



# The MyDx White Paper

A Practical Review of the Cannabis Testing Industry  
**Where do we go from here?**

MyDx Inc. February 2016

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**This review contains three parts:**

- i. A Review of Current Testing Practices in the Cannabis Industry
- ii. MyDx Technology and its Applications in Cannabis Testing
- iii. Cannabis 2.0: Understanding Cannabinoids, Terpenes, the Endocannabinoid System, and How to Use Total Canna Profiles™ to Customize Therapeutic Effects and Overall Experiences

# Table of Contents

Part 1. <b>A Review of Current Testing Practices in the Cannabis Industry</b>	<b>4</b>
The Current Landscape	<b>4</b>
<i>A need for testing</i>	
<i>The tools of the trade</i>	
A Fragmented System	<b>6</b>
<i>How accurate is lab testing?</i>	
<i>Same strain, different results</i>	
Part 2. <b>MyDx Technology and its Applications in Cannabis Testing</b>	<b>8</b>
Background	<b>8</b>
MyDx Core Technology Overview	<b>9</b>
Under the Hood: The Nose Always Knows	<b>9</b>
MyDx Analogue and Digital System Electronics	<b>11</b>
<i>MyDx hardware sensitivity</i>	
Robust Sensor Technology	<b>12</b>
<i>Conducting polymer sensor arrays</i>	
Reference Database Population Methodology	<b>14</b>
<i>Sampling methodology</i>	
Results & Observations	<b>15</b>
<i>Unique terpene fingerprints</i>	
<i>Consistency &amp; accuracy data on MyDx devices</i>	
Part 3. <b>Cannabis 2.0: Understanding Cannabinoids, Terpenes, the Endocannabinoid System, and How to Use Total Canna Profiles™ to Customize Therapeutic Effects and Overall Experiences</b>	<b>17</b>
The Endocannabinoid System (ECS)	<b>17</b>
Cannabinoids	<b>20</b>
Terpenes	<b>21</b>
The Entourage Effect	<b>23</b>
MyDx: Welcome to Cannabis 2.0	<b>25</b>
Key Features of MyDx	<b>26</b>
Conclusion	<b>29</b>
Appendix 1: The Basics of Cannabis	<b>30</b>
Appendix 2: Explaining the Entourage Effect	<b>32</b>
Appendix 3: Recalibration and Nearest Chemical Profile Feature	<b>33</b>
Appendix 4: Email & Print Certificate of Analysis with MyDx	<b>34</b>
References	<b>35</b>



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# Part 1

## A Review of Current Testing Practices in the Cannabis Industry

### The Current Landscape

#### A need for testing

As of today, twenty-three states and Washington D.C permit the sale and use of cannabis for medicinal purposes and four states currently allow the use of recreational cannabis. As public opinion shifts, with 81% of Americans supporting the use of cannabis as a medical treatment and 49% supporting legalization for recreational use, this trend is expected to grow not only in the United States but in other countries as well<sup>1</sup>. The end of cannabis prohibition is within reach and at the benefit of millions of patients and recreational users, essentially spawning a new and thriving industry. Like any other industry, regulation and testing are needed in order to ensure consumer safety and in the case of cannabis, product consistency.



Adapted from: [www.shimadzu.com](http://www.shimadzu.com)

#### The tools of the trade

Traditional cannabis testing involves the use of sophisticated analytical instruments by laboratories to identify and quantify the levels of cannabinoids (namely THC – known as potency testing), terpenes, contaminants, residual solvents (in the case of cannabis extracts), and pesticides. **Table 1** summarizes the instruments used to test for cannabinoids, terpenes, residual solvents, microbes, and metals. **Table 2** shows the instruments used to test for pesticides in cannabis samples.<sup>1</sup>

**Table 1:** The instruments utilized in cannabis testing<sup>1</sup>

Analyte	Instrument Used
Cannabinoids	Thin layer chromatography (TLC), Gas chromatography (GC), Liquid chromatography (HPLC/UHPLC)
Terpenes	GC-FID
Residual solvents	Headspace GC, GC-FID
Microbes	Culture plating, immunochemical assays, quantitative polymerase chain reaction (qPCR)
Metals	Inductively coupled plasma mass spectrometry (ICP-MS)



**Table 2:** The instruments utilized in pesticide testing in cannabis samples<sup>1</sup>

Pesticide	Use	Instruments Used
Abamectin	Insecticide/acaricide (ticks and mites killer)	LC-FLD (fluorescence detector); LC-MS/MS
Acequinocyl	Insecticide/acaricide	LC-MS/MS
Bifenazate	Bifenazate	LC, LC-MS/MS
Bifenthrin	Insecticide	GC-ECD (electron capture detector); GC-MS/MS
Chlormequat chloride	Plant growth regulator (PGR)	LC (liquid chromatography); GC-MS/MS
Cyfluthrin	Insecticide	IC (ion chromatography), LC-MS/MS
Daminozide (Alar)	PGR	UV spectroscopy; LC-MS/MS
Etoxazole	Acaricide	GC-MS/MS
Fenoxycarb	Insecticide	LC/UV; LC-MS/MS
Imazalil	Fungicide	GC-ECD, LC-MS/MS
Imidacloprid	Insecticide	LC-MS/MS
Myclobutanil	Fungicide	GC-ECD; GC-NPD (nitrogen phosphorous detector); GC-MS/MS; LC-MS/MS
Paclobutrazol	PGR, fungicide	LC-MS/MS
Pyrethrins	Insecticide	GC-ECD
Spinosad	Insecticide	LC-MS/MS; immunoassay
Spiromesifen	Insecticide	GC-MS; LC-MS/MS
Spirotetramat	Insecticide	LC/LC-MS/MS
Trifloxystrobin	Fungicide	GC-NPD; GC-MS/MS; LC-MS/MS

Source: Environmental Protection Agency (EPA), American Herbal Pharmacopoeia (AHP), BofAML Global Research



# A Fragmented System

## HOW RELIABLE IS CANNABIS TESTING TODAY?

Adapted from: [www.potnetwork.com](http://www.potnetwork.com)

With no federal oversight at this point, each state is responsible for defining its own regulations and requirements surrounding cannabis testing, from the plant to the finished cannabis product. What has resulted is a fragmented and disjointed system that is, despite the best intentions, failing the very people it's trying to protect. New Mexico can't meet the demand for testing laboratories. In 2015, Colorado had more than a dozen product recalls due to pesticide contamination, despite having testing guidelines in place. What the labs are testing for, how they're testing, and the information reported to the patient or consumer is inconsistent at best and unreliable at worst.

*"What has resulted is a fragmented and disjointed system that is, despite the best intentions, failing the very people it's trying to protect."*

From process inconsistency and human error to 'gaming the system', commercial lab testing is volatile at the moment. There are good, credible labs and there are those who lack technical acumen. There are labs that unethically provide clients with the results they desire and expect rather than ones that are honest and accurate. For those driven by profiteering, it is shockingly easy to manipulate results; shake the bag of cannabis until the trichomes (those tiny crystals that cover the buds and are rich in THC) collect at the bottom. Smear a bud in them, start the test, and voila! High numbers! Profit motivation aside, sampling errors, flawed testing practices, and technical inconsistencies can also affect results substantially.

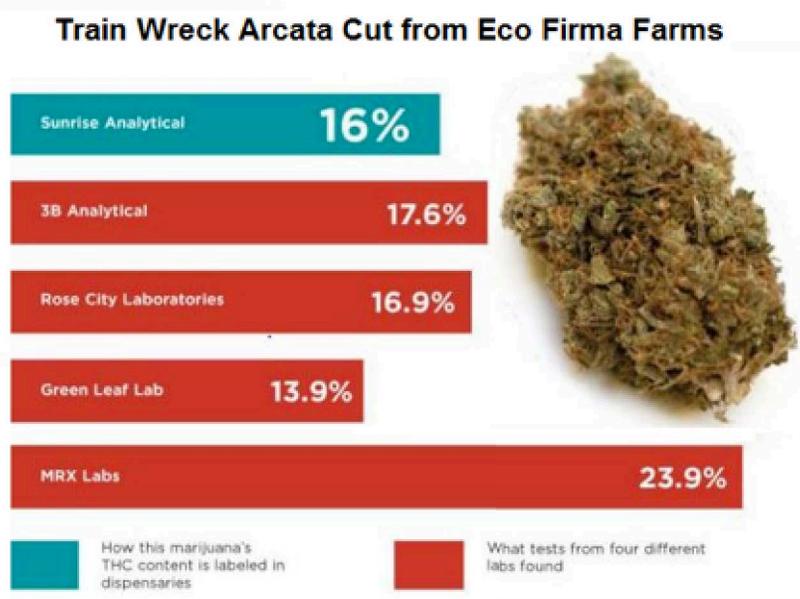
Some testing labs are even being driven out of business simply because they report honest results, rather than the results clients want. Time and time again a producer will abandon an honest testing lab for reporting "bad" results and test the same product at a competitor who passes and certifies every batch with "good" results (i.e. high in THC content). This lack of regulation can lead to a volatile environment where honest labs are put out of business by labs that are willing to give clients their desired results. Add to this the natural biochemical complexity of cannabis and the varying regulations and legislations that govern these labs, and getting honest, accurate, and reliable results that users can trust and verify seems out of reach at the moment.

That said, for the fortunate few who have easy access to cannabis testing facilities, they should take a moment to recognize and commend these labs for undertaking the risks involved with working with a Schedule 1 Drug. Furthermore, stepping outside of the United States, in many regions of world, it is practically impossible to test cannabis samples because there are no labs to support such analysis.



## How Accurate is Lab Testing?

The same sample of cannabis flower was tested at five different state approved cannabis testing facilities in Oregon and produced a wide variability in THC results from 13.9% to 23.9% as can be seen in **Figure 1** below. The CBD content varied from 0.003% to 1%.



Adapted from: *Willamette Week*

*“State-approved labs are often producing different results with the same samples, effectively invalidating the legitimacy of laboratory testing altogether.”*

**Figure 1:** Wide variability in THC potency received from five state approved cannabis testing facilities in Oregon.

The Journal of the American Medical Association recently found that only 17% of edible cannabis products were labeled accurately in San Francisco, Los Angeles, and Seattle. 23% of the products were under labeled and 60% were over labeled in terms of THC content. This is largely because state-approved labs are often producing different results with the same samples, effectively invalidating the legitimacy of laboratory testing altogether.<sup>2,3</sup>

Another issue facing testing labs today is producing homogeneity in a sample that is truly representative of one batch. Profit-motivated or unknowing clients will submit only the top part of their most robust plant and claim that this is representative of their entire crop, leading to inflated and misleading test results.<sup>4</sup>

The harder one looks, the clearer it becomes; cannabis testing labs – for the most part – are not as reliable and consistent as consumers would like, but could the plant itself be contributing to the challenge?

## Same strains, different results

Beyond testing practices, cannabis itself is complex and unruly— there is a wide variability in the chemical profile of a particular strain, and even when both samples are harvested from the same plant. Buds found at the top of the plant will have a different profile than the ones found tucked away near the bottom as a direct result of varying light exposure, temperature, and humidity. Knowing this, it should then come as no surprise to find that the Sour Diesel picked up from the dispensary six months ago could feel a little different than the one you picked up just last week.

This further proves the notion that even with consistent and reliable genetics, there can be a wide range of variability in a plant's total chemical profile.<sup>4</sup> For example, grow two clones cut from the same mother plant in slightly different environments and they will exhibit different chemical profiles, which will subsequently result in different effects in the user.

For cultivators, accurate and reliable testing during the final phases of cannabis growth cycle is critical. It can help them harvest at the ideal chemical profile and it can be used to demonstrate the quality of their final product to their clients prior to purchasing. For patients and consumers, accurate and reliable testing data is critical to ensuring a consistent and effective cannabis experience.



## Part 2

# MyDx Technology and its Applications in Cannabis Testing

## Background

The challenge for individuals and industry professionals alike has been the lack of a go-to resource for strain chemical profile data and associated effects. Scientific data collection is in its early stages, and there is a limited ability to capture reliable user-generated scientific information on a large scale—leaving people to rely on word-of-mouth or trial-and-error to find the strains that work best, by relieving specific conditions or producing targeted effects. As the cannabis community explores the complex world of cannabinoids and terpenes, reliable data and the ability to identify the detailed ‘cannabis profile’ of a given strain will be critical to helping people take advantage of cannabis’ increasing array of medicinal benefits.

These challenges and market dynamics have given rise to the next generation of cannabis testing: MyDx. This hand-held chemical analyzer introduces a new wave of on-demand analysis that is conducted directly by the user - offering an affordable, transparent, and reliable way to consistently test cannabis in the convenience of your own home, garden, or shop. This innovative handheld device allows users to analyze any strain’s Total Canna Profile™ (TCP), within minutes, giving them the information they need to predict how a strain will make them feel and what symptoms it will alleviate. MyDx is a practical option for patients, recreational users, dispensaries, commercial growers, and even small scale cultivators who want to analyze their cannabis at a primary screening level before proceeding to provide their samples to a traditional testing lab – if further analysis is needed.

Imagine being able to test the chemical profile of your garden as it grows or testing cannabis potency for your dispensary patrons right before their eyes. That is the kind of transparency and convenience that we can all rally behind. By allowing anyone to test their cannabis at any time, MyDx is empowering the industry with access to affordable testing for all.



