

Cannabis Data Science Adventures

with your host “Candy O” **MCR Labs**

Cannabis Science Fair

Dec 3, 2022

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GitHub:

<https://github.com/candy-o>

Cannlytics Contributor:

<https://pypi.org/project/cannlytics/>

Cannabis Data Science Meetup member: <https://www.meetup.com/cannabis-data-science/>



On a cold and rainy day...



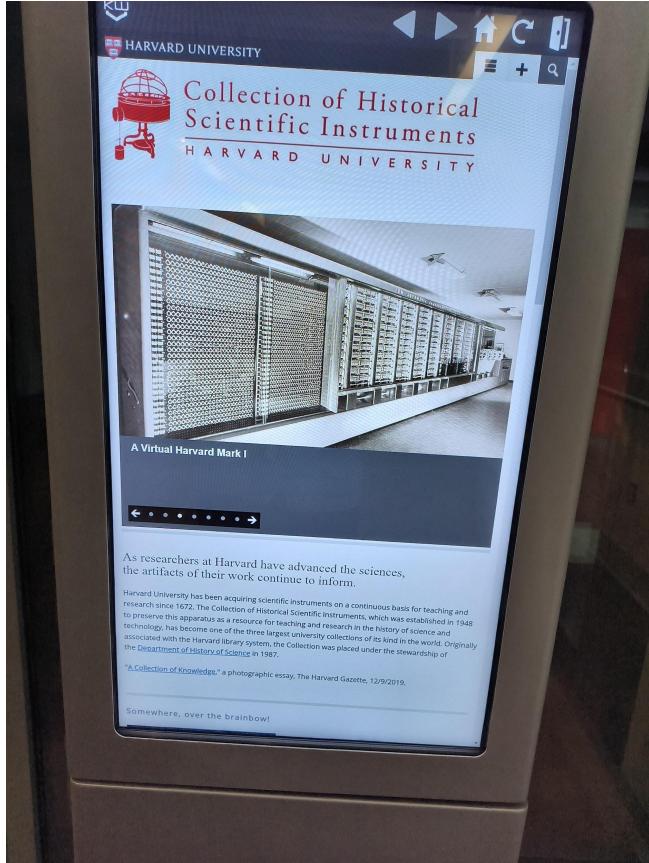
Candy O' went to Harvard University Cambridge MA...



To check out another intriguing MCR Labs event...



Always thrilled to be near any Information Technology department...



"Wow! A Virtual Harvard Mark I" ... haha... but I digress... I am here for MCR Labs...



First off a self-service cannabis testing kiosk (Looking forward to when “Terpenes are included”).

Big Brain Cannabis: A Continuous Meta Analysis of Cannabis Research

Project By: Dr. Nathan Charpentier PharmD, Dr. John Paul Tosco, Yasha Kahn

BIG BRAIN CANNABIS

Introduction

There are thousands of peer-reviewed studies on the effects that cannabinoids and terpenes have on various medical conditions. Evidence indicates that some compounds or combinations of compounds can alleviate specific symptoms, while others can worsen them.

There are about ten thousand products available every day in Massachusetts, each with unique cannabinoid and terpene combinations. With so much research to sift through and so many products available, how should a consumer select the products that work best for them?

BigBrain Cannabis is a platform that has streamlined this process.

We have:

1. Quantified peer-reviewed studies on cannabinoids and terpenes.
2. Collected data on all products available in Massachusetts, with potency profiles.
3. Developed an algorithm to identify which products most closely match those that have been successful in treating a variety of medical conditions.

By utilizing this technology, BigBrain Cannabis employs current data to help consumers identify the products that match the latest research.

THIS SCIENCE **HOW TO USE**

Why Is This Product a Good Match for Breast Cancer?

We look at multiple factors:

- Does the product contain the compounds shown to treat the condition?
- Is the amount of each close to what has been demonstrated in successful treatments in peer-reviewed studies?
- Is the product type a good fit for treating Breast Cancer?

based on

- 184 studies
- 8 primary studies
- 715 experiments

[Learn more](#)

Methods

Cannabis products backed by science

To match products to research, we:

1. Analyze and extract data from relevant studies and identify how much of each compound reaches the bloodstream.
2. Determine weighted averages for results across all studies on a condition.
3. Calculate a score for each product based on how well the product compounds matches the desired compounds for each condition.

Read more about methods for data extraction, the databases, and the algorithms we use by scanning the QR code.

Results

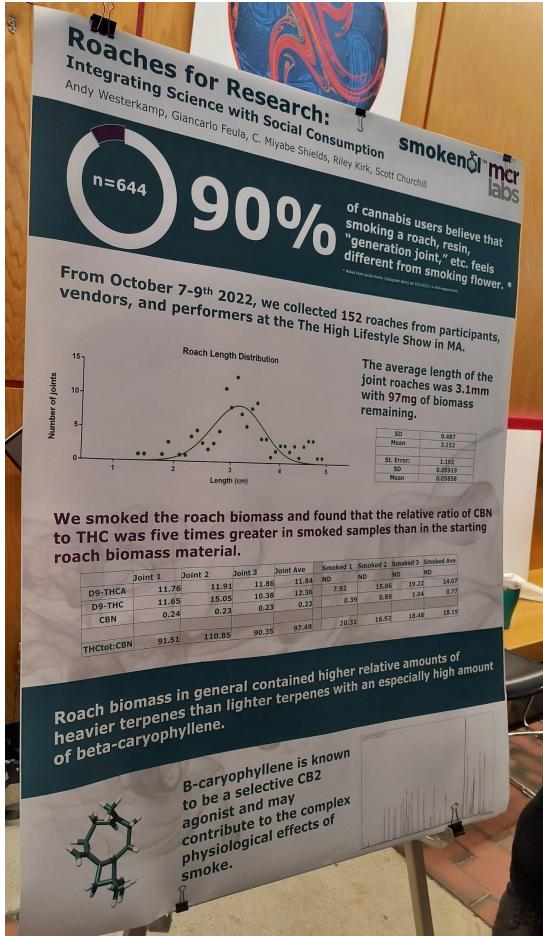
We have cataloged and quantified nearly a thousand studies on over two hundred conditions, and used those to develop two databases. A condition study database with 868 studies, and a pharmacogenetic studies database with 722 studies.

