Measuring the Effects of THC on Human Sperm Parameters Using Biomonitoring Analysis

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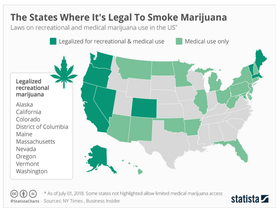
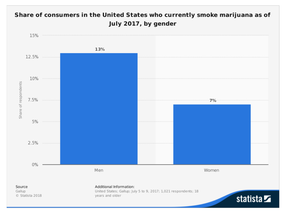
THE UNIVERSITY OF UTAH | GW | Public Health

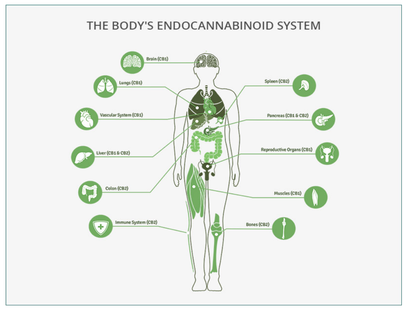
Introduction

➢ **Marijuana** usage is very common with about **40-50% of US adults** having used it at least once





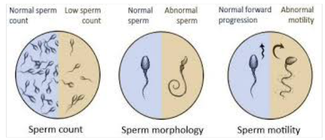
➢ Effects of tetrahydrocannabinol (THC) on the brain is well known but **few studies** have evaluated its effects on the **male reproductive system**



➢ **Cannabinoids** such as THC bind to cannabinoid receptors and have been **associated with low sperm concentration and sperm count**

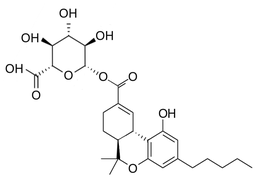
Methods

➢ Participants recruited for The Men's Health Study in clinics at the **GW Medical Faculty Associates** and in the **DC community** provided urine and **semen samples** and completed a comprehensive questionnaire that included medical history and **cannabis usage**



➢ **Semen analysis was completed at GW** SPH labs according to **WHO 2010 standards**

➢ **Urine samples** were evaluated at University of Utah for COOH-THC, using gas chromatography-mass spectrometry (GC-MS/MS)



Results

Table 1. Demographics of Participants in the THC Study

	N	Mean (Median)
Age	62	39.25 (39.00)
BMI	62	29.60 (27.85)
Sperm Concentration (x10^6)	62	86.11 (79.75)
Sperm motility (Clinic) % motile	19	50.95 (61.00)
Sperm motility (Community) mm in straw	24	47.72 (49.50)
Sperm morphology % normal	59	4.19 (4.00)
	N	**%**
Cigarette smoking %	62	32.80
Race		
Asian	6	9.68
Black	28	45.16
White	23	37.10
Two or more/Other	5	8.06

Table 2. Urine COOH-THC Results

Participants with Detection	22.6%
Mean COOH-THC	120.91 ng/mL
Median COOH-THC	43 ng/mL
Range COOH-THC	2.70 – 406.60 ng/mL

Table 3. Self-Reported Cannabis Use vs. THC Biomonitoring

	Urine Detection Yes	Urine Detection No
Self Report Yes	2	2
Self Report No	8	30

Self-report data only available for Community recruited men (n=42)

Table 4. Comparison of Participants With and Without THC Urine Detection

	THC Detected				THC Non-Detect			
	Mean	Median	25th Percentile	75th Percentile	Mean	Median	25th Percentile	75th Percentile
Sperm Concentration (x10^6)	79.05	80.00	19.00	142.50	87.98	79.50	52.00	118.00
Morphology % Normal	4.64	5.00	3.00	7.00	4.08	4.00	2.00	6.00
Age	38.46	39.00	32.00	47.00	39.46	39.00	31.00	47.50
BMI	30.64	28.57	25.83	36.17	29.33	27.71	25.08	34.17

Table 5. Comparison of Parameters Below Normal WHO Standards

	THC Detect (%)	THC Non-Detect (%)
Sperm Concentration < 15 million/ml	23.10	10.20
Sperm Morphology < 4% Normal	36.40	43.8

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Conclusions

➢ **Mean Sperm concentration** was **lower** in men who had **detectable THC** in their urine

➢ **THC** users were more likely to be **cigarette** smokers

➢ **Self-report** was found to be an **unreliable information source**. Many participants with THC in urine reported not using cannabis; this indicates **biomonitoring is important for THC studies**

➢ Future studies should include **larger samples to study dose response relationships**, and repeated measures to evaluate changes in associations between THC and sperm parameters over time

References

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