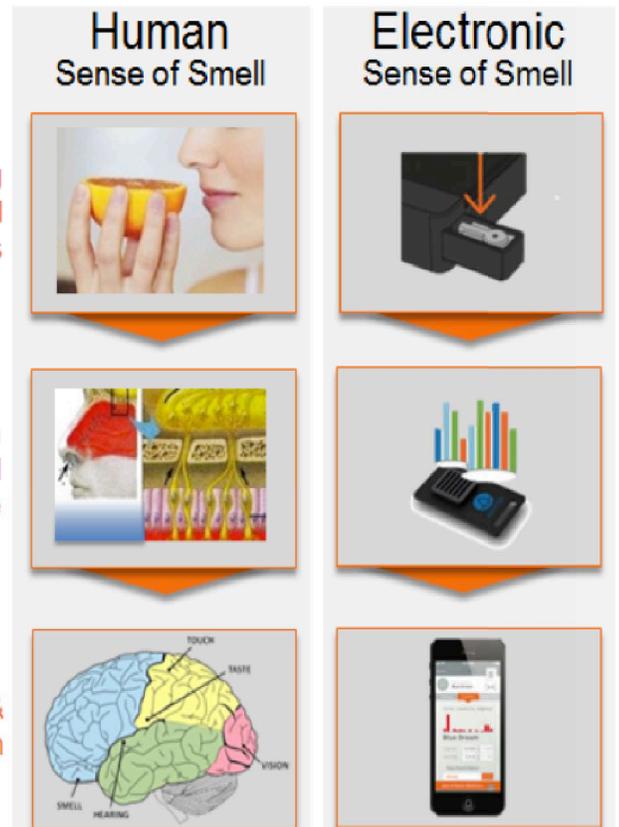
*“Imagine being able to test the chemical profile of your garden as it grows or testing cannabis for your dispensary patrons right before their eyes. That is the kind of transparency and convenience that we can all rally behind.”*



# MyDx Core Technology Overview

MyDx is a battery-powered chemical analyzer, slightly larger than a smartphone, fitted with functionalized sensors that are being programmed to test samples of food, air, water, and cannabis in order to identify chemicals of interest. To analyze cannabis, the CannaDx sensor measures cannabinoid and terpene contents, forming a Total Canna Profile™ (TCP), which is then delivered to the CannaDx App.

Built from a combination of patented technologies originally developed by the Jet Propulsion Laboratory and implemented by NASA, MyDx uses electronic nose nanotechnology to 'sniff out' chemicals in nearly any solid, liquid, or gas form. This technology essentially mimics the human sense of smell wherein chemical vapors are analyzed and converted into electrical signals that are then interpreted by the brain.



This same concept applies to MyDx; insert a 50mg sample of cannabis and the CannaDx sensor will analyze THC, CBD, CBN, and 20+ terpenes in the chemical vapors present. The resulting analysis, or TCP, provides a summary of the medically relevant cannabinoids and terpenes in the sample which have been shown to play a key role in the resulting cannabis experience. The CannaDx App then interprets this information, allowing a user to track and predict how the sample will make them feel and what symptoms it will alleviate. This system effectively enables users to hone in on the strains, or TCPs, that work best for them.

## Under the Hood: The Nose Always Knows

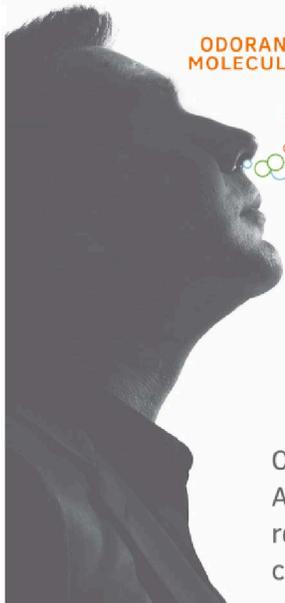
MyDx is engineered to act as a portable electronic nose that is able to detect molecules in vapor. When a cannabis sample is placed into the MyDx testing chamber, it is analyzed using our gas-flow-over-the-sensor system that supports the chemical release process, essentially volatilizing the compounds for analysis by our formulated polymer based sensors.

The vapors cause swelling, which induces quantifiable resistance changes at a sensitivity up to 500 parts per billion. Within minutes, an in-depth analysis of the sample is sent to the CannaDx App, including exactly what the information means and why users should care.

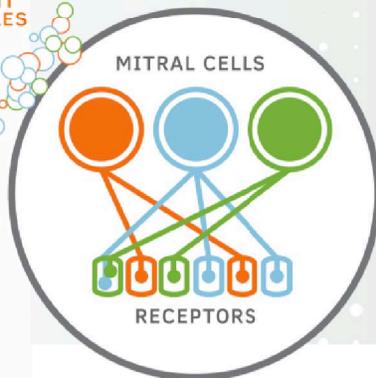


# THE TECHNOLOGY

behind **MyDx** (My Diagnostic)  
the first **PORTABLE ANALYZER** for *everyone*.



ODORANT  
MOLECULES



## How does it work?

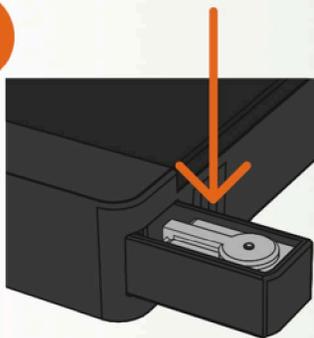
MyDx mimics the way we naturally detect scents.



Our bodies have **1,000 chemically different types of odorant receptors**. A single receptor recognized multiple odorants and a single odorant is recognized by multiple receptors. Odorants may be identified by pattern combinations of activated receptors.

### 1 THE TESTING CHAMBER CREATES VAPOR

1



Acting as an electronic nose, **MyDx is engineered to detect molecules in vapor**. The sample that is placed in the MyDx device is analyzed by multiple sensors exposing the chemicals that are present.

### 2 INSULATING MATERIAL EXPANDS

2



The vapors cause swelling which induce resistance changes. MyDx is able to quantify chemicals to within 20% of conventional gas chromatography instrument values. Our subsequent generation devices and **sensors will target a marginal error rate within 5% of GC values**.

### 3 SENSORS PRODUCE DIFFERENT RESPONSE PATTERNS

3

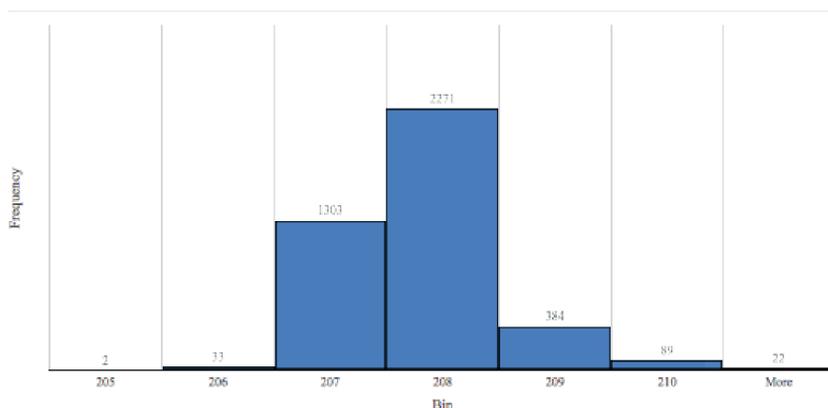


Within seconds, the app will provide you with an in-depth analysis of the sample, including exactly what the information means and why you should care.



# MyDx Analogue and Digital System Electronics

As shown in the photo, the MyDx conducting polymer sensors are electronically connected to an analogue and digital electronics board that reads the resistance change from the sensor and transmits digital delta R/R data via Bluetooth to an iOS, Android, or Windows application, which transmits this data via a network to our cloud servers for storage and analysis.



**Figure 2: The ENOB measurement of MyDx**

**MyDX 24 BIT ADC EFFECTIVE NUMBER OF BITS. ENOB = 21.70 bits, Peak-to-Peak Electrical Noise = 4.90lsb, RMS noise = 0.94lsb**

The hardware's overall performance is about 22bits Effective Noise Bits (ENOB) out of 24 bits without any filtering. **Figure 2** shows the ENOB measurement for MyDx to measure its intrinsic electrical noise. Each least significant bit (LSB) is approximately 298nV, and based on the plot below it can be inferred the combined electrical noise intrinsic to the system is around 1.46uV. This implies that signals above 2uV changes in the sensor are detected with this hardware. Improvements to the noise level can be further reduced by the introduction of a moving average filter, though MyDx does not use it currently.

## MyDx hardware sensitivity

MyDx hardware uses state-of-the-art mixed signal electronic hardware capable of conditioning an array of chemical sensors to sense down to 2ppm signal change. The hardware uses a low electrical noise analog front-end to interface with the sensors, and amplify their signal changes in order to be quantized by a 24-bit analog-to-digital converter. The measured data is extracted by the on-board micro controller where it is transported to a Bluetooth low energy module for wireless transmission.



# Robust Sensor Technology

## Conducting polymer

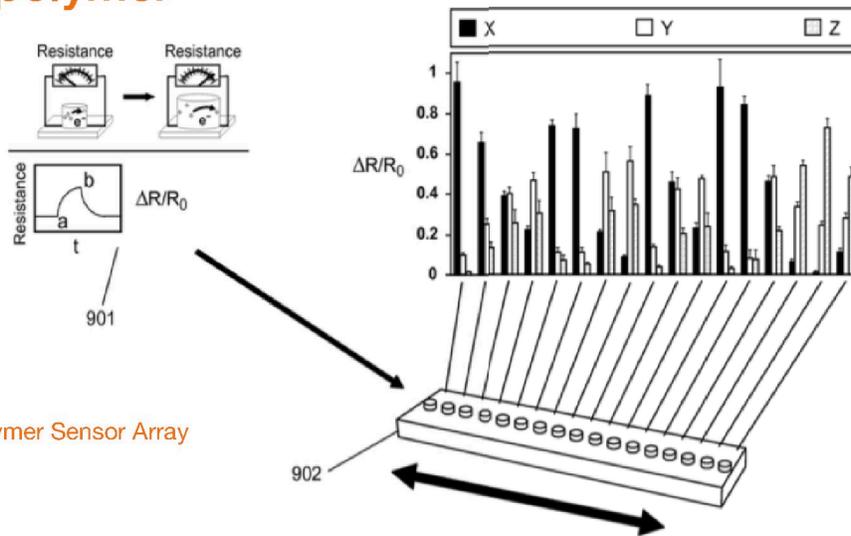
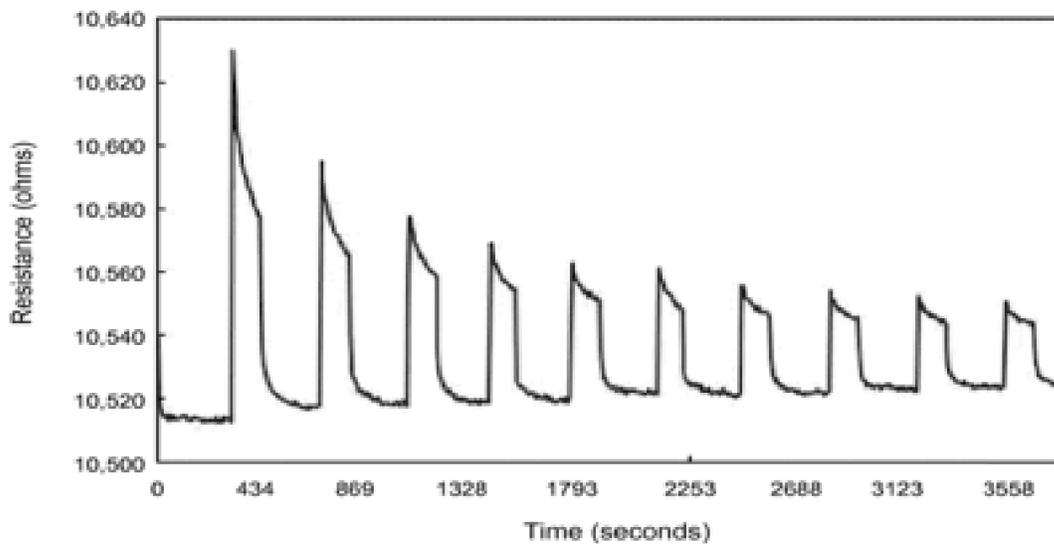


Figure 3: Conducting Polymer Sensor Array

By using a variety of sensors that are coated with different sensor films, we are able to detect numerous analytes due to their varying reactions at those sensors. This sensor profile response can then be correlated to the characteristics of a specific analyte. As shown in **Figure 3**, each individual sensor can be thought of as a unique sensor film coated on an electrode (**901**) in an array of sensors (**902**) that have different formulated coatings. A suitably produced sensor array (**902**) will result in a unique profile of  $\Delta R/R_0$  responses (resistance change) for each analyte measured by the low noise MyDx Analyzer components. As shown in **Figure 3**, analytes X, Y, and Z can be distinguished from each other by their unique sensor array response profiles. At 8-bit resolution, more than 1048 distinct profiles are theoretically possible for a 16-sensor array.<sup>5</sup>

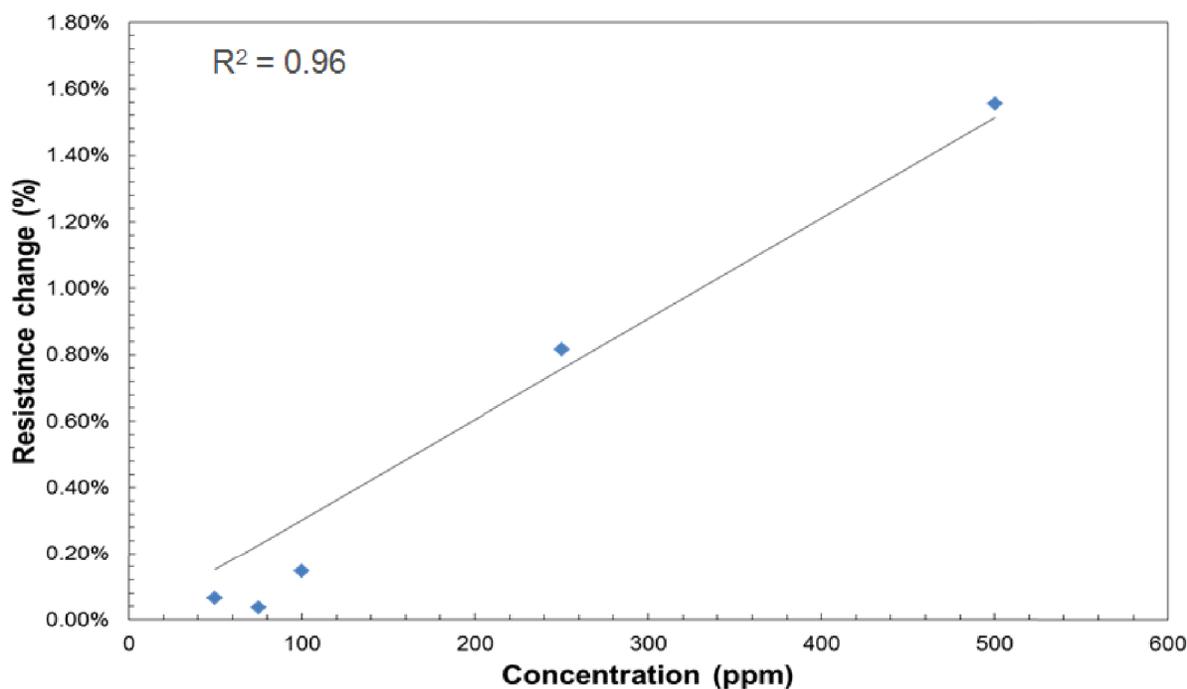
Figure 4: Repeated sensor exposure to same cannabis sample (chemical depletion occurs with each exposure).