Using these databases, we can identify the compounds that are beneficial or potentially adverse for treating each condition, and the products that contain the correct dose of these compounds.

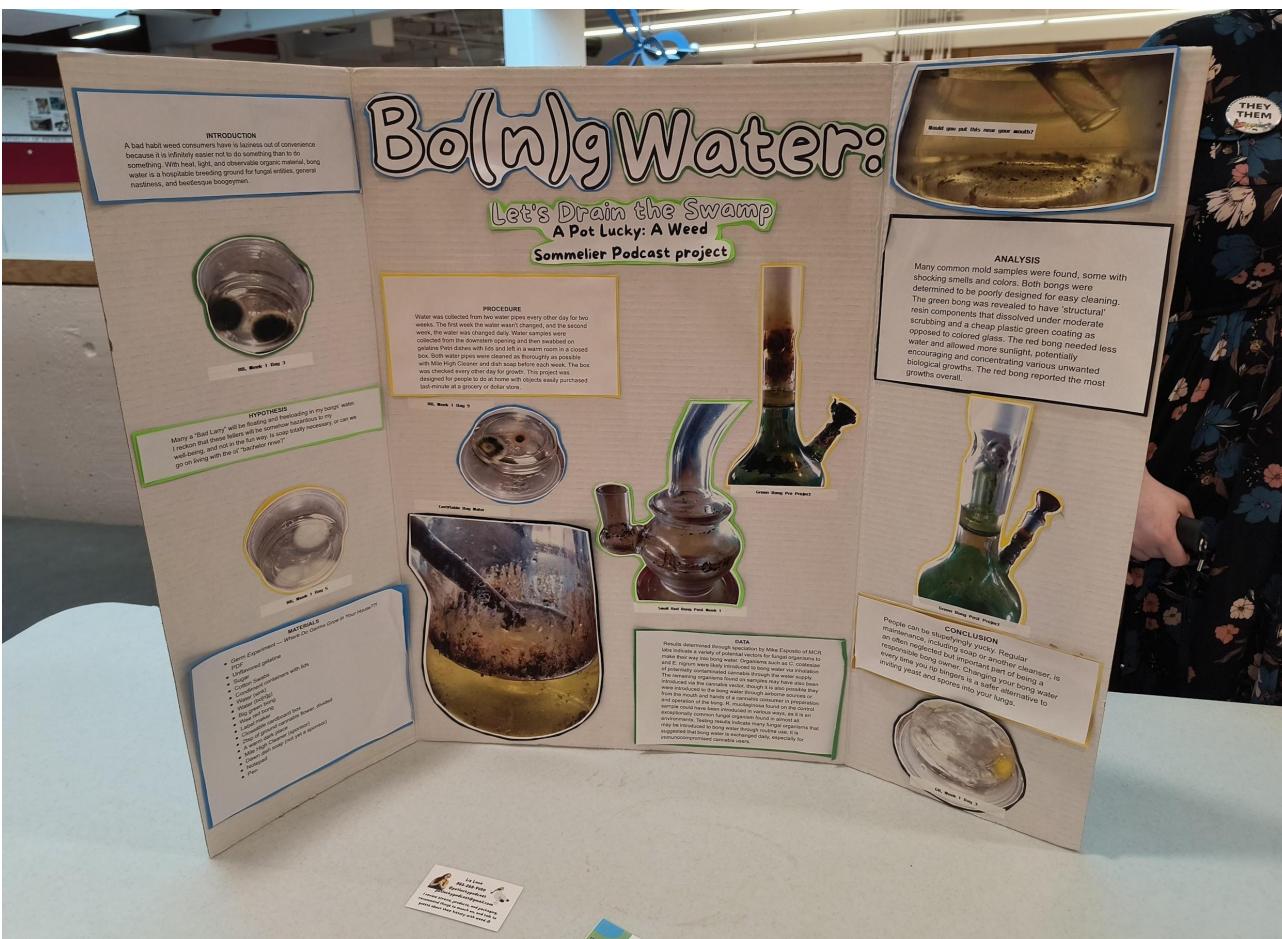
Required Product Compounds for Breast Cancer

Compound	Amount required per gram*	Percent of patients requiring this*
CBD	0.2 mg	40%
THC	0.05 mg	50%

MCR Labs Yasha Kahn “Big Brain Cannabis” project that helps Cannabis Patients and their Doctors individualize patient medicine was exciting. I do not have a website link nor is there a picture - but the live demo was “Fabulous” with a user-friendly dashboard coupled with interesting backend data consisting of PubMed type documents, COA data?,... Looking forward to when “Big Brain Cannabis” goes live.



