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Subject: basis thesis on neurotransmission

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Just like genetic code is something common to all life forms, I believe intracellular communication is too. Like there is a common chemical language that all living things use to "talk" between cells. Most ppl say plants don't have a nervous system because they don't have synapses or nerves but it turns out their cells communicate using exactly the same chemicals. Why else would plants have dopamine, acetylcholine, serotonin, norepinephrine etc. They do. I'd like to study WHAT they do with these neurotransmitters using neuroimaging, specifically PET and fMRI to understand in vivo irritative (excitatory) function. The spatial resolution isn't great but I think it prove the point that intracellular communication is preserved at the cellular level. It's been hard to convince plant people to do "neuro" studies but ultimately I want to try move away from "neuro" perspective and just think about how cells communicate. We still don't know how anesthesia works. We still don't know a ton of things but I think if we can decipher the cellular/chemical communication language we will find it is preserved but just applies differently in different anatomy. Same physiology. That's physics right? Same rules apply to everyone. The fact that the biochemistry is exactly the same says something. Dopamine looks like dopamine, always.

I've written up a 2 page proposal. So far, plant scientists have either responded "no thanks" or not responded at all. I will keep trying, and I've identified a few groups that have created plant focused imaging (PET and fMRI) but they aren't using it for these purposes. My friend at Stanford is a neurotransmitter expert and he's the Vice Chair of Psychiatry and a little crazy (Rob Malema) I suspect he would help me develop the idea a little but I still need experimental partners. Given that you have to develop imaging protocols and for PET you have to have tracers, experiments are less complicated but they are still more expensive than bench work. I'd say to do each series of scans would cost between \$3-5K for each plant species looking at each neurotransmitter and you would need a few plants as a controls. So if you did the 5 basic neurotransmitters with 3 plants each that would be somewhere between \$45 and \$75K just for the experiments and not all the staff time and university taxes etc. So I would say to get this done you might need \$125-150K and probably 3-6 months.

This will tell you resting neurotransmitter function in plants. Nothing about what happens when you stress it.

If there is left over, you might try to image an overoxygenated plant and an over CO2 plant to see how this affects function and metabolism. Or you could anesthetize the plants and see what it does to a selected neurotransmitter or set of neurotransmitters. I don't understand why you can't image all the biogenic amines with one tracer but I guess it's because I'm not a biochemist. You should be able to - well maybe not histamine but all the others.

My guess is that once the "team" (imaginary team that I haven't been able to rally yet) gets facile with plant neuroimaging it will get super easy and cheap. Activation energy is always high when trying something new.

Let me know if I should keep looking. I can try Brookhaven (government lab but not dedicated plant scanner - or the other guys I sent you last night).