As illustrated in **Figure 4**, a typical sensor response as a result of 10 sequential exposures of the same 50 mg of a ground sample of cannabis. As can be seen, the depletion of available terpene VOC's after each 2 min exposure of 200 ml/min of gas flow results in a corresponding smaller sensor response after each exposure. As a result, we instruct users to test samples only once, as they should expect a slightly different response after repeated tests.

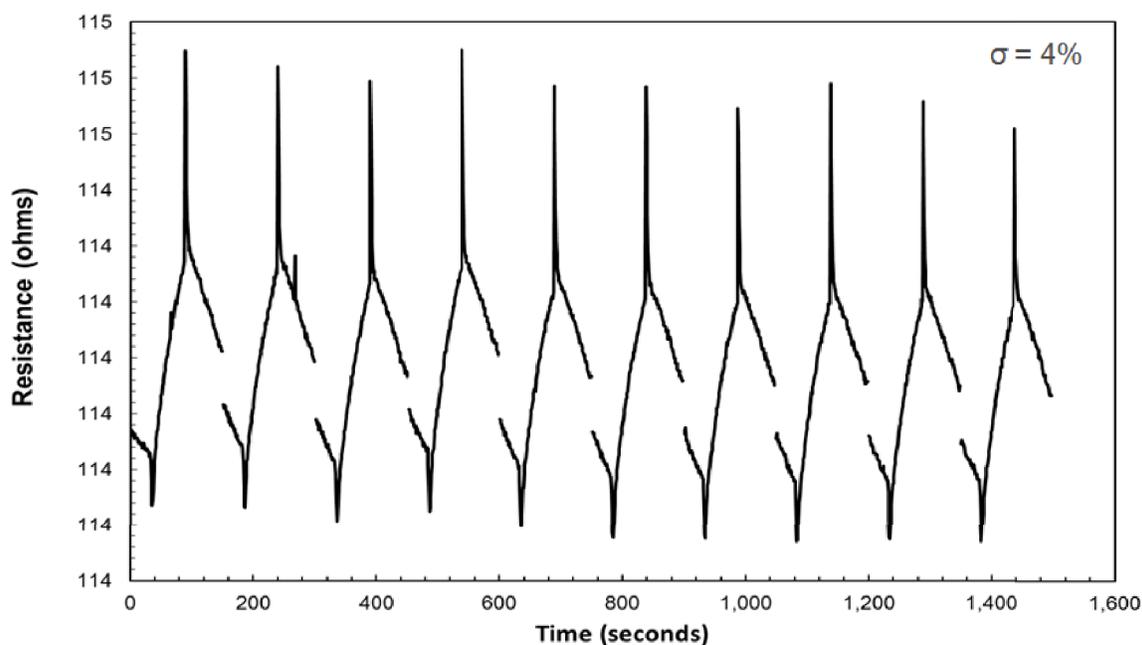


**Figure 5:** Linear relationship between changes in resistivity and alpha-pinene concentration at Channel 16.



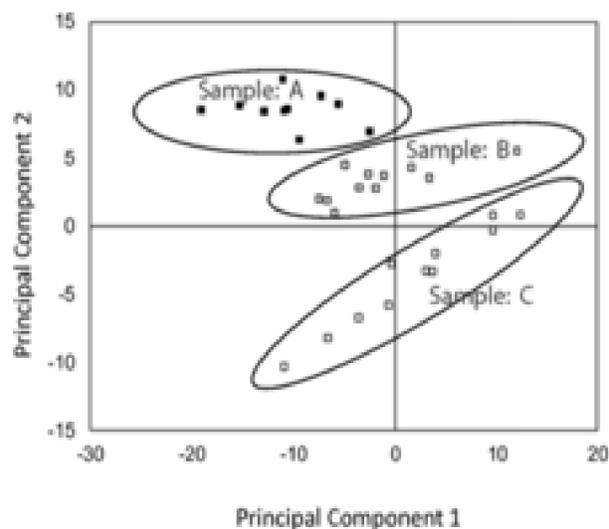
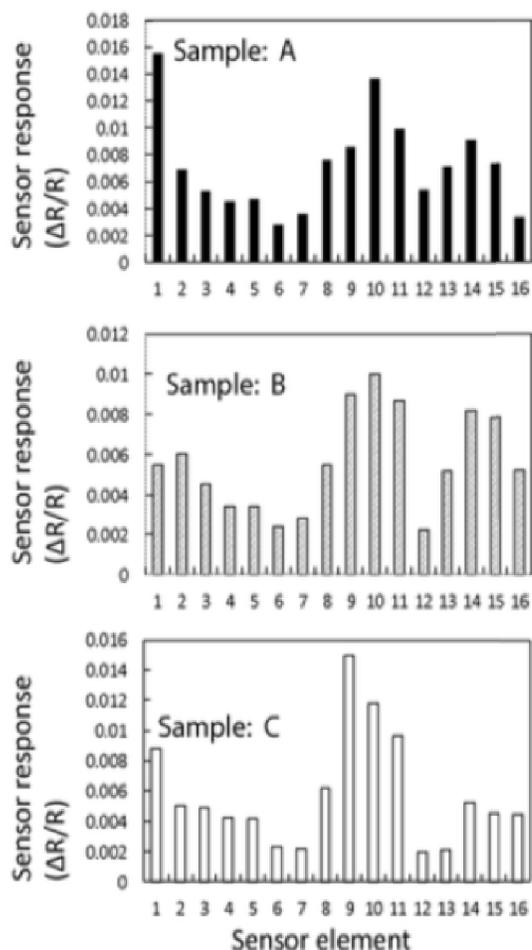
As shown in **Figure 5**, a linear relationship exists between alpha-pinene concentration and measured sensor response (change in resistance). An R2 value of 0.96 indicates good accuracy and a low margin of error. This linear relationship allows MyDx to interpret changes in resistivity into analyte concentration.

**Figure 6:** Reproducibility for limonene at a concentration of 100 ppm at Channel 4 ( $\sigma = 4\%$ ).



As shown above in **Figure 6**, repeated exposure to the same concentration of limonene showed a high level of reproducibility with a variance of 4%. This demonstrates consistent sensor response from sample to sample. Depending on the formulation, sensor response returned to baseline typically on the order of 2 minutes of air exposure but some sensors required up to 30 minutes to return to true baseline. No degradation of sensor elements was observed even after





**Figure 7:** Sensor response for 3 unique cannabis samples **A, B, and C** (shown on the left) as well as PCA analysis to uniquely identify them (shown on the right).

As seen in **Figure 7**, even though sensor responses look similar, PCA analysis shows Samples A, B, and C can be differentiated using two principle components despite the sample-to-sample variance that results across the same sensor. One channel may react to multiple terpenes; because of this we need sophisticated algorithms capable of detecting channel interdependency and multiple terpene presence.

## Reference Database Population Methodology

We secured over 350 unique strains of cannabis from dispensaries in California and Arizona. A reference database was compiled by calculating the actual chemical composition of these strains using gold standard Gas Chromatography (GC) methodologies published by Restek Corporation ([www.restek.com](http://www.restek.com)) and correlating that data with MyDx's 16 channel sensor response patterns to generate a Delta R/R fingerprint of the same exact sample. We tested for 3 cannabinoids and 20+ terpenes found in the plant using GC. We exposed 10 replicates of 50 mg of cannabis flower to generate a MyDx fingerprint for each strain.

By applying specific algorithms to sensor formulations developed in collaboration with our partner, Next Dimension Technologies based in Pasadena, CA, we have identified proprietary polymer formulations on our sensors that are most effective for analyzing cannabis samples. Next generation sensors will build on this foundation to improve accuracy and specificity for various analytes in cannabis.



# Sampling methodology

The following sampling procedures were used for each strain of cannabis secured:

1. One strain of cannabis flower was purchased from a local dispensary in California.
2. 500 mg of the same sample was provided to our local testing lab (SD Pharm Labs) for analysis via Gas Chromatography.
3. 50 mg of flower sample was ground against the rim of a MyDx Sample Insert and filled to the brim.
4. Step 3 was repeated 10 times with 10 Sample Inserts.
5. The MyDx Software was used to measure 10 samples across 10 different devices and sensors.
6. The MyDx Total Canna Profile signatures generated were processed via our signal processing and algorithm software to report the individual chemicals quantities detected.



In the MyDx system, sensors are exposed to three phases: baseline air for 60 seconds, then exposed to sample for 2 minutes, and a final baseline flush of 2 minutes and 15 seconds through the use of software controlled solenoid valve built into the MyDx system. Results are displayed within the CannaDx App after approximately 3 minutes while the system flush occurs in the background.

## Results & Observations

### Unique terpene fingerprints

Terpene fingerprints uniquely identify cannabis strains. After analysis of 350 fingerprints, we were able to ascertain the following: of the 43 total terpenes being tested in cannabis flower, we are currently testing over 20 terpenes using gas chromatography methods developed, and we have focused on formulating our sensors to target these terpenes in the MyDx Analyzer Generation 1, Rev 2.

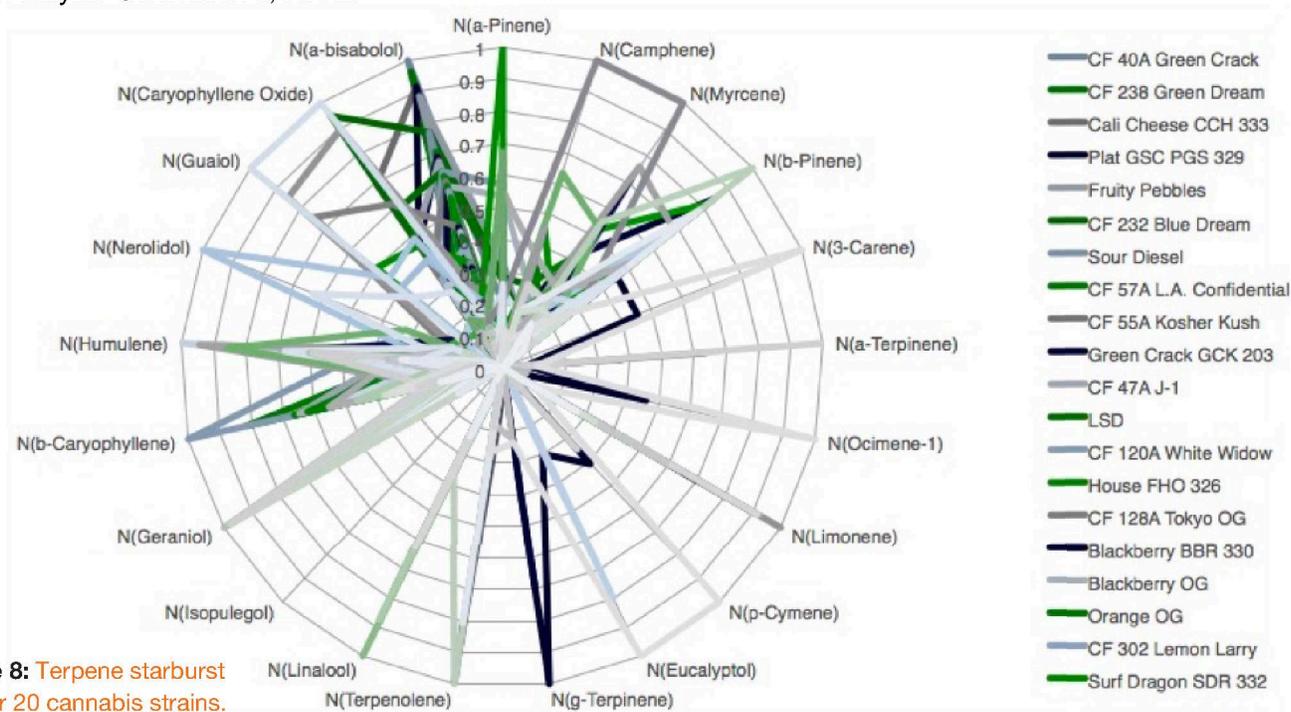


Figure 8: Terpene starburst plot for 20 cannabis strains.



Using the terpene starburst plot shown in **Figure 8**, we demonstrate visually how each cannabis strain has a unique terpene fingerprint, which can be detected by the MyDx Analyzer.

## Consistency & accuracy data on MyDx devices

Our Target System Accuracy is 80% or more as compared to an established gold standard instrument (gas chromatography) and our Target Variance is 20% or less. Future generations of MyDx will reduce this Target Variance to 5%. Less variance = more consistency. **It is important to note that our data will only be as accurate as the reference database, which is currently based on the accuracy of our lab testing partners.**

Run #	Testing Method/Device	Strain Sample	Total THC (%)	Relative Accuracy*	Total CBD (%)	Relative Accuracy*	Total CBN (%)	Relative Accuracy*
	<b>Lab Gas Chromatography</b>	<b>Girl Scout Cookies</b>	<b>16.83</b>	<b>100.0%</b>	<b>0.48</b>	<b>100.0%</b>	<b>0.08</b>	<b>100%</b>
1	MyDx Device 1 - Sensor 101	Girl Scout Cookies	18.15	92.8%	0.093	19.4%	0.09	88.9%
2	MyDx Device 2 - Sensor 102	Girl Scout Cookies	16.71	99.3%	0.133	27.7%	0.048	60.0%
3	MyDx Device 3 - Sensor 103	Girl Scout Cookies	15.08	89.6%	0.09	18.8%	0.1	80.0%
4	MyDx Device 4 - Sensor 104	Girl Scout Cookies	16.21	96.3%	0.153	31.9%	0.06	75.0%
5	MyDx Device 5 - Sensor 105	Girl Scout Cookies	15.03	89.3%	0.065	13.5%	0.04	50.0%
6	MyDx Device 6 - Sensor 106	Girl Scout Cookies	18.92	88.9%	0.196	40.8%	0.064	80.0%
7	MyDx Device 7 - Sensor 107	Girl Scout Cookies	17.00	99.0%	0.083	17.3%	0.06	75.0%
8	MyDx Device 8 - Sensor 108	Girl Scout Cookies	18.90	89.1%	0.108	22.5%	0.104	76.9%
9	MyDx Device 9 - Sensor 109	Girl Scout Cookies	15.11	89.8%	0.105	21.9%	0.055	68.8%
10	MyDx Device 10 - Sensor 110	Girl Scout Cookies	16.21	96.3%	0.145	30.2%	0.07	87.5%
	<b>Average Across 10 Sample Runs</b>		<b>16.73</b>	<b>93.0%</b>	<b>0.12</b>	<b>24.4%</b>	<b>0.07</b>	<b>74.2%</b>
	<b>Variance (Std Deviation/Average)</b>		<b>9%</b>		<b>34%</b>		<b>32%</b>	

**Figure 9:** Results obtained from the strain “Girl Scout Cookies” across 10 MyDx Devices.

As seen above in **Figure 9**, in the case of 10 MyDx analyzers testing the Girl Scout Cookies strain, the resulting variance was found to be 9%. Note this test is a representative sample of just one strain and how it performed using the MyDx system. We have run hundreds of strains and thousands of runs using a similar procedure. In many cases as can be seen in the population data below in **Figure 10**, but not all cases, we see similar results.