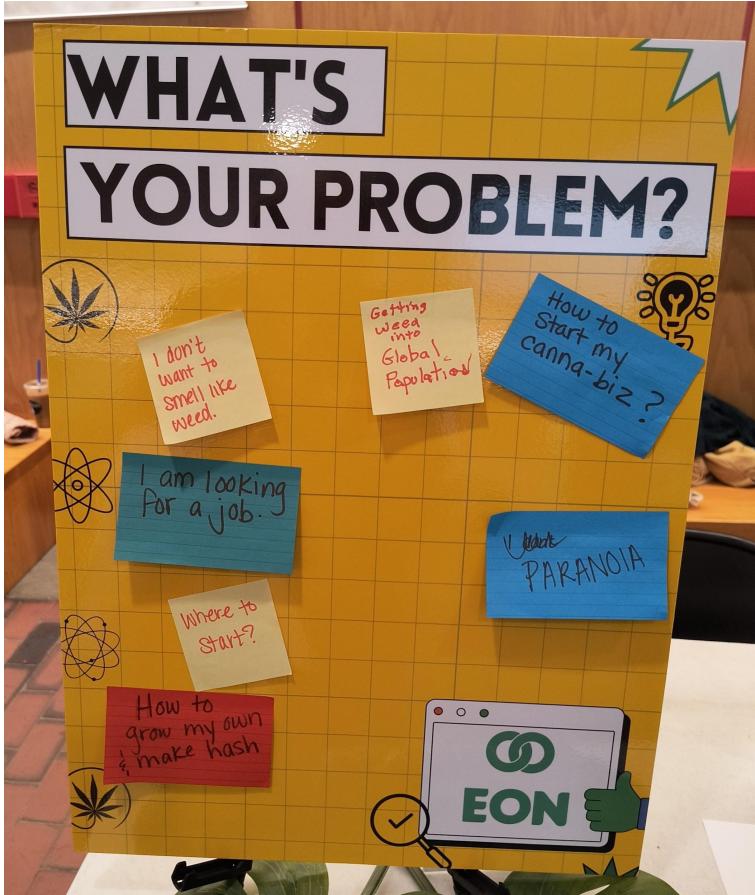
Check this out... the creative test ideas that come out of MCR Lab never fail to impress me.



This inventive Science Project showed why you should clean your bong water daily as a medically autoimmune compromised Cannabis user (or any user). Mike Esposito MCR Labs did the testing.



Any project that directly helps humans succeed is wonderful.



Creativity Abounds...

ICS The Institute of Cannabis Science
HONEST DATA ABOUT WEED

We produce the data our society needs to manage cannabis

Testing off-the-shelf



sample	measured	analysis	calculated
A	15.1	15.0	15.0
B	15.1	15.0	15.0
C	11.8	12.0	12.0
D	11.8	12.0	12.0
E	11.8	12.0	12.0
F	11.7	12.0	12.0
G	11.7	12.0	12.0
H	9.5	10.0	10.0
I	10.8	11.0	11.0
J	10.8	11.0	11.0
K	10.9	10.9	11.0
L	10.9	10.9	11.0
M	10.9	10.9	11.0
N	10.9	10.9	11.0
O	10.9	10.9	11.0

six of 15 lower by >20% !!!

