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2-AG protects spinal cord injury

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In writing these essays, we had to learn how to read PubMed. We laughed a lot trying to pronounce the unfamiliar science. We gleaned here and there. We kept meeting, asking, writing and learning. Like all newbies, we were overwhelmed by the amount of information. Soon we started to notice various patterns. One was the investigation into activating and blocking cannabinoid activity. It is referred to as "agonist" for activating and "antagonist" for blocking receptors.

It was also clear that there was great interest in understanding cannabinoids – at the research level. **PubMed is a free database of references and abstracts on life sciences and biomedical topics maintained by the US National Library of Medicine at the National Institutes of Health.** It's a place where fact *beats* fiction. To the thousands of white-coats publishing in the journals posted on PubMed, cannabinoids are fascinatingly intriguing. We knew we could rely on their expertise – ***if we could only decipher it***.

Here's a technique we found useful. We would begin by deconstructing the abstract and interpreting each sentence. This allows one to see the theories, evidence and conclusions in their own framework. For example, the one we're going to breakdown in this essay is about the ***endocannabinoid 2-arachidonoyl glycerol***. The problem with the name is obvious, as it is with most cannabinoids, so everyone calls this one ***2-AG***.

A PubMed search of this endocannabinoid returns nearly a thousand publications. We chose one from 2010 and published in Neurobiology of Disease. The title first caught our attention:

> *The endocannabinoid 2-arachidonoyl glycerol reduces lesion expansion and white matter damage after spinal cord injury*

That's a long title to make a clear point: ***2-AG reduces the damage after spinal cord injury***.

Now let's read the abstract to see what support they have to test such a fantastic theory as the ECS reducing the damage of spinal cord injury. How can this be?

1) *A series of pathological events secondary to spinal cord injury (SCI) contribute to the spread of the damage, which aggravates neurological deficits.*

Sounds like beyond the initial damage from the injury, there are a series of events that also cause harm:

2) *Here we report that a single dose of the neuroprotective endocannabinoid 2-arachidonoyl glycerol (2-AG) administered early after SCI reduces lesion expansion, which was prevented by simultaneous blockade of both CB1 and CB2 receptors but not by blockade of either receptor alone.*

Okay. The white-coats dosed a rodent (mouse or rat most likely) with 2-AG right after SCI. This reduced the "lesion expansion" – the harm. They know this because they blocked CB1 and CB2 receptors and stopped this from happening. They also found that they had to block them both:

3) *Treatment with 2-AG also preserves the white matter around the epicenter of the injury.*

Well, the preservation of "white matter" sounds important. A check of spinal cord on Wikipedia tells us that "Columns of white matter carry information either up or down the spinal cord." Yes, that's important:

4) *Moreover, in the preserved white matter, 2-AG protects myelin from damage and reduces oligodendrocyte loss.*

Bingo! That's the sentence that makes this one so important. Oligodendrocytes build myelin. This is bordering on amazing ...

5) *In addition to these protective actions at the epicenter region, 2-AG also inhibits the myelin damage and delayed oligodendrocyte loss induced at 10mm from the epicenter.*

Yes, there's amazing! Not only is 2-AG protective at the place of injury, it also inhibits myelin damage and delayed oligodendrocyte loss. That means the "myelinators" will be around to remyelin the damage:

6) *Interestingly, the early protective action of 2-AG is maintained 28 days after injury, when the lesion size is still smaller and the preservation of white matter is better in 2-AG-treated animals.*

Yes, ***interestingly***. After a month the injuries treated with the cannabinoid were better off. Interesting indeed:

7) *Therefore, our results show that 2-AG protects from the expansion of the lesion and white matter damage, which suggest that this endogenous cannabinoid may be useful as a protective treatment for acute SCI.*

The white-coats report that the *endo 2-AG protects from the damage caused by acute spinal cord injury*.

There, that wasn't so difficult.

Cannabis as a means to cannabinoid supplementation should be noted for its properties – not its politics. The PubMed world knows this. As we learn more and more about cannabinoids and the ECS, the harm we are causing is becoming clear. Prohibition isn't just about taking our liberty; it also takes away possibilities – ***like protecting our spinal cords***.

Publius
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Search terms
PubMed, 2-AG and diacylglycerol lipase; oligodendrocytes; cannabinoids and SCI/neuroprotection; remyelination.

Research and selected readings
2011: L Zhang, et al, *Endocannabinoids generated by Ca2+ or by metabotropic glutamate receptors appear to arise from different pools of diacylglycerol lipase*, PLoS One, January 2011:6(1):e16305.

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2007: J Blackman, et al, *A comprehensive profile of brain enzymes that hydrolyze the endocannabinoid 2-arachidonoylglycerol*, Chemistry & Biology, December 2007:14(12):1347-56.

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