The Life of a Neuron: Fatal Habits

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After a hard fought five months of neurogenesis, I have become a neuron. It wasn't easy; there is so much competition nowadays. I traveled and matured from a stem cell, and now I'm in the thalamus between the cerebral cortex and mid-brain. My axon is moving fast; my dendrites are a bit slower, but they are moving quite far and beginning to sparse. Genetically, we all look pretty healthy. I'd say that we are going to make one great human as we grow together. As a thalamus cell, my job seems to be relaying sensory and motor signals to the cerebral cortex, as well as regulating consciousness, sleep, and alertness. I have a lot on my plate. I've begun to mature and form synapses. It looks like my job is pretty important, so I've still been receiving my nutrition and didn't get the "code red," ahem, apoptosis…

There are billions of us now in this brain, and we're making trillions of connections together. It's a bit overwhelming. The human has reached birth, and his name is Rick. I'm still a bit novice to this idea of consciousness, but sleep and alertness seem pretty straightforward. I'm beginning to send sensorimotor signals a little faster, but it will only get better. The parents are starting to teach Rick language. I've also just figured out that things exist even when I can't necessarily send signals that they're present! I'm getting many connections, and we now have the ability to grasp things and pinch objects. I, myself, am not too familiar with the language system, for those are my buddies in Wernicke's and Broca's, but the collaboration of language and my ability to send sensory signals is making our human more compatible. We are 5 years old now, and with our new abilities, we neurons are gaining the ability to form mental representations of things in the world. I can even help out with drawing due to my motor connections. Rick has also begun to play sports, and my signals have increasingly advanced. Myelination is still progressing.

At 15 years old, cells have died but some have stayed connected. Instead of thinking so concretely, I've started coming up with more abstract ways of thinking. My consciousness has come to the point where I'm not exactly sure why I'm here at all. What should I do now? Rick yearns for a partner as well. With my increase in connections, Rick has become an increasingly active human being. Realistic considerations have come to consciousness for Rick; he is thinking about his abilities and what he needs to reach a goal in life. I have done such an efficient job in motor and sensory signals to the cortex that Rick is turning into an athletic, smart young man. It's also leading Rick to think he should join the military to reach the pinnacle of his motor skills and alertness. We are now 20 years of age and I'm in my prime.

At age 25, it has happened. Rick has injured himself in warfare. I knew consciously that military vocation could have its downfalls. He suffered a gunshot to his lower back, making walking a real life problem. My sensory and motor connections are still working, but many of my sensory connections from the injured locale are sending pain. Specifically, I heard certain receptors, called nociceptors, are sending these pain signals to us in the brain. Rick has been sent home. It seems as though we've just begun our quest, and it has abruptly come to a stop. Even after being sent home, Rick stills seems depressed.

A couple of years after the incident now, I've been receiving some foreign chemicals in the brain. It is inhibiting some of the abilities I once had. This, I assume, is called Jack Daniel's. Rick's been drinking it a lot lately. The chemical it contains, alcohol, has caused an influx in our transmission of Gamma-aminobutyric acid, or GABA, an inhibitory neurotransmitter. To put it simply, this alcohol chemical furthers the activation of GABA and keeps it between our signaling cells. GABA is helpful, though. It controls my impulses; it helps make sure we neurons don't have seizures due to all this circuitry, but I have this strange feeling that these levels of GABA are ultimately going to become unbalanced if Rick does not stop. Consciously, it makes me feel good, sedated, and carefree sometimes. However, I can tell that my sensory and motor skills are diminishing. Sometimes I feel like there is a line—a queue—when I try and send my signals to the cortex. It's almost all the time now; Rick will not stop. Not only is he holding back my abilities with this habit, but he also isn't eating how he should be probably due to the depression. I have been feeling a bit languid recently.

I don't even know how old I am and it has been years since the injury. Rick still has these habits. So much of my food has disappeared. I'm relying on the bare minimum to function. As a component of the human body, there's some food that I cannot make alone. I need food from the outside world. Because of Rick's habit, he hasn't gotten me the nutrition I need to function my best. I think what I need more than anything is vitamin B1, also called thiamine, because this alcohol chemical has been interfering with the intestine's absorption of it. This vitamin is crucial for me to maintain my membrane structure. It's only a trace molecule, but I feel like I haven't had it in a while. I haven't been able to relay motor signals well at all lately, and it is showing. Rick is stumbling a lot lately. I can't consciously remember how I got to this point. I'm even having trouble recognizing Rick's siblings. Other cells that have to do more with memory are hurting too. Rick doesn't remember much, so instead of living with the embarrassment of obvious forgetfulness, he has been confabulating many stories. Who are we to know? It's been a while since those events happened anyway. Rick's brother, Jim, has taken him to the doctor who is running tests on us neurons. The test results show a depletion of—you guessed it—vitamin B1! Due to this deficiency, we neurons are injured. Not only is that a problem, but I also heard the doctor tell Rick's family that he has a case of generalized cerebral atrophy. This could be why my signals to the cerebral cortex have been lost lately and haven't been following through to their destination cells. Why didn't we tell someone about our state? The doctor explained to Rick's family that he suffers from anosognosia, a symptom of this vitamin deficiency in which the human is unaware of the condition and its onset.

The word is in: Rick suffers from Korsakoff's syndrome. His family has committed to giving Rick intravenous sources of vitamin B and then switching to pill form once he's back on his feet. He will have rehabilitation and be put on a better diet. Vitamin B1 replacement therapy isn't always a cure, but it may help Rick reach a certain level of independence. The bright side of the matter is that I have not died, and if Rick keeps at it, we can live through this illness. If all goes well, we should regain some abilities in a few years.

* This author wrote this "neuron narrative" for Biology 130: Deadly Shapes, Hostage Brains taught by Dr. Shubhik DebBurman.

I'm 25 years old, right? So young, but I'm still hurting. I don't even know this old man that visits me. Rick's brother is much younger than him. Who is he? I think I'm dying. I don't have any food to share with the cells around me and Rick's habits have changed minimally, if even at all. It looks like this is it. Neuronal damage has taken me over; my signals are no longer needed…

Key Topics

Neural Darwinism, Neurogenesis, Stem cells, Cell Migration, Differentiation, Maturation, Synaptogenesis, Apoptosis, Myelogenesis, Synaptic Pruning, Nerve Growth Factor (NGF), Wernicke's and Broca's areas, Axon growth vs. Dendrite growth, Sensorimotor Stage, Pre-operational Stage, Concrete Operational Stage, Formal Operational Stage, Object Permanence, Identity vs. Confusion, Consciousness, Nociceptor, Depression, Post-Synaptic reuptake inhibition, Thiamine (B1), Brain Structure and Locale, Hypothalamus, non-endogenous nutrition, Cerebral Atrophy, Cerebral Cortex Receptors, Anosognosia, Korsakoff's syndrome, Replacement therapy.