Analysis of state-archived test results

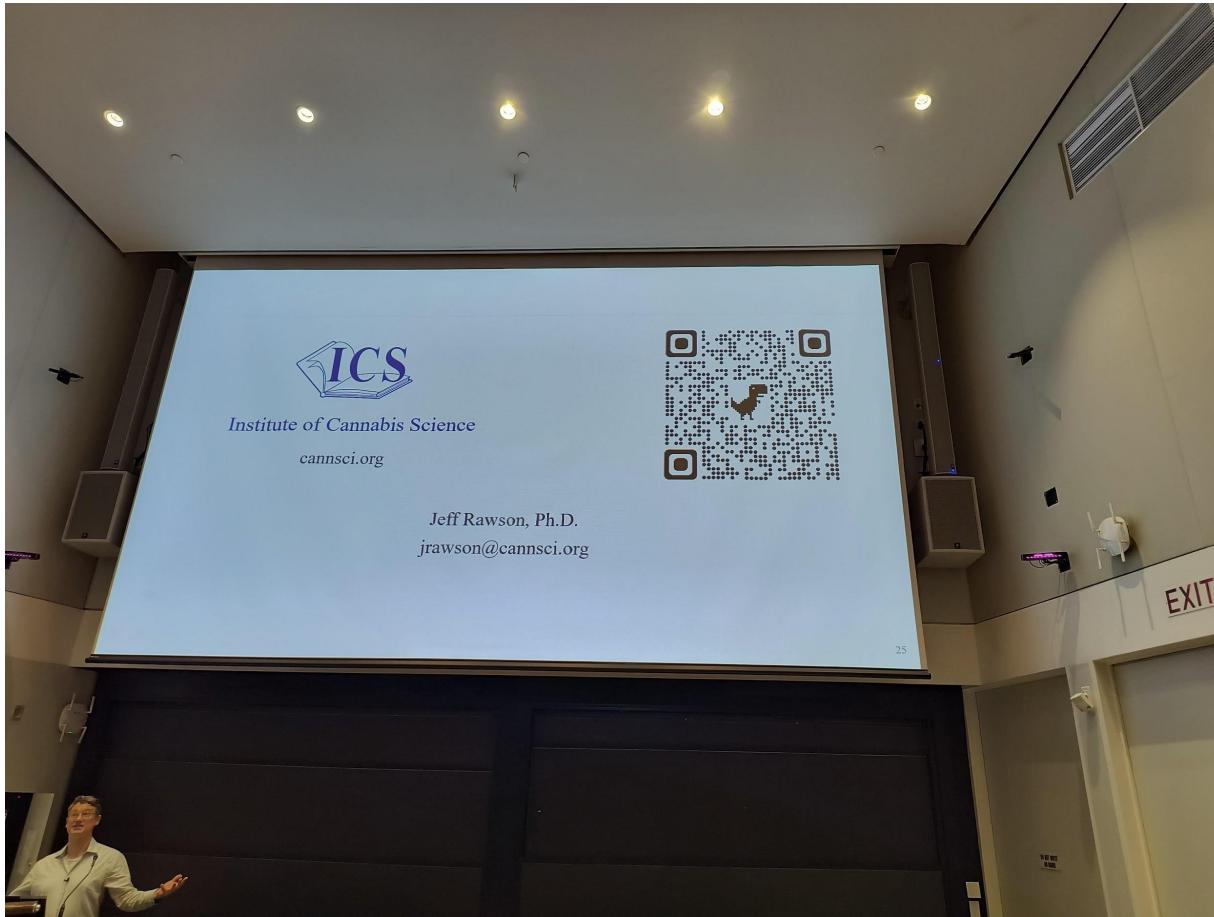


Jeff Rawson, Ph.D., president
rawsonicannabis.org

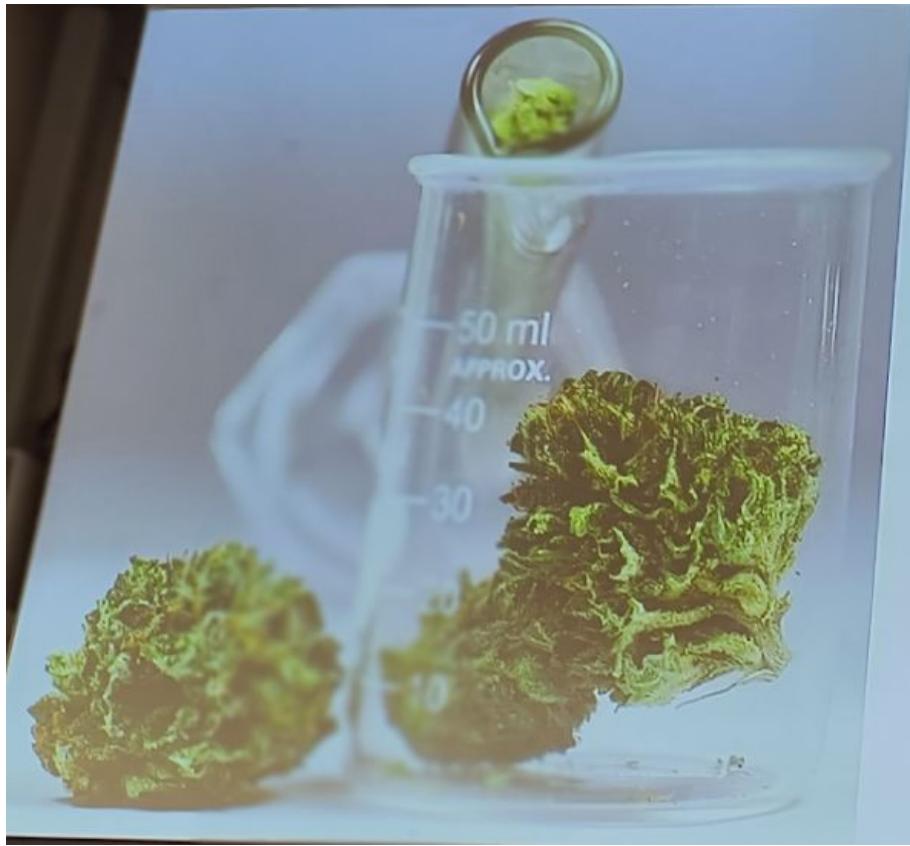
cannabis.org blockchaincannabis.org



Jeff Rawson is presenting today - looking forward to this.



Presentation: Jeff Rawson Ph. D. Institute of Cannabis Science cannsci.org



3rd party testing of ~~samples~~

Hazards

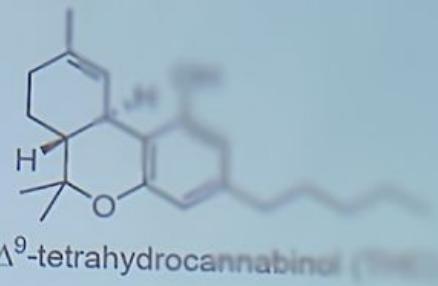
Heavy metals

Pesticides

Microbiological ~~samples~~

Potency

THCA, THC, and other ~~samples~~



I was in the 3rd row my phone camera acted up ... sorry.... 3rd party testing Hazards and Potency

Who cares?