MyDx Accuracy compared to GC Reference Lab Data						
	Average Accuracy	Average Consistency	Min Range	Max Range	# Tests within 80% Accuracy	Total Tests
THC	83.70%	7.79%	11.741	23.782	985	1571
Eucalyptol	75.88%	9.03%	0.049	0.086	61	174
Carene	69.61%	16.56%	0.04	0.093	66	185
Guaiol	68.55%	18.51%	0.827	3.021	551	1921
Camphene	65.39%	23.47%	0.011	0.046	242	1010
P-Cymene	61.93%	38.06%	0.061	0.465	62	293
CBN	60.10%	33.55%	0.045	0.324	321	1571
Alpha Bisabolo	59.07%	23.20%	0.217	1.156	204	882
Camphor	59.04%	28.32%	0.041	0.235	233	1206
Myrcene	57.04%	29.30%	0.053	0.385	302	1668
Humulene	54.79%	36.58%	0.006904	0.08219	109	578
Linalool	54.52%	32.01%	0.27105	3.0907	150	864
Limonene	52.76%	30.96%	0.071	0.49	159	1054
Terpinolene	52.47%	25.59%	0.324	1.605	139	878
Caryophyllene Oxide	50.29%	32.89%	0.084	0.550	96	714
Fenchol	50.29%	32.89%	0.08355	0.54952	96	714
Nerolidol	48.20%	46.28%	0.038	0.434	250	1811
Beta Pinene	43.61%	34.82%	0.084	1.158	109	955
CBD	42.26%	107.73%	0.039	2.263	201	1571
Alpha Pinene	38.74%	51.42%	0.029	0.869	164	1822
Beta Caryophelene	38.15%	107.28%	0.056	9.993	391	2631
Alpha Borneal	17.73%	55.79%	0.051	2.971	20	604

TARGET CONSISTENCY <20%  
 TARGET ACCURACY >80%

Consistency = Variance/Mean

**Figure 10:** Population data highlighting consistency and relative accuracy of analyte quantification.

In conclusion, we generally see relatively good accuracy and consistency numbers for THC and we are getting closer to achieving our targets on other chemicals we are reporting, especially in the most common range of profiles where our strain reference database is strong (between 11%-24% for THC). We need more efforts to improve our CBD accuracy, as well as to capture samples in the extremely high or extremely low THC ranges. We are currently reporting 3 cannabinoids and 20+ terpenes. As we update our database and improve our algorithms, consumers will be able to update their results of previously tested samples using our new Recalibrate Results feature in the App (see **Appendix 3**).



## Part 3

# Cannabis 2.0: Understanding Cannabinoids, Terpenes, the Endocannabinoid System, and How to Use Total Canna Profiles™ to Customize Therapeutic Effects and Overall Experiences

As most users know, cannabis experiences can vary greatly in terms of physiological effects and overall characteristics. These variations arise from three main factors: the cannabinoid and terpene content of the cannabis and the user's native endocannabinoid system. MyDx monitors these factors closely by first providing users with a Total Canna Profile™ (TCP) of the analyzed sample – giving them raw terpene and cannabinoid content data, and associating that data with how this sample made them feel or what it helped them relieve.

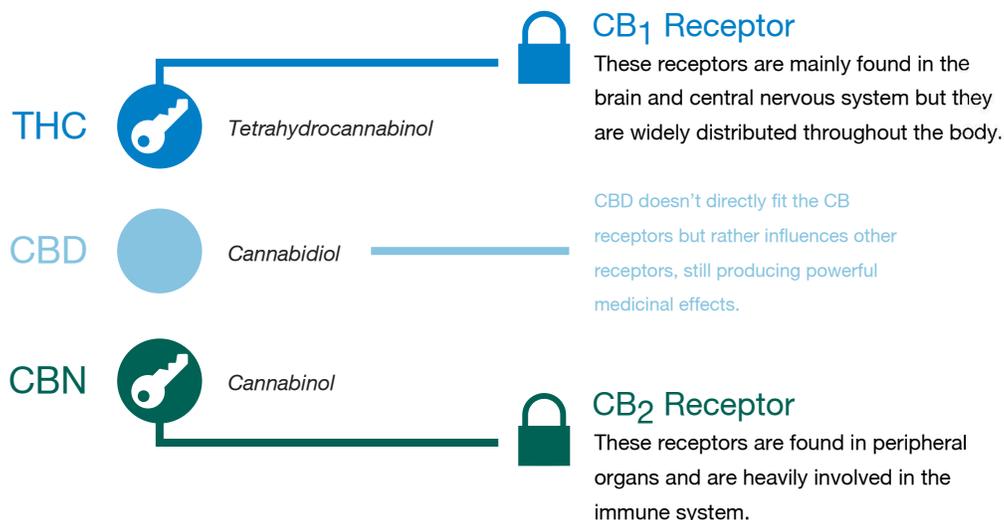
*This system will essentially allow users to customize their cannabis depending on how they would like to feel or what symptoms they would like to relieve. Welcome to Cannabis 2.0.*

Utilizing Cannabis 2.0 means users must understand how a Total Canna Profile™ works; which requires familiarity with a few basics on cannabinoids, terpenes, the endocannabinoid system, and lastly how these components all come together to deliver a unique cannabis experience.

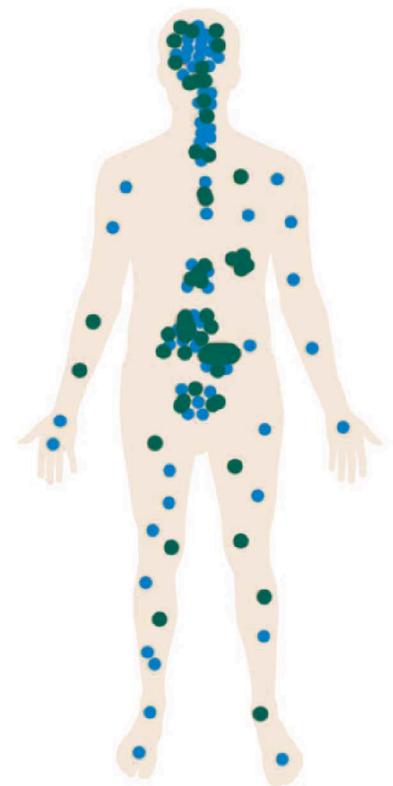
## The Endocannabinoid System (ECS)

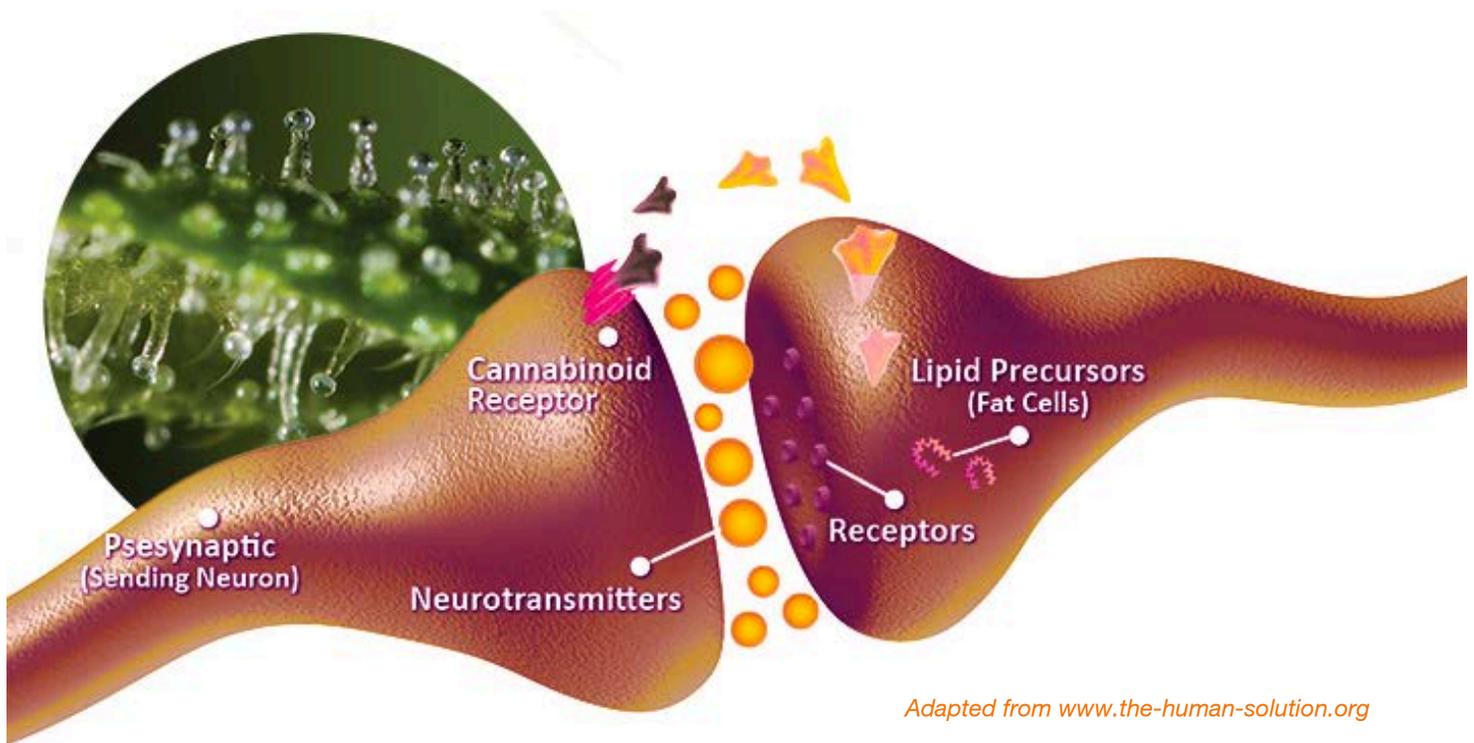
### The Human Endocannabinoid System

The endocannabinoid system (ECS) is a network of receptors, ligands, and enzymes that help regulate a myriad of functions within your body. Cannabinoids such as THC, CBD, and CBN fit receptors already found in your body like a key fits into a lock. When these cannabinoids bind the magic happens!



Receptor Distribution in the Human Body





**Figure 11:** A simplified diagram of the endocannabinoid system.

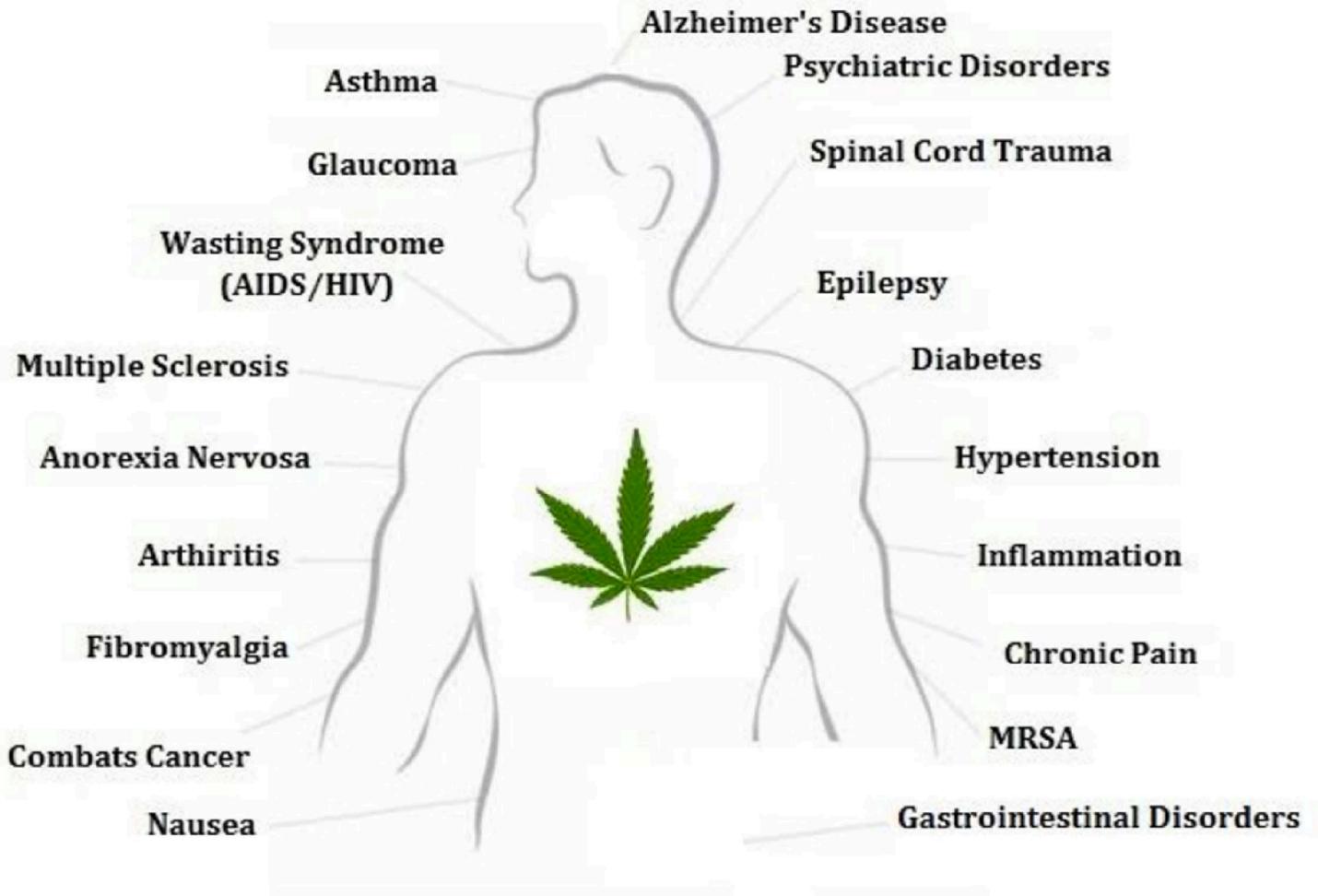
The endocannabinoid system (ECS) is a network of receptors, enzymes, and ligands that help regulate a variety of functions within your body.<sup>6</sup> This system (depicted in **Figure 11**) is activated by ligands known as cannabinoids. There are two types of cannabinoids: endocannabinoids (cannabinoids naturally produced by your body) and phytocannabinoids (cannabinoids originating from cannabis). Research shows that the ECS is not only influenced by cannabinoids but also by other organic compounds known as terpenes. This total effect is referred to as the entourage effect.<sup>22</sup>

The ECS has been implicated in a wide variety of physiological and pathophysiological processes including neural development, immune function, inflammation, appetite, metabolism and energy homeostasis, cardiovascular function, digestion, bone development and bone density, synaptic plasticity and learning, pain, reproduction, psychiatric disease, psychomotor behavior, memory, wake/sleep cycles, and the regulation of stress and emotional state.

