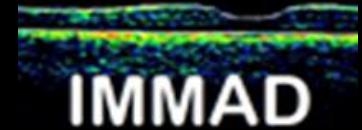


# Acute Marijuana Use: Functional Findings of Retinal Ganglion Cell Impairment



Denise A. Valenti, OD, FAAO

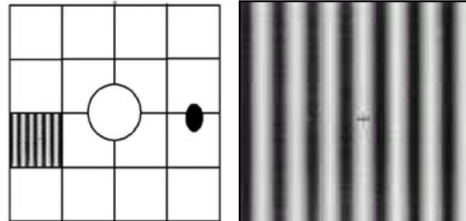
IMMAD-Impairment Measurement Marijuana and Driving  
deniseavalenti@gmail.com



## Background and Methods

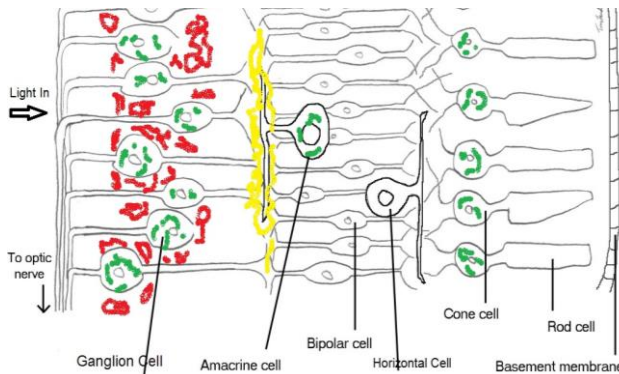
We evaluated, using basic screening protocols, two participants during a screening who reported to have self-dosed with their own legal recreational marijuana twenty minutes earlier. Additionally, we used a visual field screening technology assessing visual field function within the central forty degrees of vision. We elected to use the instrument's threshold strategy rather than screen program. Tests of psychomotor performance; including tests of visuospatial field perception, have the potential to demonstrate the impact of cannabis consumption. Cannabis impacts vision with reports of increased function in periphery (1) and decreases in other functions (2). Understanding deficits associated with cannabis is particularly critical for tasks such as driving.

**The stimulus**, far right, is a low spatial frequency grating of 10°, presented at 1 of 17 test locations, shown near right. The grating alternates at 25 Hz. The frequency doubling illusion is the subjective perception that the grating has twice the number of dark and light bars (i.e., its spatial frequency appears to be 0.50 cpd), as shown in the diagram.



## Cannabinoids And The Retina

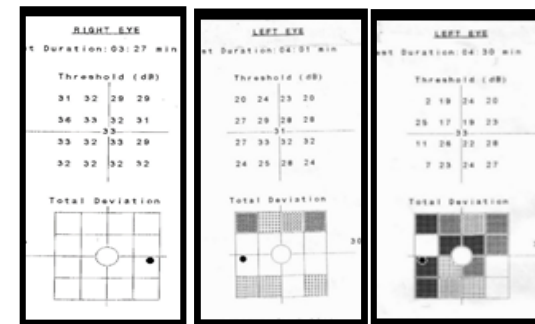
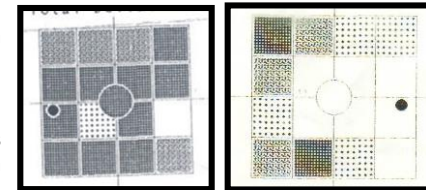
**Cannabinoid receptors** are throughout the retina (3). Cannabis depletes retinal **dopamine** (4). Retinal amacrine cells are involved in processing **acetylcholine** and cannabinoids disrupt this neuroprocessing in the retina (5). To the right is an image of the retina. Cannabinoid receptors are shown in green, acetylcholine is yellow and dopamine is depicted with red.



## Outcome: Retinal Ganglion Cell Dysfunction

Disruptions in neurotransmitter balance due to disease, medications or drugs can result in dysfunction in the retinal ganglion cells (RGCs). Chronic cannabis use as well as acute use causes dysfunction in the RGCs (6). Functional tests can demonstrate such losses. Near right is an example of retinal ganglion cell dysfunction specific to **dopamine** depletion in Parkinson's (7).

The image to the far right is an example of **acetylcholine** inhibition secondary to medication, methotrexate (8). **The three images below are the results of the cannabis group.** The far left is a normal result from a person who had not used cannabis. The others are from two males, age 24 years old and 22 years old, who had used marijuana twenty minutes earlier.



## Conclusion

Acute use of marijuana has already been reported to cause retinal ganglion cell dysfunction. These cases demonstrate the functional impairment that is caused by marijuana use. Further study is important as the functional deficits that this measures; contrast and temporal processing, are important for safe driving.

## References and Images

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## \* Key To Results

Probability Symbols	
	P >= 5%
	P < 5%
	P < 2%
	P < 1%