- Patients
- Recreational consumers
- Producers
- Labs

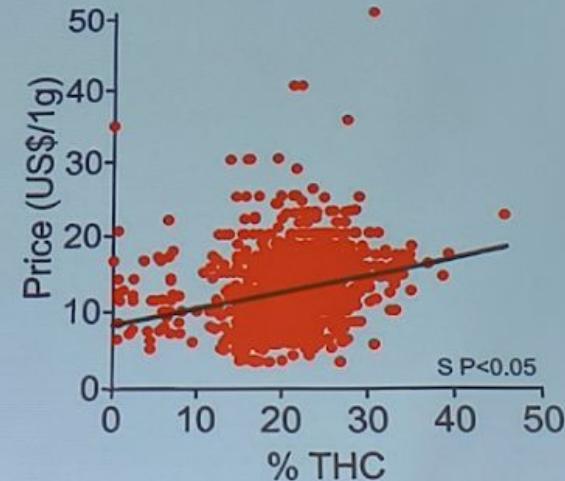
Candy O' cares... as a Cannabis Patient that exhibits reactive lymphs using legal MA/FL State Weed vs. her (legal home grow in MA not FL) Cannabis.



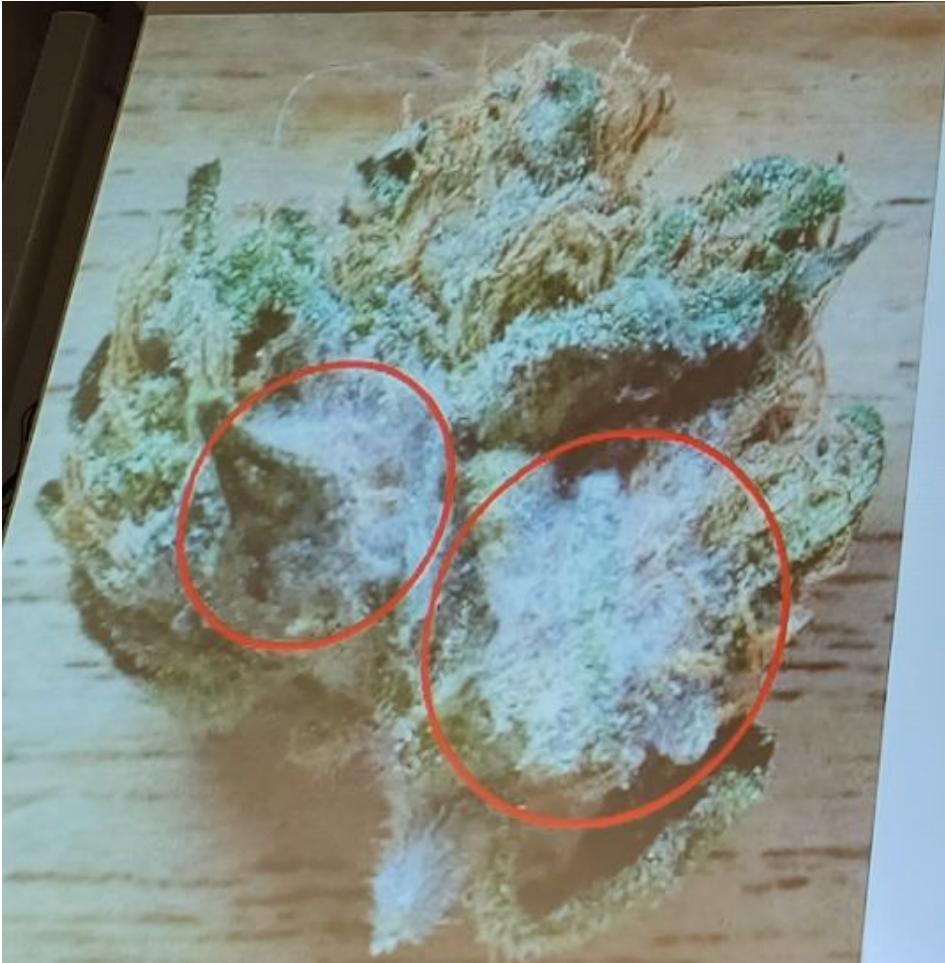
Incentives to cheat: \$\$\$\$

Potency:

- THC dictates price
- Low THC doesn't sell



Dobbins *et al.*, *Frontiers in Public Health*
2022, 10, 893009



Incentives to cheat: \$\$\$\$

Mold:

- Licenses grant limited ‘canopy’
- Packing in plants risks mold

Typical federal responsibilities:

- Set standards
- Protect consumers
- Coordinate research
- Collect and distribute data
- Investigate



Institute of Cannabis Science

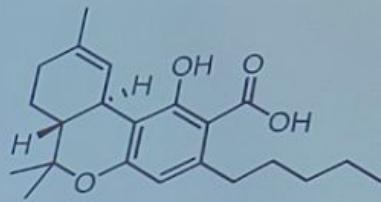
- Set standards
- Protect consumers
- Coordinate research
- Collect and distribute data
- Investigate



Secret Shopping

Retest by multiple labs *within the system*

Jeff purchased, divided, sent out to three different MA USA Labs - same samples from Product X