Therefore, cannabinoids (and other allosteric compounds such as terpenes) can theoretically be used as novel therapeutics in any disease in which any of the previously mentioned processes is affected. Such diseases and ailments include: **nausea and vomiting, wasting syndrome (AIDS), lack of appetite (exhibited in cancer and AIDs patients as well as patients suffering from anorexia nervosa), multiple sclerosis, spinal cord trauma, epilepsy, pain, arthritis (and other musculoskeletal disorders), movement disorders, glaucoma, asthma, hypertension, psychiatric disorders, Alzheimer's and dementia, general inflammation, gastrointestinal disorders,** and very likely, many, many more (shown in **Figure 12**).<sup>6</sup>



## Potential Therapeutic Applications of Medicinal Cannabis



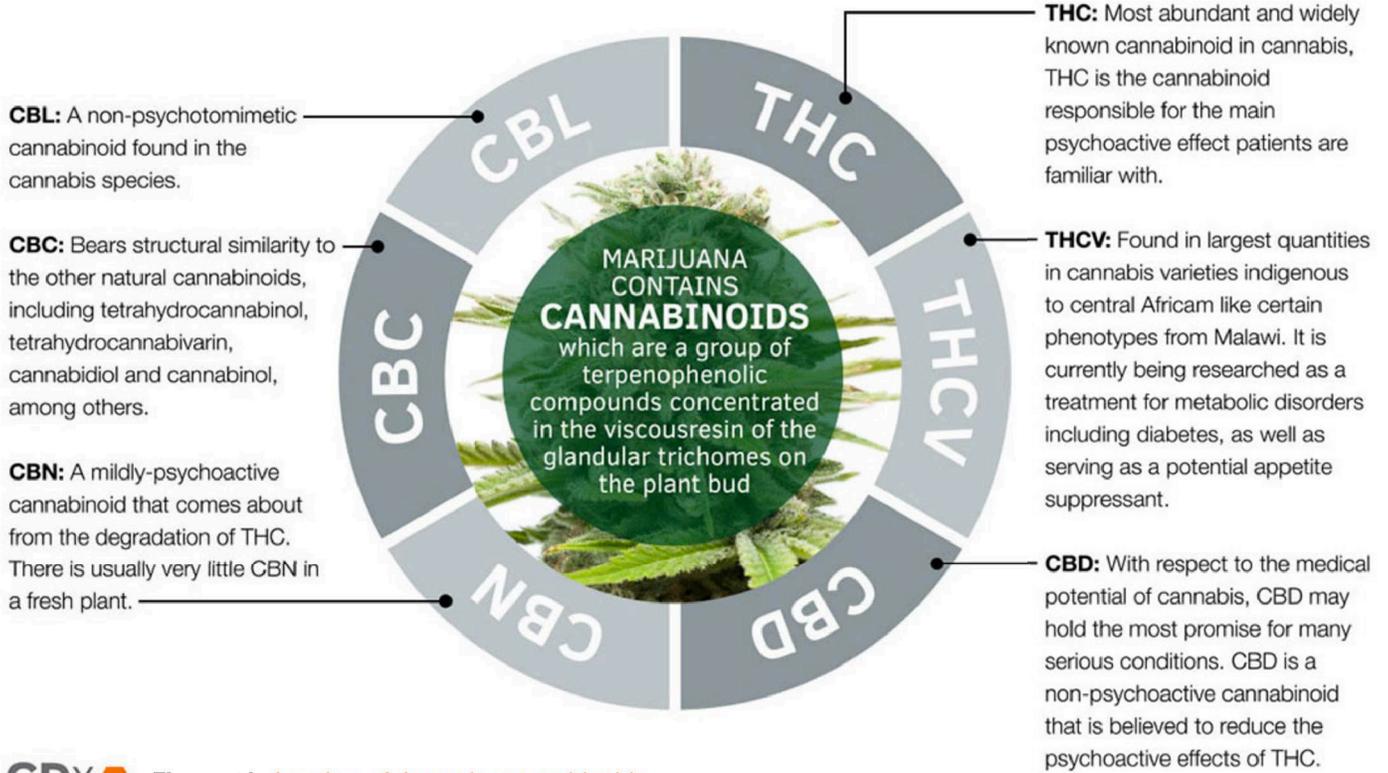
*Adapted from: [www.MedicalJane.com](http://www.MedicalJane.com)*

**Figure 12:** This diagram illustrates some the potential therapeutic applications of medical cannabis.

As we learn more and more about the ECS, our ability to develop novel and targeted cannabis-based therapeutics increases. Studying our own bodies allows us to better tailor this complex plant to match our individual needs. MyDx will allow users to do just that, by analyzing the contents of their cannabis they can track and predict how a particular strain makes them feel or what symptoms it alleviates. This device will help users understand the fundamentals of cannabinoids and terpenes and how they work in the human body.



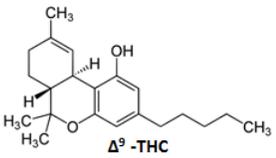
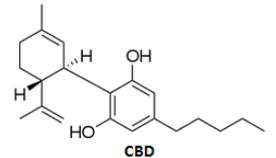
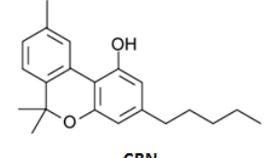
# Cannabinoids



**CDX** **Figure 13:** A review of the major cannabinoids.

Cannabinoids, such as tetrahydrocannabinol (THC) and cannabidiol (CBD) (summarized in **Figure 13**), are molecules that target receptors found throughout the body providing relief to an array of symptoms including pain, nausea, and inflammation.<sup>6</sup> The principal cannabinoids found in cannabis are THC, CBD, and cannabinal (CBN).<sup>6</sup> For an overview of the cannabis plant please see **Appendix 1**. These natural compounds account for the primary effects of cannabis and therefore are more popular and well-studied than terpenes, which have also been shown to play a major role in the effects observed by the user. The principal cannabinoids and their physiological effects are summarized below in **Table 3**.

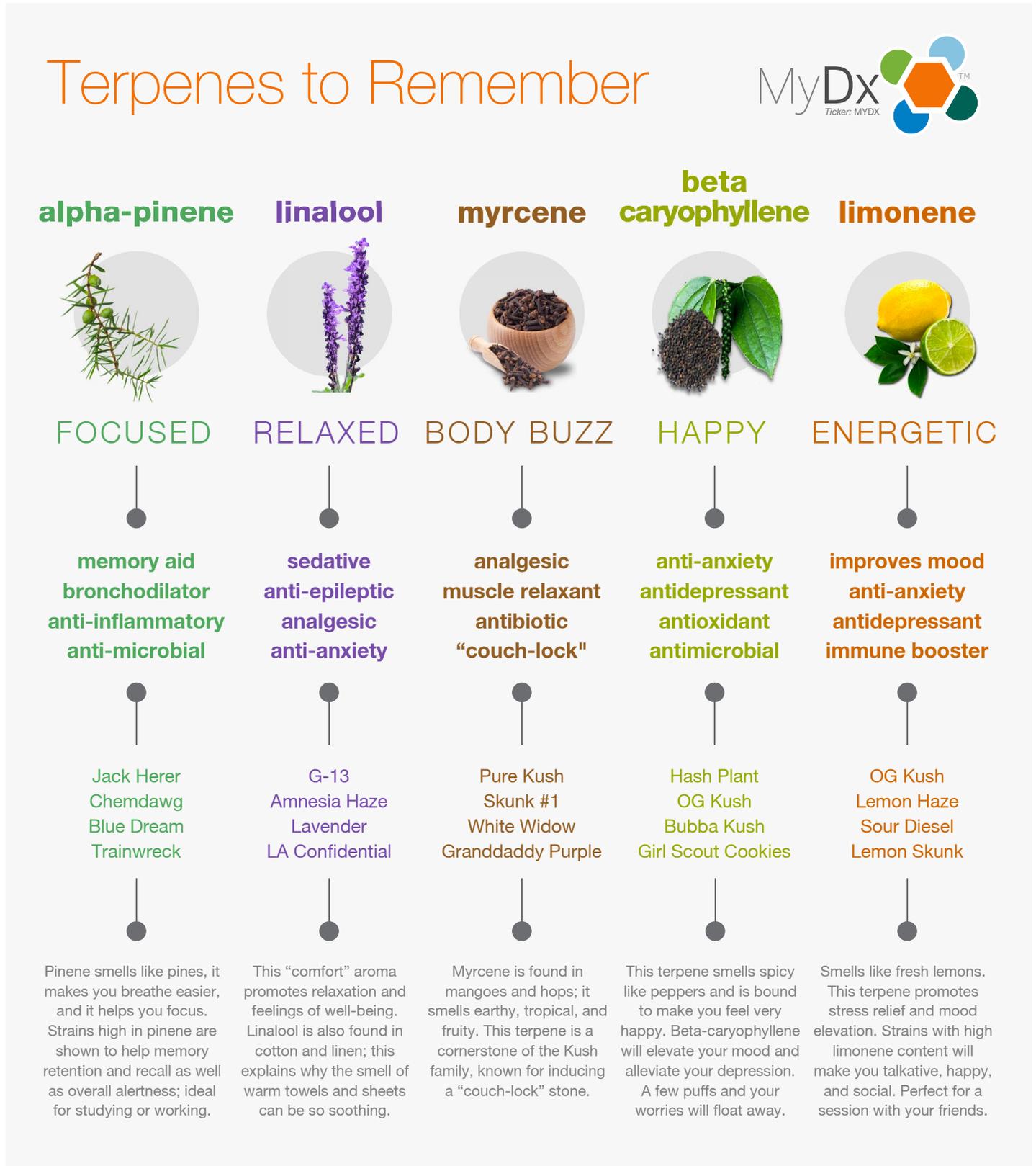
**Table 3:** This table summarizes the therapeutic potential of the principal cannabinoids.

Principal Cannabinoids	Description	Alleviates	Makes User Feel
 <p><b>Δ<sup>9</sup>-THC</b></p>	Tetrahydrocannabinol is the primary psychoactive compound found in cannabis. <sup>7,8</sup> This cannabinoid is by far the most well studied and understood component of cannabis. It is extremely safe; not a single case of overdose has been attributed to THC (or to cannabis as a whole) despite its widespread use. <sup>7,9</sup>	migraines, pain, stress, depression, epilepsy, asthma, inflammation <sup>8</sup>	happy, social, relaxed
 <p><b>CBD</b></p>	Cannabidiol is largely considered to be the most medically significant. <sup>7</sup> CBD is non-psychoactive, meaning that unlike THC, CBD does not produce a high. In fact, CBD has been shown to mitigate some of the negative effects of THC, contributing to the entourage/ synergistic effect. <sup>9</sup>	migraines, pain, epilepsy, anxiety, stress, depression, insomnia, inflammation <sup>7,8</sup>	happy, social, relaxed
 <p><b>CBN</b></p>	Cannabinal is shown to have very mild psychoactive effects. Research shows that THC can naturally degrade into CBN over a long period of time and as a result of improper storage. <sup>7</sup>	migraines, pain, epilepsy, inflammation <sup>8,9</sup>	happy, relaxed



# Terpenes

Terpenes are what give cannabis its amazingly complex taste and smell. Without terpenes, cannabis would be very bland because THC and other cannabinoids have no distinguishable odor or taste.



**Figure 14:** A review of the five most common terpenes found in cannabis and their effects.



Alpha-pinene, linalool, myrcene, beta-caryophyllene, and limonene (shown in **Figure 14**) may not roll off the tongue, but their sensory descriptors like piney, musky, fruity, tropical, spicy, floral, and citrusy immediately conjure up memories of familiar tastes and aromas.<sup>7</sup> It is then no surprise to learn that terpenes aren't unique to cannabis – these medically viable compounds can be found in everything from plants and herbs to fruits and spices.

Terpenes are an important component to the overall cannabis experience, not only influencing a strain's taste and smell but also influencing its effects on the body. Terpenes work in concert to either catalyze or inhibit effects of other compounds within the plant.<sup>7,8</sup> This entourage effect is the unique and synergistic combination of cannabinoids and terpenes, ultimately producing the unique effects that distinguish one strain from another. Over 100 different terpenes have been identified in cannabis; and despite not being quite as popular or as well-studied as cannabinoids, these diverse molecules are instrumental in delivering the physiological and psychoactive effects of cannabis.<sup>7</sup> The varying terpene concentrations found in cannabis directly influence the taste and smell, as well as the observed effects.<sup>8</sup>

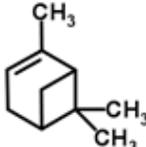
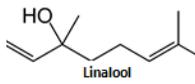
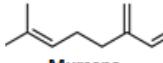
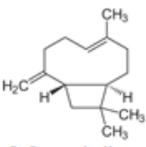
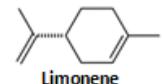
*Terpenes shape the feelings and effects delivered by a strain. Whether you're a patient seeking therapeutic effects, or a grower looking to tailor a strain, or a recreational user looking for a certain kind of buzz, it's time to learn about terpenes and to use them to your advantage.*

A user doesn't have to be a scientist or botanist in order to learn about the most common terpenes found in cannabis and the effects they have on the body. Using their nose and the guide above in **Figure 14**, users can begin to identify which terpenes will offer them the therapeutic relief or general experience they desire. All they have to do is pick a strain, or a desired effect, or a symptom they want to relieve; users can customize their medicine to meet their specific needs.

