know, moving from mice to kids was they actually drilled small holes in the children's skulls. And it sounds extreme, but these were actually small holes just sort of big enough to get a fine needle into there. And then they basically squirted millions of these stem cells into the white matter of the children's brains. And this was done on four boys with the disease. And then they monitored the boys for about a year. And they found that at the end of the year, all the boys showed changes in their

brain that were consistent with more myelin. And they also didn't have any side effects. And that's actually one of the big things that these trials are trying to do: not necessarily prove efficacy at first – although that's ideal – but just to prove that a therapy is safe. And at least in this case, it seems to be safe. And as a bonus, they actually saw that the boys actually seemed to have modest improvements in their development. For example, a five-year-old boy in the study began, for the first time, to feed himself and to walk without assistance during the study. So that was a pretty encouraging sign.

Interviewer – Edward Hurme
So what does this mean for the future of stem cell therapies, and even neural stem cell therapies?

Interviewee – David Grimm
Well, it's a good question. It's not just this disease that these researchers are concerned about because obviously this is a very rare disease. But there's a lot of factors of this disease that overlap with diseases like Parkinson's disease and multiple sclerosis, which are far more common. So the hope is that if the researchers can really sort of nail down this technique and make it work for this particular disease, that it could be applied to diseases that are much more common but also have a lot of very devastating neurological effects.

Interviewer – Edward Hurme
So our next story looks at how models of the spread of a disease found an unlikely reservoir for a virus. And the virus in question is known as EEV. So what is EEV?

Interviewee – David Grimm
Well, it's actually – you forgot an E there, Edward. It's actually EEEV, and it stands for Eastern equine encephalitis virus. And this is a very devastating disease that primarily strikes horses and kills horses, but it can actually also infect humans. And almost 35-50% of humans with the disease die. So this is a really big problem. It seems to be prevalent along the eastern coast of the United States and tends to emerge as the weather gets warmer. And what scientists know is that EEEV is spread by mosquitoes. But there's a mystery because mosquitoes die in the winter, and that should really wipe out this virus. And yet every year the virus seems to come back. And that suggests to the scientists there must be what they call a reservoir. There must be another animal besides mosquitoes that's holding onto this virus so that the virus can reemerge back when the winter is over.

Interviewer – Edward Hurme
So how did the researchers figure out where this reservoir might lie?

Interviewee – David Grimm
Well, they had two prime suspects: either birds or reptiles. And they searched through a lot of the birds, and they found out that birds just rid themselves of the virus too quickly. When they get infected, they really get rid of it too quickly to be able to harbor it for months and months over the winter. So they didn't really seem like the likely reservoir.

So they looked at a bunch of reptiles, and they also didn't see a lot of promising signs there until they looked at snakes. And specifically, they looked at several different species of snakes in Alabama's Tuskegee National Forest, and that's a place where EEEV is known to strike. And they tested the blood of the snakes, and what they found was that in two species of snakes, specifically the cottonmouth and the copperhead, more than 35% of the cottonmouths had antibodies against the virus, and 22% had bits of the virus's DNA in their blood. So this was a pretty strong indication that these cottonmouths – and probably the copperheads as well – are able to harbor this particular virus.

Interviewer – Edward Hurme
So how did they actually prove that the virus is staying in the snakes over the wintertime?

Interviewee – David Grimm
Well what they did was they actually brought some garter snakes back into the lab. They didn't want to use cottonmouths or copperheads because they didn't really want to get bit, so they chose garter snakes, which are nonvenomous. And they showed that in these garter snakes, the virus persisted even during the snake's hibernation, and it remained active even after 30 days of what they call cold-induced sleep. So this virus really stuck around in these animals, and it was still present at pretty high levels. And when I say virus, I don't actually mean virus. And that's actually one of the potential downsides of this study, because the researchers actually didn't find the virus itself. What they found was these antibodies and these bits of RNA that are related to the virus, and that's one possible downside. One expert said, you know, we can't really be conclusive about the snakes being the reservoir until we actually find the virus itself in these reptiles.

Interviewer – Edward Hurme
So from disease potentially hiding under the skin of snakes, our third story looks at a certain species of octopus that's hiding something under its skin as well. So, David, what can you tell me about the blue-ringed octopus?

Interviewee – David Grimm
Well Edward, this is a golf ball-sized octopus, and it's actually very poisonous – speaking of poisonous animals. It can actually kill an adult human within minutes. And what it does is actually bites people, or bites other animals, and releases venom through its beak – actually venomous saliva. But before it does this, it's kind enough to sort of give off a warning signal. And the warning signal is dramatic. It flashes these bright blue rings of light, and you can actually see a video of this on the site. And scientists have wondered how does this work? Where is this light coming from, and how actually are the octopi flashing them in the first place?

Interviewer – Edward Hurme
I'm guessing this is different from how octopuses normally control their colors.

Interviewee – David Grimm
You know, a lot of time what octopuses usually do is they activate what are called chromatophores, which are basically sacs of pigment. And these chromatophores give

off color, give off light. And that's kind of what's happening here, but it's a little bit different. What the researchers found by dissecting a few of these octopi in the lab was they found that actually these blue rings of light are pretty much always on. But what happens is that they are actually concealed by pouches of skin normally. And what the octopi do is when they get agitated, they release one set of muscles and tense another set of muscles, and that basically just gets the pouches out of the way. You can almost think of it like a spotlight that's always on, but it's sort of got a cover on it. And when the octopi flex their muscles, they're basically removing that cover, and the light shines through again. And that's sort of what's happening.

Interviewer – Edward Hurme
And David, what else have we had on the site this week?

Interviewee – David Grimm
Well Edward, for *Science*NOW, we've got a story about how mites seek revenge on their childhood foes. Also, a story about how a feast of ribs shedding light on early human behavior. For *Science*Insider, we've got a story about the controversy over genetically modified crops in India. Also about how President Obama and Governor Mitt Romney differ on energy policy. And finally, for *Science*Live, our weekly chat on the hottest topics in science, this week's *Science*Live is all about new therapies for mental illness, and it actually will have already taken place by the time this Podcast comes out, but you can check out a transcript of the chat on the site. Next week's chat is going to be about the Nobel Prizes. Do the Nobels need an overhaul? And just one more thing to note. We are running our annual Dance Your Ph.D. contest. This is a contest for scientists who can interpret their Ph.D. theses in dance form. We have collected all of the entries for this year. And the 12 finalists have been picked, and you can go on our site to check out the 12 finalists in four different categories and vote for your favorites. We'll be announcing the winner next week. So be sure to check out all of these stories on the site.

Interviewer – Edward Hurme
Well David, thanks for talking with me.

Interviewee – David Grimm
Thanks, Edward.

Interviewer – Edward Hurme
David Grimm is the online news editor of *Science*. You can check out all our news at news.sciencemag.org, including daily stories from *Science*NOW, and science policy from *Science*Insider. While you're there, be sure to check out *Science*Live, a live chat on the hottest science topics every Thursday at 3 p.m. U.S. Eastern time.