Tetrahydrocannabinolic acid

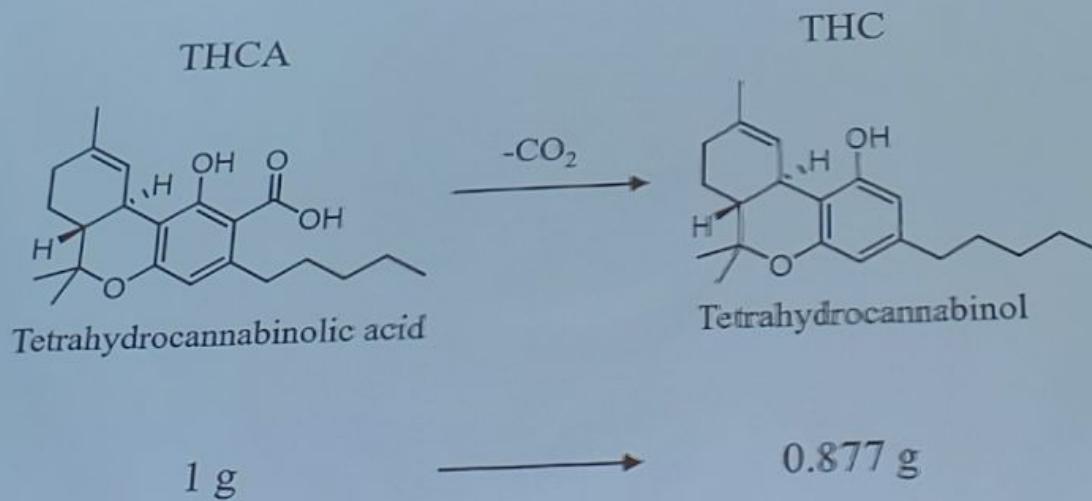
3 labs avg.



Sample	Certificate	Measured	Measured
	THCA (%)	THCA (%)	Standard Deviation
A	22.7	19.6	0.6
B	26.4	12.8	4.1
C	33.8	27.4	1.7
D	31.8	23.0	2.8
E	33.9	24.5	1.5
F	21.7	14.8	0.9
G	23.4	21.7	0.5
H	37.4	32.5	0.9
I	20.8	17.7	0.7
J	32.6	29.0	2.1
K	31.0	24.6	1.1
L	31.0	25.7	1.3
M	30.8	25.4	1.4
N	31.6	26.2	1.5
O	31.5	23.3	2.3

COA THCA verses “Three labs” averaged THCA measured - Standard Deviation is “High”

THCA, THC and decarboxylation



$$\text{"Max THC"} = \text{THC} + (0.877 \times \text{THCA})$$

The correct “Max THC” formula = $\text{THC} + (0.887 \text{ g} \times \text{THCA})$

Websites often advertise “total THC”



THCA + THC

Indica

4.4 ★ (8 reviews)

Details

THC 34.10% CBD 0.10%

*This % may represent an aggregate of THC/CBD, THCa/CBDA, THCb/CBDb within the product. Consumers should review the actual product label for exact % of THC/CBD.

Description

Lineage:

Strain Type: Indica

Smell/Taste/Aroma: Sweet, Doughy, Woody, Earthy

Effects: Relaxed, Happy, Euphoric

Websites often advertise “total THC” = THCA + THC

Sample	Advertised THC%	Max THC (theoretical %)
A	22.7	20.6
B	26.4	24.0
C	35.2	31.0
D	32.2	28.3
E	34.6	30.2
F	22.8	20.2
G	30.2	21.6
H	37.6	33.0
I	20.8	20.0
J	34.1	29.9
K	31.6	30.2
L	31.0	28.4
M	30.8	29.4
N	32.1	28.2
O	31.5	28.0

Advertised is “High”er than Max THC (theoretical %) - fuzzy photo apologies

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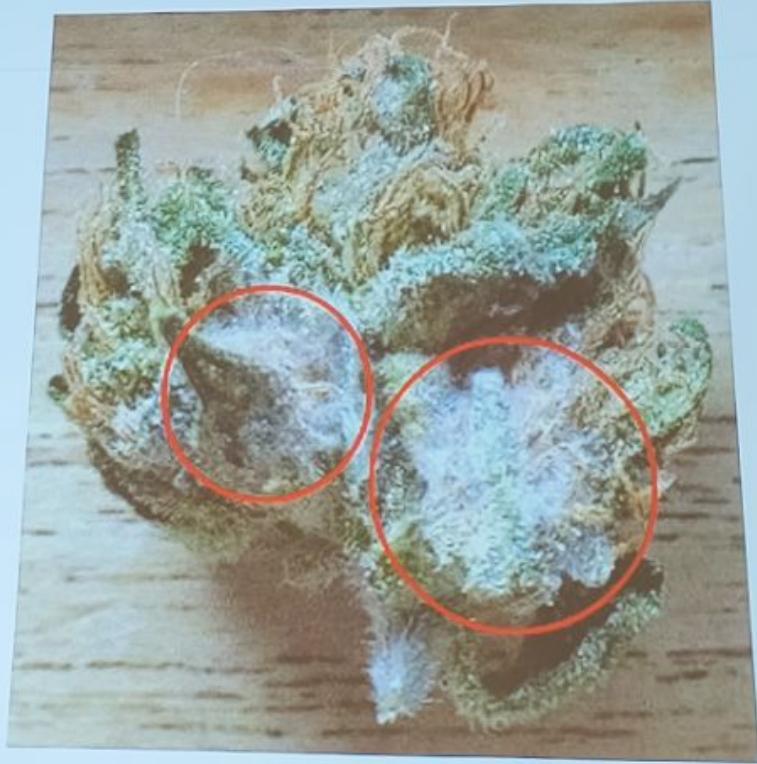
Max THC less than
website THC by 20+%



Comparing Website/Certificate/Measured Max THC Values (Max THC < Website by 20+%)

2 of 10

Failed microbio test!