Unfortunately, your nose can only get you so far. Chemical analysis is needed in order to truly know what's in a user's cannabis sample. Analyzing cannabis for its Total Canna Profile™ will allow growers to target and produce certain results, it will allow patients to predict how a strain will make them feel and what symptoms it may alleviate, and it will allow recreational users to anticipate characteristics of the overall experience. Basically, it doesn't matter if you're a patient seeking certain therapeutic effects, or if you're a grower who's looking to design a specially tailored strain, or even if you're just a recreational user looking for a certain kind of buzz; it's time to learn about terpenes and it's time to use them to your advantage. The most common terpenes found in cannabis and their physiological effects are summarized below in **Table 4**.

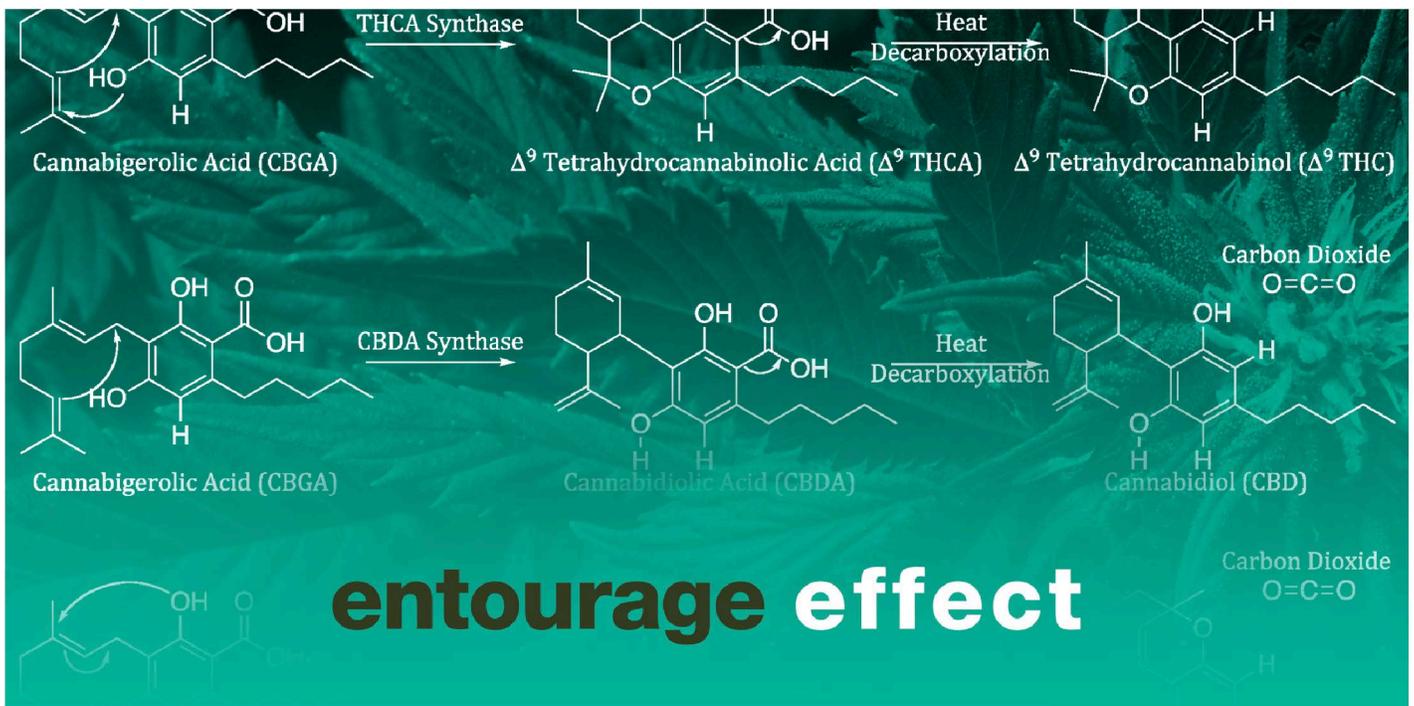


**Table 4:** This table summarizes the therapeutic potential of the five most common terpenes in cannabis.\*

Terpene	Natural Sources	Characteristic Taste/Smell	Alleviates	Makes User Feel	Strains to Look For
 <p><b>α-Pinene</b></p>	various plants; pine trees, rosemary, etc. <sup>7</sup>	Pine needles, rosemary <sup>8</sup>	migraines, asthma <sup>10</sup> , pain <sup>7</sup> , anxiety, stress, inflammation <sup>8</sup>	intelligent, energetic <sup>7</sup> , focused <sup>8</sup>	Jack Herer, Chemdawg, Blue Dream, Trainwreck, Super Silver Haze <sup>11</sup>
 <p>Linalool</p>	Lavender <sup>8</sup>	floral with a hint of spiciness <sup>12</sup>	insomnia, anxiety <sup>14</sup> , stress, epilepsy, migraines, pain, depression <sup>7, 8</sup> , inflammation <sup>15</sup> , sedative <sup>13</sup>	happy, relaxed, social <sup>7, 8, 14</sup>	G-13, Amnesia Haze, Lavender, LA Confidential <sup>11</sup>
 <p>Myrcene</p>	mango, lemongrass, thyme, hops <sup>8, 11</sup>	earthy, musky, herbal, tropical, fruity <sup>16</sup>	pain, migraines, stress, inflammation, insomnia <sup>7, 8</sup>	relaxed, happy <sup>7, 8</sup>	Pure Kush, Skunk #1, White Widow, Granddaddy Purple <sup>11</sup>
 <p><b>β-Caryophyllene</b></p>	Black pepper, cloves, hops, rosemary <sup>7</sup>	spicy, clove-like <sup>17</sup>	migraines, pain <sup>7</sup> , inflammation <sup>18</sup> , anxiety, depression <sup>19</sup>	happy, relaxed, social <sup>19</sup>	Hash Plant, OG Kush, Bubba Kush, and Girl Scout Cookies <sup>11</sup>
 <p>Limonene</p>	Oranges, lemons, and rinds of citrus <sup>21</sup>	citrus, orange, lemon <sup>20</sup>	anxiety, depression, stress <sup>7, 8</sup> , pain, migraines, inflammation, asthma <sup>15</sup>	happy, social, energetic <sup>7, 8</sup>	OG Kush, Super Lemon Haze, Sour Diesel, Lemon Skunk <sup>11</sup>

\*Table 4 includes only 5 of the 20+ terpenes that MyDx tests for

## The Entourage Effect



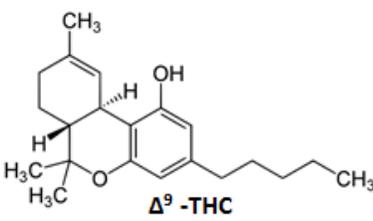
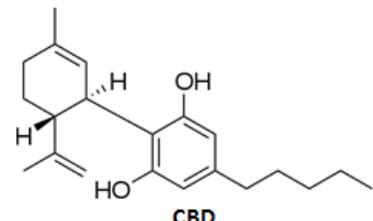
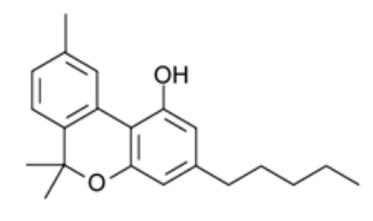
Sometimes you just find a strain that totally works for you. It's all about the right ratio of terpenes and cannabinoids and the entourage effects that ratio produces. The result is a unique cannabis experience that essentially distinguishes the wide variety of strains (and their chemotypes). Clearly, the entourage effect should not be underestimated.

*“This entourage effect is a recognized and accepted theory in peer-reviewed scientific literature. It’s clearly not just about THC.”*

Research shows that these synergistic effects lead to three to four times the medical efficacy; meaning a full cannabis extract will be three to four times as effective as a THC-only extract.<sup>7</sup> Synergistic compounds also help mitigate some of the negative side effects of the primary constituents, THC in this case. This poly-pharmacological effect is a recognized and accepted theory in peer-reviewed scientific literature.<sup>7,8</sup> It's clearly not just about THC. An underlying tenant of herbal remedies, such as cannabis, is that they often contain secondary compounds, such as terpenes, flavonoids, and other cannabinoids, that work synergistically with primary compounds, such as THC. In **Table 5**, we summarize the synergistic effects between the principal cannabinoids and the five most common terpenes found in cannabis. Understanding these effects is the last step to realizing the future of cannabis consumption, Cannabis 2.0.

This effect is a product of the combined physiological and psychoactive properties of the components in cannabis working together to maximize medical efficacy (described in **Appedix 2**).

**Table 5: Summary of Entourage Effects\***

Cannabinoid	Paired with	Produced Synergistic Effect
 <p><b>Δ<sup>9</sup>-THC</b></p>	<b>Various</b>	analgesic, anti- inflammatory
	<b>CBD</b>	Reduces negative side effects, anti-epileptic, antidepressant
	<b>CBN</b>	anti-epileptic
	<b>Alpha-pinene</b>	Anti-asthma
	<b>Linalool</b>	anti-epileptic, antidepressant
	<b>Beta-caryophyllene</b>	antidepressant
	<b>Limonene</b>	Anti-asthma, antidepressant
 <p><b>CBD</b></p>	<b>CBN</b>	anti-epileptic, analgesic, anti-inflammatory
	<b>Alpha-pinene</b>	Analgesic, anti-inflammatory
	<b>Linalool</b>	Analgesic, anti-epileptic, anti-anxiety, antidepressant, anti-inflammatory, anti-insomnia
	<b>Myrcene</b>	Analgesic, anti-inflammatory, anti-insomnia
	<b>Beta-caryophyllene</b>	Analgesic, anti-anxiety, antidepressant, anti-inflammation
	<b>Limonene</b>	Analgesic, anti-anxiety, antidepressant, anti-inflammatory
 <p><b>CBN</b></p>	<b>Alpha-pinene</b>	Analgesic, anti-inflammatory
	<b>Linalool</b>	Analgesic, anti-epileptic, anti-inflammatory
	<b>Myrcene</b>	Analgesic, anti-inflammatory
	<b>Beta-caryophyllene</b>	Analgesic, anti-inflammatory
	<b>Limonene</b>	Analgesic, anti-inflammatory

\*Table 5 includes only 5 of the 20+ terpenes MyDx tests for.



# MyDx: Welcome to Cannabis 2.0



It's NOT about **THC** (*Tetrahydrocannabinol*)  
It's about **TCP** (*Total Chemical Profile*)



Cannabis contains over 400 chemical compounds that can effect our minds and bodies.

These Cannabanoids, Terpenes, and Flavonoids work together to create an Entourage Effect, and ultimately the Total Chemical Profile of the plant dictates the resulting physiological impact on our minds and bodies.

MyDx will test for the Total Chemical Profile of the plant and correlates that with how it makes you feel, or what it helps you relieve, so you can find a strain profile that works for you

CDxLife.com

**It's not about THC, it's about TCP.**

When all of these variables are analyzed in the context of the data contained within a TCP, users experience a new way of consuming cannabis. Cannabis 2.0, wherein the user can directly track, predict, and record the effectiveness of a strain (or TCP) depending on their own specific needs. Essentially, this is cannabis tailored to the users' needs. In order to help users get their desired cannabis experience MyDx utilizes all of this information to relate cannabinoid and terpenes content into feelings and symptom relief. **Tables 6 and 7** summarize these findings.

**Table 6:** Quick reference for relating "I Want to Alleviate" to strain characteristics.\*

I Want to Alleviate	Cannabinoids and Terpenes to Look For
<b>Pain</b>	THC, CBD, CBN, alpha-pinene, linalool, myrcene, beta-caryophyllene, limonene
<b>Asthma</b>	THC, alpha-pinene, limonene
<b>Epilepsy</b>	THC, CBD, CBN, linalool
<b>Migraines</b>	THC, CBD, CBN, alpha-pinene, linalool, myrcene, beta-caryophyllene, limonene
<b>Anxiety</b>	CBD, alpha-pinene, linalool, beta-caryophyllene, limonene
<b>Stress</b>	THC, CBD, alpha-pinene, linalool, myrcene, limonene
<b>Depression</b>	THC, CBD, linalool, beta-caryophyllene, limonene
<b>Inflammation</b>	THC, CBD, CBN, alpha-pinene, linalool, myrcene, beta-caryophyllene, limonene
<b>Insomnia</b>	CBD, linalool, myrcene

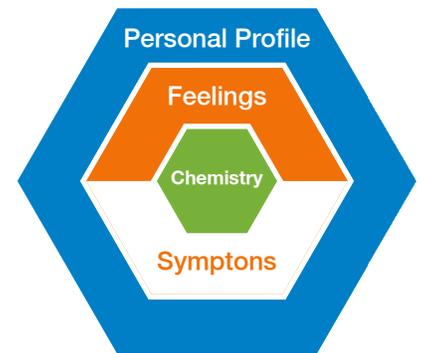


**Table 7:** Quick reference for relating “I Want to Feel” to strain characteristics.\*

I Want to Feel	Cannabinoids and Terpenes to Look For
<b>Happy</b>	THC, CBD, CBN, linalool, myrcene, beta-caryophyllene, limonene
<b>Energetic</b>	Alpha-pinene, limonene
<b>Focused</b>	Alpha-pinene
<b>Relaxed</b>	THC, CBD, CBN, linalool, myrcene, beta-caryophyllene
<b>Social</b>	THC, CBD, linalool, beta-caryophyllene, limonene
<b>Intelligent</b>	Alpha-pinene

\*Tables 6 and 7 only includes 5 of the 20+ terpenes MyDx tests for.

MyDx uses the data above, a crowdsourced database, the resulting TCP, and proprietary algorithms to relate the concentrations measured into how that strain makes users feel and what symptoms it can relieve. As the crowdsourced database grows, so will MyDx’s ability to relate TCPs to users’ experiences. Similarly, the more a user tests and tracks their experiences the better MyDx will become at predicting the characteristics of future cannabis samples. By finding similar TCPs, MyDx allows users to consistently find strains that deliver their desired effects.



