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Forum

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The Chemotrode

Chapter Four

by Robert J. O'Connell

“As you recall from our last meeting the problem with the chemotrode had us stumped for quite a while. Many of the things we tried to get SCAP into the brain either didn't work or were so invasive that they were like the chemotrode, impractical to use in humans. We wondered if there was another way to get our compound past the blood-brain barrier?”

Mrs. Kelly nodded and sat quietly in the chair next to the Doctors desk.

“Recently, we began to think more deeply about the structure of the brain and wondered if there was a part of the brain that was in direct contact with the outside world. At about this same time a student of mine told me about a paper she had just read for her anatomy class. Anatomists were mapping connections within the brain with a protein enzyme. They faced the same problem, how to get their protein into the brain unaltered. They knew that with the

appropriate chemistry its presence could be visualized in histological sections. They were using a plant enzyme called horseradish peroxidase, nicknamed, HRP. She further reported that HRP was very popular among those who study the olfactory system as olfactory receptor neurons in the nose can eat this protein if it is placed in the nasal cavity. They then transport it rapidly through their axons directly into the brain where they terminate. Given this important piece of information we had the idea to create a duplex compound which had HRP on one end and SCAP on the other. A simple drop of saline containing this new protein just dropped into the nose of the animal would be eaten and delivered unaltered into the brain where it would be broken first into its two components by the proteases. It worked! Mutant mice became almost normal but the treatment had to be repeated daily for several months to be effective.”

Eileen stood and walked around the office grinning widely.

He said “Although we can fix the mutant mice so there is an end in sight, the problem we face now is much more difficult than the original scientific question. We are being stymied by a number of forces that are out of our control. In one corner stand those orthodox scientists who make decisions about grant funding. They find this potential solution too far out and weird. They will not fund anything unless I can prove that it will work in humans. Their argument is simple, brain development in the mouse and the human have to be very different given the outcome, so the efficacy of the treatment in the mouse model is no guarantee that it will work in the human. I cannot argue against this point of view.

But it is catch 22, without doing the experiment at least once there is no way of knowing. Also allied against further research are those who are against the reliance on stem cells for any reason. The net result of this is that I have run out of government money to support this research. Now there are a few sources of money from private foundations interested in other neurological disorders that seem to be willing to take a risk on funding us but before that happens we run into the second layer of problems.”

“Who are these people, let me talk to them.”

“Not so simple. This second problem has to do with our own clinical research committee. By current law they have to approve any study that I might want to do. But they will not allow me to treat a patient, without informed consent, and without demonstrating that the treatment will cause no harm. In our desire to protect our clinical subjects we have designed a system that stops most clinical research. If I went ahead without their approval I could lose my license to practice medicine leaving all of my patients without care. Since John is still a minor and has a proven neurological defect the philosophers on the committee claim that he cannot give an informed consent himself. And you, as his guardian, cannot because you are pressured by the desire to have him fixed and you might agree to anything.”

She nodded with understanding and mumbled something that sounded like, damn straight.

He said, “And finally without trying the treatment in humans there is no way I can prove that it has positive therapeutic benefits. I really don’t see any way out of this dilemma.”

“Well I do,” she said loudly. “This is a crazy situation. As I told you long ago, I will do anything possible to help John. I will not let anyone stop me from helping my son. Give me

the protein and I will treat him myself. We already use that anti-cold nasal spray every day so I am sure that the treatments with your compound will be just the same. When he is better I can tell them the truth and you will be able to use John’s case to get permission and money to help other children.”

“Well,” he said with a smile, “I may have to move my lab to Mexico to avoid prosecution.”

Mrs. Kelly said, “You have always been very open with me about your studies and taken time to show and explain each step you have made. As a consequence I have visited your lab many times. I have every confidence in your work. That is why everyone in my family has given so much money to the damn School. Now they say they won’t let you help my son. I won’t stand for it. If asked, I will claim that I stole the material from your shelf when you first made it. They already know that I am crazy and if I do something like this it only proves that I am not in my right mind.”

He said quietly, not wishing to irritate her further, “Well, of course you can have it, it was produced with public money so I suppose you are entitled to it. You know the freeze where it is stored, Help yourself. Use the same concentration as is listed in the mouse paper. But if you treat him yourself we have to have additional MRI’s done more frequently to gauge the progress of the treatment. You would have to bear the cost of these yourself as I can’t pay for them any more.” She said, “Paying for them is not a problem Doctor and if it will help I will be happy to appear more hysterical about John’s progress and demand more frequent tests. This situation has already gotten my Irish dander up.”

And so the plot was hatched.

An additional five years of treatment go by. The doctor reviews the latest MRI scan of

John and called his collaborator. “Eileen, something is wrong. The improvement we have seen in the scans over the last few years seems to be going overboard quickly in the last few months and I am concerned that we have too much stem cell repair going on to fit into John’s somewhat smaller than normal cranium. Come in to the office, we need to see if we can figure this out.”

The next day, John and his mother appeared in the Doctors office. Upon seeing him in the flesh for the first time in months the doctor remarks. “My goodness John, you are so big. How are you feeling.”

John looked down at his feet, shrugged and slouches away to the waiting room.

Eileen reported, “Since puberty hit him about six months ago he has put on weight, grown nearly a foot and is now more interested in girls and track instead of computer games.”

“Aha,” the Doctor sighs, “this makes perfect sense now. What a relief. We know from our earliest work with the mouse model that exercise alone can drive stem cell proliferation in the brain. Before we discovered SCAP we saw that just the little bit of extra exercise the mice got in running the swimming test could increase the activity of stem cells. I expect that the combination of increased physical activity and daily SCAP in John is driving us too far. As exercise is desirable for all the organ systems we will have to suspend the daily nasal treatments until we can see some reduction in the thickness of John’s cortex, Then we can reinstate the treatment at a slower rate. This will have to be adjusted as we go along.”

John came to his mothers call, flexed his new muscles and smiled directly at the Doctor for the first time. The doctor said, “If we get past this bump in the road we will have to schedule a news conference to announce our discovery

and show off our new boy.”

“Well Doctor”, she said, “ I think that I should do that. But it may not be necessary to have a news conference. I will just post my new claims on my social network MySpace page where I have been regularly posting John’s improvements. We get thousands of hits on this page every month. So it will not take long to get the word out. We will pretend that you don’t know anything about it. You can suggest, if asked, that you thought his improvement might be hormonal.”

Disclaimer. Many of the neurological terms used here are real, but their properties and functions are frictional as are all of the characters. Many of the problem solving skills and technologies employed by the characters exist in one form or another but there is no reason to suppose that an actual physician or neurobiologist would or could approach them in the same way. This work should not be used to guide any medical decision or expectation. These should always be obtained with the assistance and guidance of your own physician.

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