This is UnHEALTHY! for autoimmune compromised Cannabis patients (or users).



Open Data

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If COA/SOP read-only real-time data and archives were publicly available patients could select their own product based on Cannabinoids, Terpene, Pesticides used, Radiation used,... Software Professionals could create patient dashboards, discover lab anomalies, keep Cannabis Safe! I am frustrated with how difficult it is for me to get product purchase COA from MA State Pot shops currently. Now I am in FL to find out ease of COA with product purchased from FL State Pot shops.



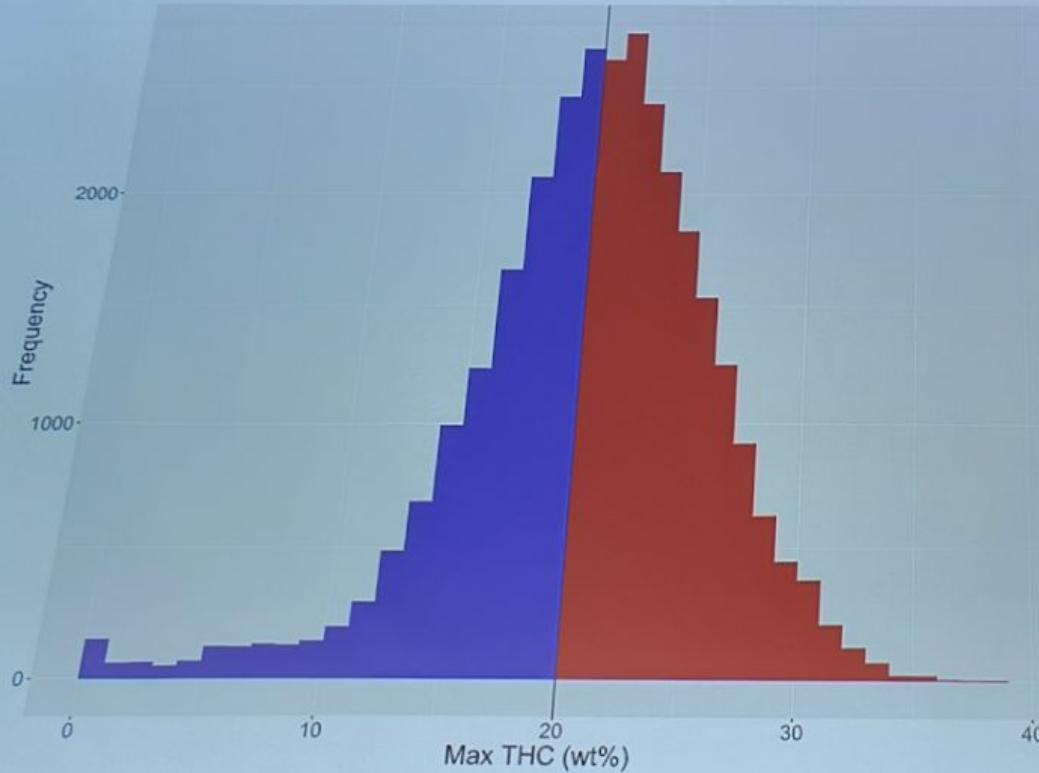
Seed-to-Sale



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Why can't patients (everyone!) have access to this data? COA and SOP

Ideal normal distribution



Here is ideal normal THC distribution

Discontinuous distribution

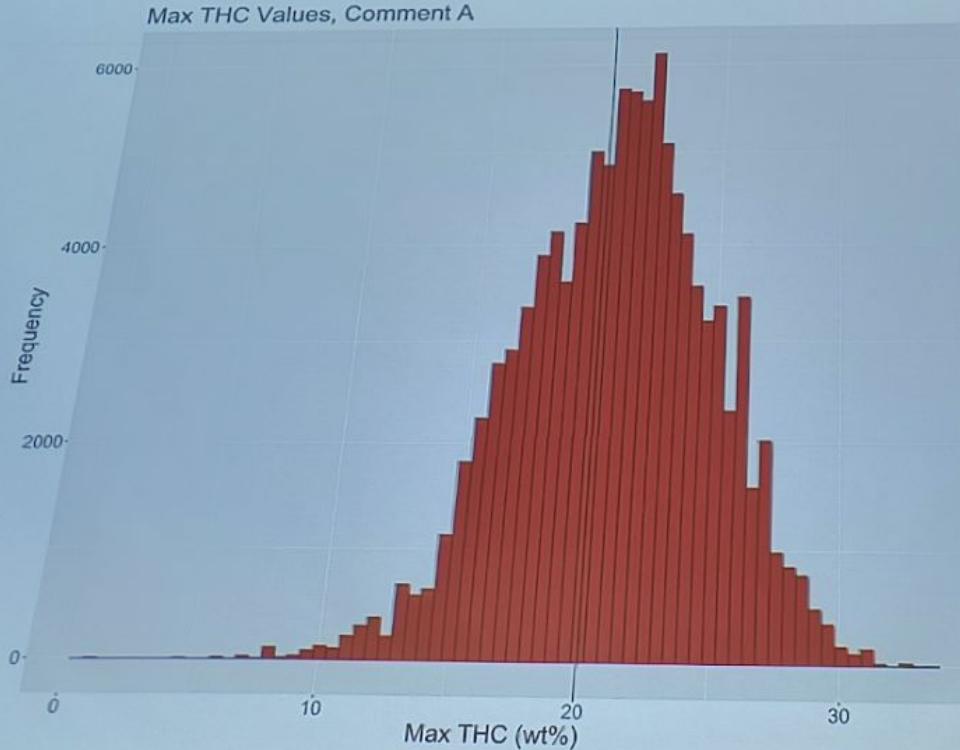


But we see Max THC Discontinuous distribution especially with 19% and 20%.
Note: 20% sells more than 19%