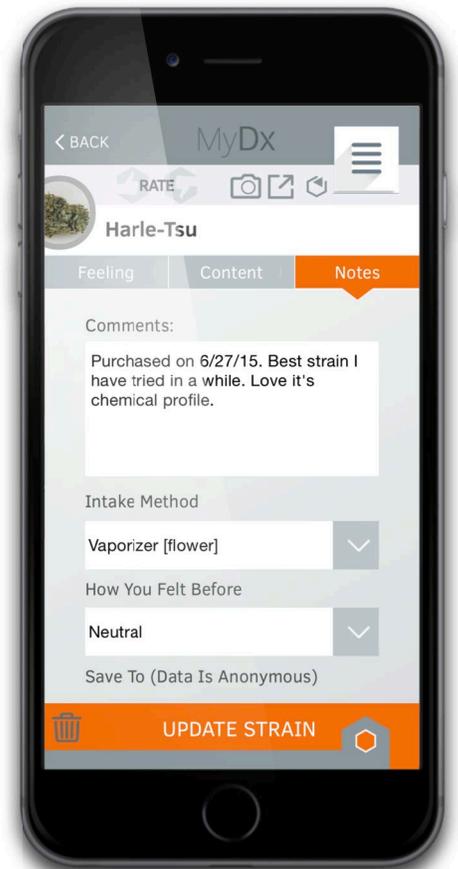
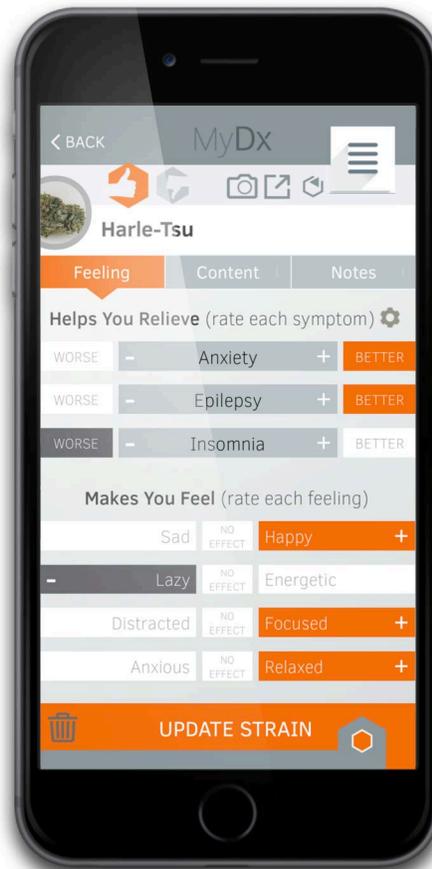
## Key Features of MyDx



MyDx offers four main features to users: the ability to analyze cannabis samples for a TCP, to track how that TCP affected them, to seek similar TCPs to ones that worked for them, and to get information on where to find those strains, or TCPs, that delivered the experience they desired. The App screenshots below highlight these features.



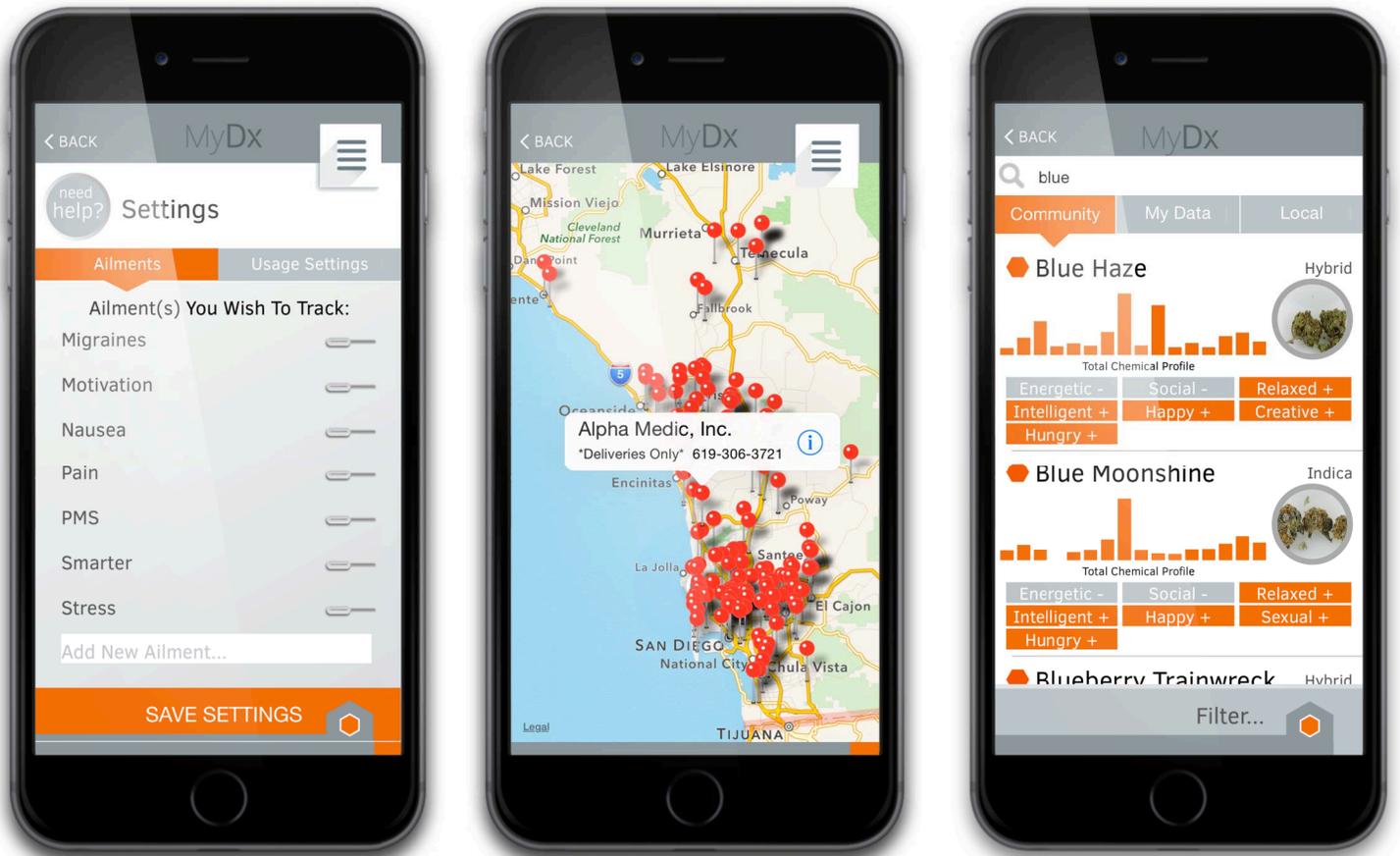
## Analyze Strains + Capture Experience



## Seek Recommendation



## Get Information & Customize Tracking



MyDx provides the entire cannabis industry with the tools and knowledge needed to truly get the most out of their cannabis. We aim to bring manufactures, distributors, consumers, and regulators together under a common goal of transparency, consistency, and reliability.



### Manufacturers

- Know what you are growing and when to harvest
- Optimize plant growth conditions in real time
- Enjoy more profits from a better quality product



### Distributors

- Know what you are buying and selling
- Track how your patients are feeling with your strains
- Promote your strains and attract new customers



### Consumers

- Know what you're putting into your mind & body
- Test the profile of your strains and track how it makes you feel
- Find the best strain profiles that works for you



### Regulators

- Know what is being made and consumed
- Track production lots with "chemical fingerprint"
- Print Labels in Real Time

The CannaDx Sensor and App are generating useful data, including terpene signature patterns for strains that can be identified using our sensors. Continued improvement in terms of sensor-to-sensor variability in mass production will deliver increasingly accurate results for users. Furthermore, we plan to establish larger arrays and more sensitive sensors to expand the potential for detecting distinct profiles as our library grows.



## Conclusion

At MyDx, our vision is simple: empower users to Trust and Verify™ what they put into their minds and bodies. Whether that is food, water, air, or cannabis – we believe that everyone should have the right to know exactly what they are consuming. Our portable handheld chemical analyzer, MyDx, utilizes electronic nose technology – allowing our various sensors to detect certain chemicals of interest. Our CannaDx™ sensor is currently on the market, and our three other sensors, OrganaDx™ AquaDx™, and AeroDx™, are currently in the R&D pipeline.

MyDx paired with the CannaDx™ sensor marks a revolution in cannabis testing technology, effectively allowing users to Trust and Verify™ their cannabis prior to consumption. In doing so, users have the ability to test their cannabis potency (% THC) on site, and within a matter of minutes. This groundbreaking device goes even beyond that, testing for a total of 3 cannabinoids and 20+ terpenes, forming a Total Canna Profile™ (TCP) – or a broader chemical analysis of the cannabis tested. The MyDx App is then used to track and predict how the TCP will make users feel and what symptoms it may potentially alleviate.

We aim to help establish cannabis as a legitimate medicine, by crowdsourcing data into a globally referenced database, and to legitimize the cannabis industry as a whole, by providing everyone with the means to test and verify their cannabis. This crowdsourced data will help accelerate cannabis research and provide the industry with a go-to reference regarding strain differences and physiological effects. We also want to show users that it's not just about THC percentages or strain names; it's about the broader chemical makeup of that strain, or the TCP.

Additional sensors are in the R&D pipeline that will enable users to test the purity of their food, air, and water using the MyDx analyzer, thus providing a complete testing platform that will empower everyone to live a healthier life. The Organa sensor will analyze pesticide levels in organic produce. The Aqua sensor will measure impurity levels in the water you and your family drink. Lastly, the Aero sensor will measure the Air Quality Index, an indicator used by people worldwide to detect and avoid unsafe air conditions by monitoring the levels of harmful chemicals in the air. We aim to protect the consumer and to provide them with the tools and knowledge needed to live pure and healthy lives.

For more information about MyDx and the CannaDx cannabis testing platform, visit [cdxlife.com](https://www.cdxlife.com). The CannaDx App is free and available for both Android and iOS systems.

**MyDx Interactive Videos Link:** <https://www.cdxlife.com/overview-video/>



# Appendix 1 – The Basics of Cannabis

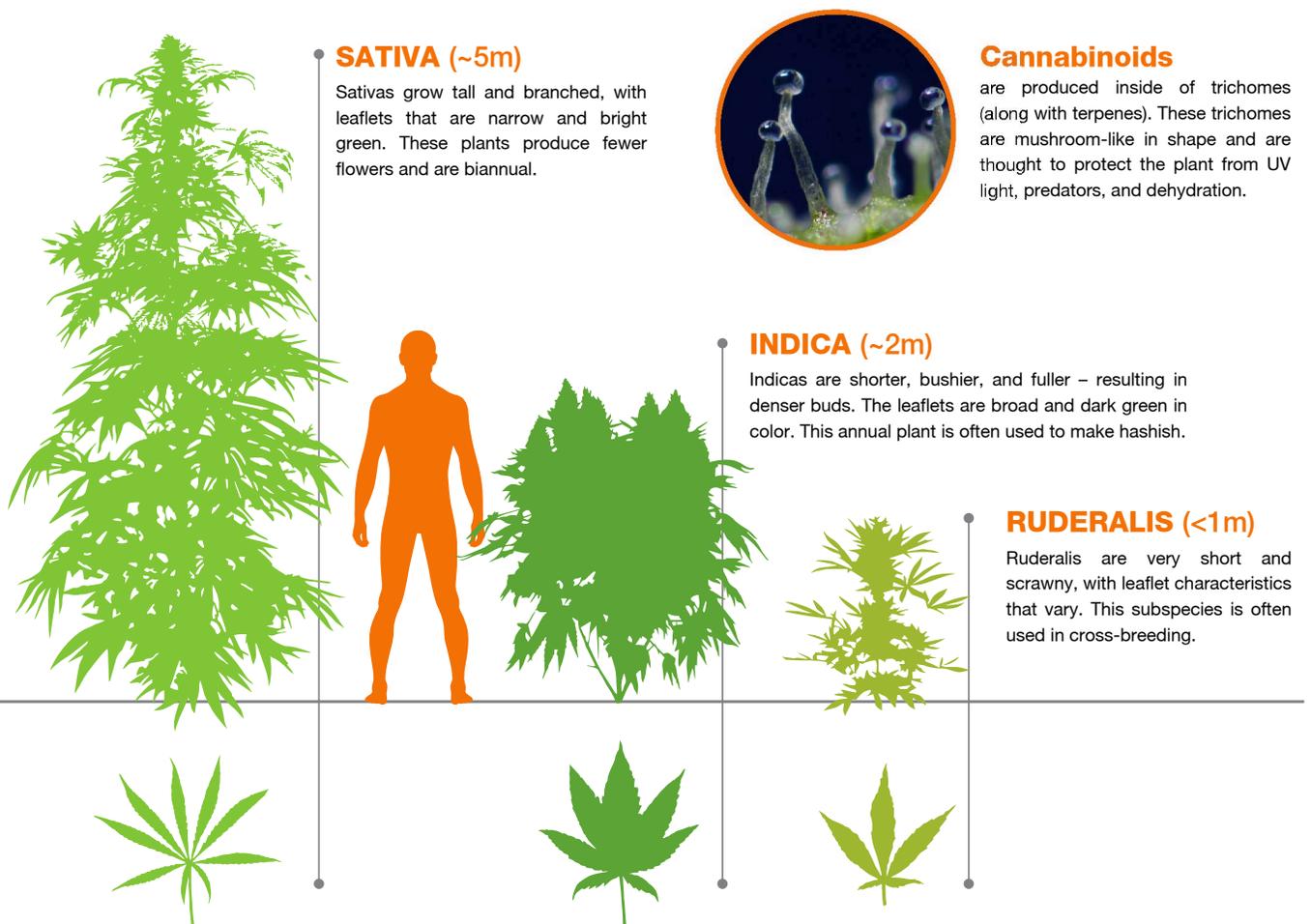
## Cannabis

*Cannabis* (marijuana, weed) is a wind-pollinated dioecious flowering plant that belongs to the Moraceae family.<sup>22</sup> The therapeutic use of cannabis stretches back to ancient times; it was cultivated in China around 4000BC and is included in the world's oldest pharmacopoeia written by Pen Ts'ao Ching.<sup>22</sup> As shown in **Figure 15**, there are three common varieties of cannabis: *cannabis sativa* (biannual), *cannabis indica* (annual) and *cannabis ruderalis* (varies).<sup>7</sup> Growing conditions and genetics influence the characteristics of developing plants and the subsequent finished cannabis product.