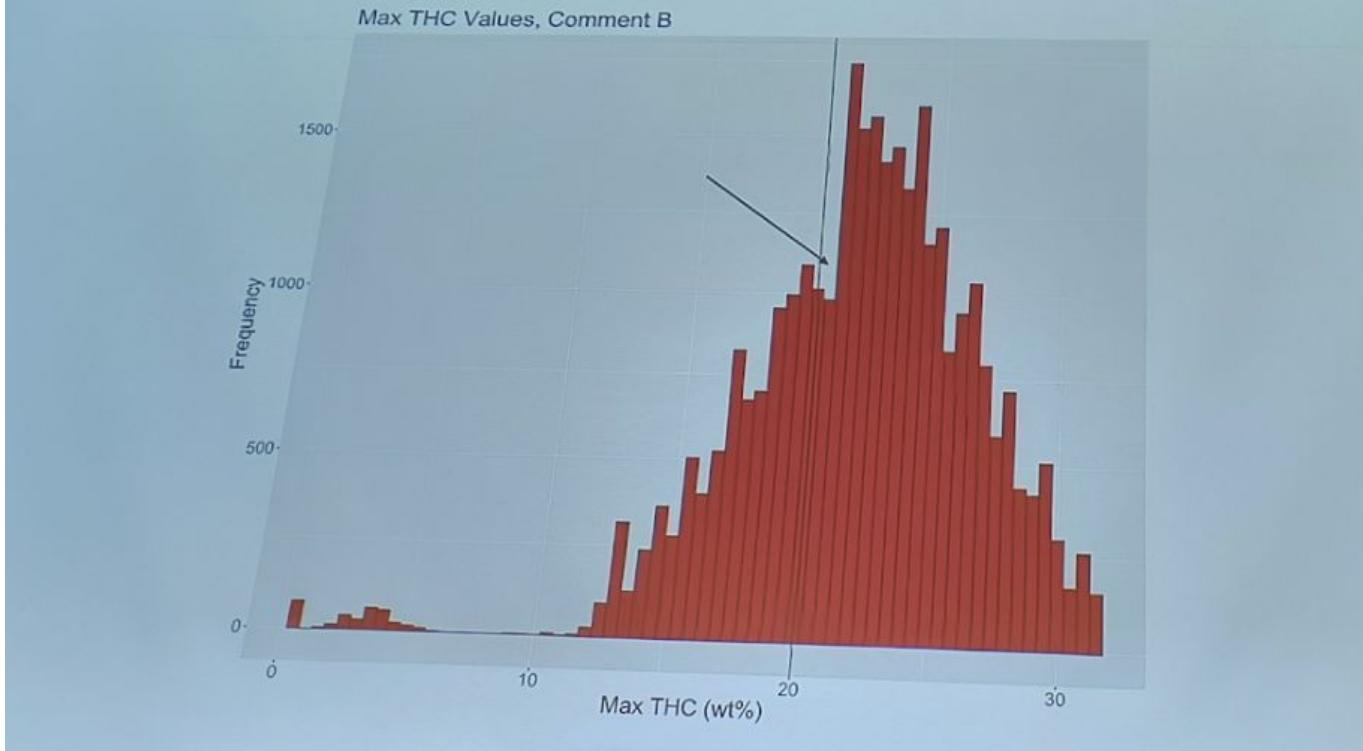
Label	THC_TPD	THC_Unit	THC_PCN	THC_TestResultLevel	THC_TestComment
1A40A010000044D000000198	2021-02-10	Grams	Buds	0.300	Weight based %; D9-THC result is 0.29%; D8-THC Not...
1A40A010000044D000000199	2021-08-10	Grams	Buds	1.200	Corrected data from previously entered results
1A40A010000044D000000201	2021-07-20	Grams	Buds	0.200	
1A40A010000044D000000204	2021-06-11	Grams	Buds	0.490	Weight based %; D9-THC result is 0.49%; D8-THC Not...
1A40A010000044D000000206	2021-07-20	Grams	Buds	0.500	
1A40A010000044D000000207	2021-07-29	Grams	Buds	0.556	Weight-based %; d9-THC
1A40A010000044D000000210	2020-11-03	Grams	Buds	0.200	Weight based %; D9-THC result is 0.18%; D8-THC Not...
1A40A010000044D000000211	2020-12-07	Grams	Buds	0.288	D9_THC = 0.288

Separation by comment

Separation by comment – example ‘normal’ distribution



Separation by comment – signatures of adulterated data



Separation by comment - signatures of adulterated data



Conclusions

- Testing labs serve cultivators
- Misinformation is common
- Off-the-shelf testing
- Big data analysis

Wow! MCR Labs “Science over Stigma” series are just wonderful! Wouldn’t you agree? Rock your Day! :-)