*“Cannabinoids and terpenes are secreted by glandular trichomes that occur most abundantly on the floral calyxes and bracts of the female marijuana plant.”*

### What is Weed?

According to Leafly, there are approximately 1,700 distinct strains of cannabis. There are three common subspecies of cannabis: *sativa*, *indica*, and *ruderalis*.

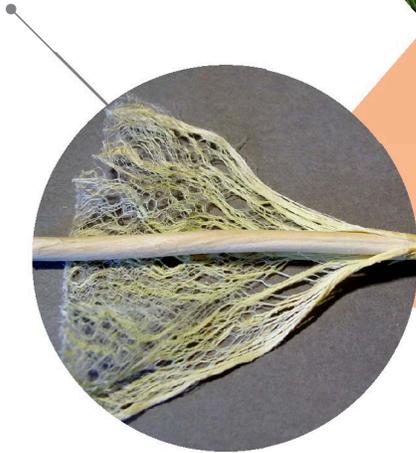


**Figure 15:** The basics of cannabis: the subspecies, cannabinoids, and the extremely diverse applications.



## MATERIAL

The outer layer of the plant stalk is made up of long bast fibers. These fibers can be used to make a variety of products from rope to fabrics.



## MEDICINE AND INTOXICANTS

Trichomes, the tiny crystals found on the bud surface, are packed with medicinally useful substances such as cannabinoids and terpenes.



## FOOD AND COSMETICS

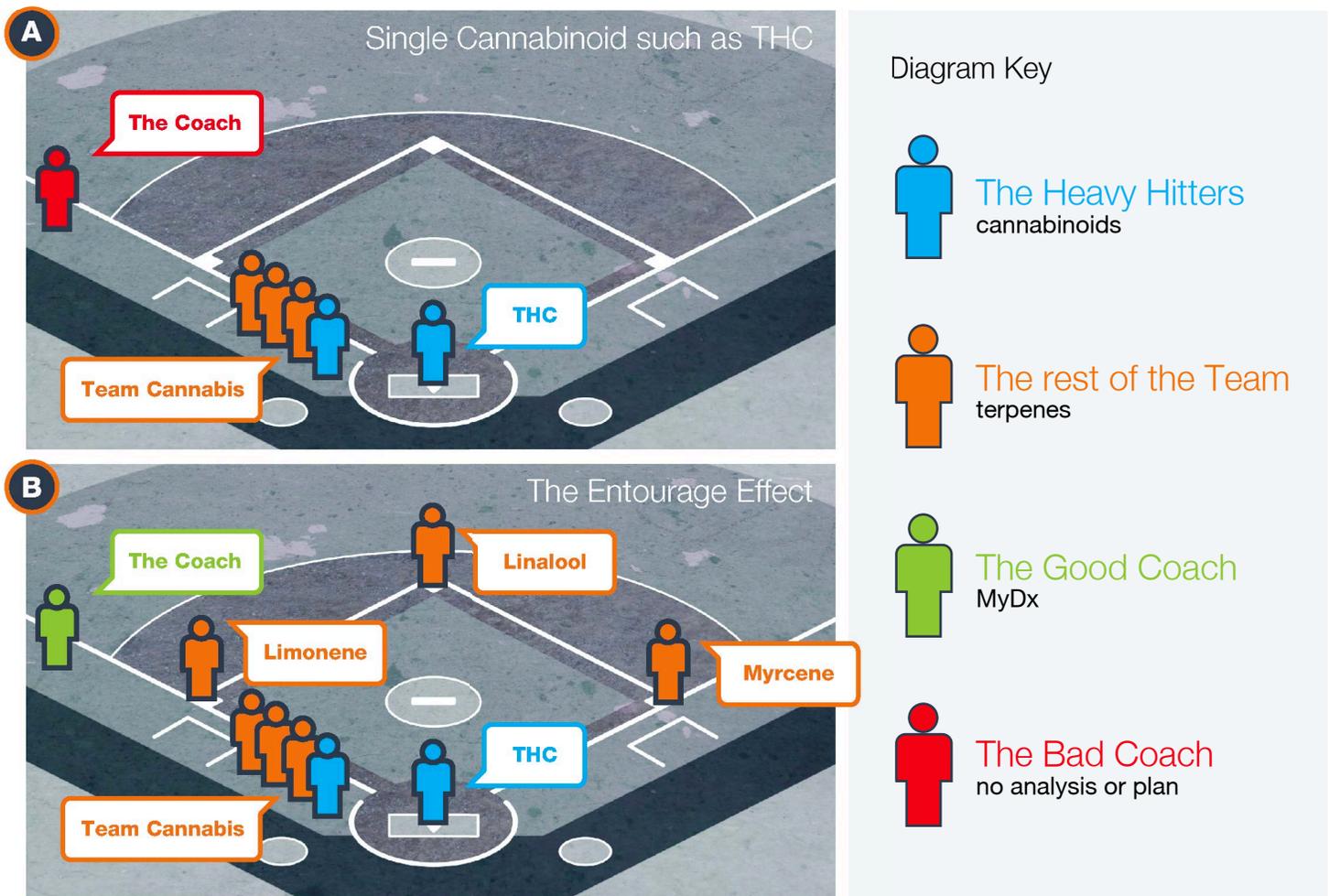
Hemp seeds are packed with protein and natural oils making them ideal candidates for manufacturing food and cosmetic products.

Mature male plants, known as hemp, have minute cannabinoid contents and are typically used to manufacture goods and as an alternative energy source.<sup>23,24</sup> The harvested flowers originating from mature female cannabis plants are characteristically higher in phytocannabinoid content and typically possess significant concentrations of other phytochemicals, such as terpenes, that are also of pharmaceutical interest.<sup>25</sup> Cannabinoids and terpenes are secreted by glandular trichomes that occur most abundantly on the floral calyxes and bracts of the female marijuana plant.<sup>6</sup> Dried cannabis flowers are the most basic form of cannabis. Other, more potent, preparations of cannabis include hashish (typically ranging from 20-65% THC) and hash oil (typically ranging from 50-90% THC).<sup>22, 26</sup>

Cannabinoids and terpenes have shown great potential as medicinal therapeutics. This is largely due to the individual medicinal properties of cannabinoids and terpenes working together in concert to produce maximum medical efficacy – also known as the entourage effect.<sup>25,7,8</sup> Classifying and tracking the Total Chemical Profile™, or the terpene and cannabinoid contents, will allow users to find the strain (or entourage effect) that works for them.



# Appendix 2 – Explaining the Entourage Effect



**Figure 16:** This diagram draws an analogy in order to relate the various components responsible for the cannabis experience. **(A)** Represents the use of a single cannabinoid (THC) and **(B)** highlights the entourage effect

There are several variables that have to be just right in order for the user to achieve their desired cannabis experience. This is analogous to how in baseball several factors and variables, such as the playing field, the chemistry of the players, and the coach, have to all work constructively in order to win the game. It is then helpful to think of cannabis as a baseball team and your specific endocannabinoid system as the playing field. As illustrated above in **Figure 16:** Team Cannabis has all-star heavy hitters, cannabinoids, but they can't win the game without the rest of the team, terpenes. Sure, an individual cannabinoid may hit a home run **(A)**, or produce some sort of effect, but there is a big difference between scoring one point and winning the whole game, or achieving your desired entourage effect **(B)**. MyDx, or the Good Coach, will evaluate the players and the field – providing the tools and information needed to win the game.

The coach does this by compiling a comprehensive summary of his player's stats and making decisions based on this information. MyDx essentially does the same thing, providing users with a Total Canna Profile™ (TCP) of the analyzed sample. This TCP, or the raw terpene and cannabinoid content data, is then interpreted by MyDx, relating to users how this sample will make them feel and what symptoms it can alleviate.

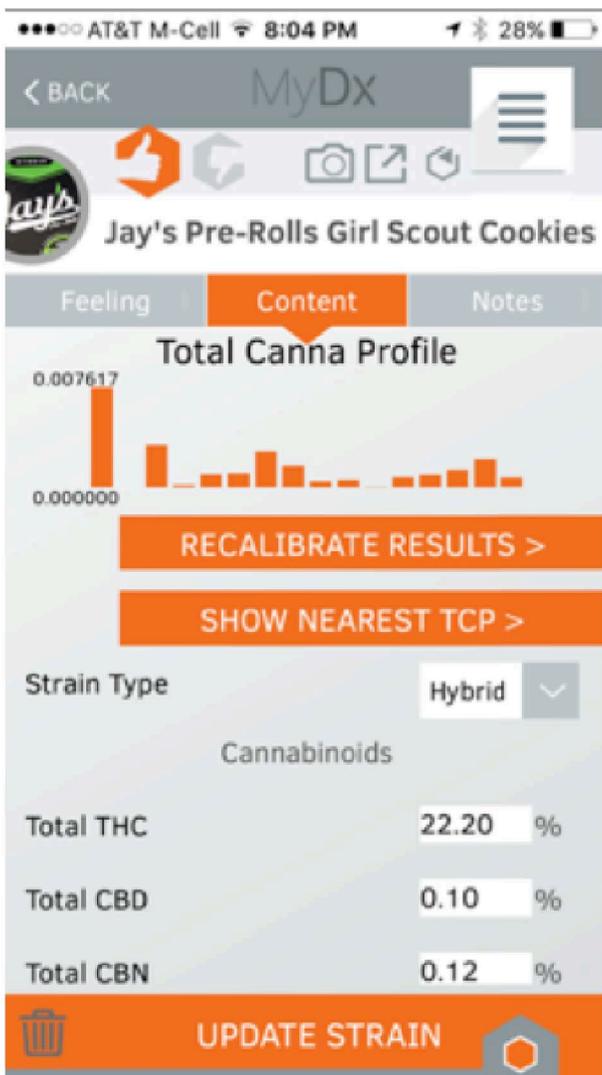


# Appendix 3 – Recalibration and Nearest Chemical Profile Feature

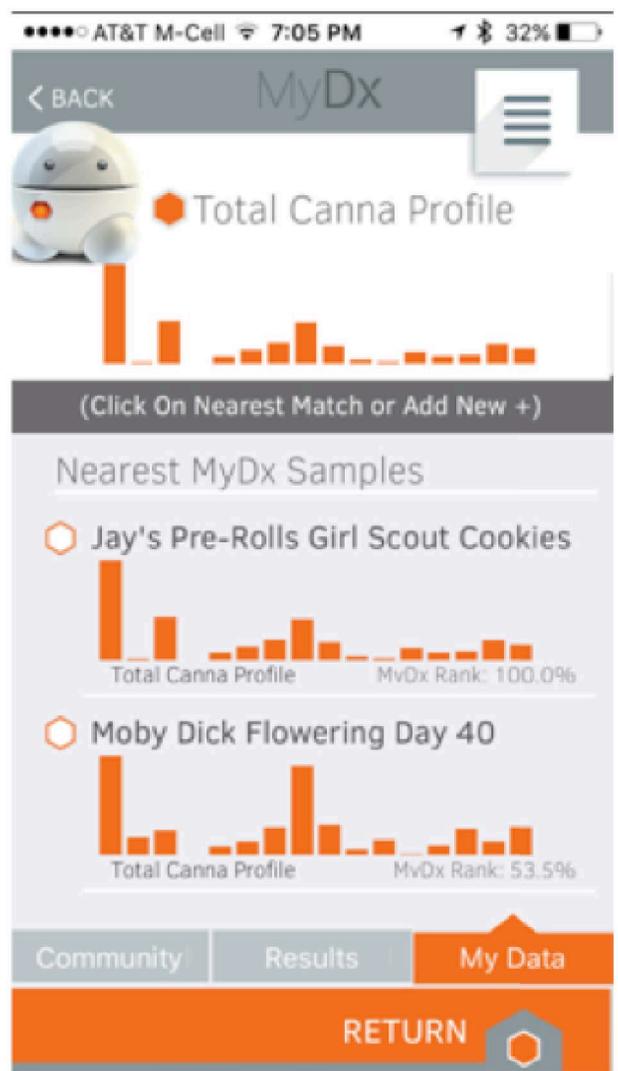
One of the latest features MyDx has worked on is providing a recalibration feature to consumers so that as we updated our reference database on backend, consumers can simply push the recalibrate button in their app for a sample they already tested in the past and the updated interpretation of Cannabinoid and Terpene content will be displayed based on the sensor response, which will be a constant and does not change for each unique sample.

The MyDx platform also offers a nearest TCP feature, which allows users to compare how similar the chemical profile of each tested sample to previously tested samples in the user's data "MyData" or by other users in the "Community" Database.

## Recalibrate Results



## View Nearest Chemical Profiles



# Appendix 4 – Email & Print Certificate of Analysis with MyDx



## Total Canna Profile™



**Sample Name:** OG18  
**Username:** dan  
**Tested On:** 02/08/2016



Total Canna Profile™

Cannabinoids	
Total THC	19.06 %
Total CBD	0.23 %
Total CBN	0.06 %
Terpenes	
beta-Caryophyllene	0.49 mg/g
alpha-Pinene	0.09 mg/g
beta-Pinene	0.36 mg/g
Myrcene	0.09 mg/g
Limonene	0.09 mg/g
alpha-Bisabolol	0.00 mg/g
Camphene	0.01 mg/g
delta-3-Carene	0.00 mg/g
Caryophyllene oxide	0.00 mg/g
Geraniol	1.66 mg/g
Guaiol	0.00 mg/g
Linalool	0.00 mg/g
Terpinolene	0.15 mg/g
p-Cymene	0.07 mg/g
Eucalyptol	0.01 mg/g
Isopulegol	0.00 mg/g
Humulene	1.04 mg/g
Nerolidol-1	0.26 mg/g
Dosage	
Milligrams of API	N/A
Moisture Content	N/A

Ailments	
Helps People Relieve	
Migraines	Better
Pain	Better
Sexual	Better
Feelings	
Helps People Feel	
Focused	More
Relaxed	More
Intelligent	More
Notes	
Comments	San Diego Collective
Intake Method	Glass
How You Felt Before	Neutral
Save To (Data Is Anonymous)	Internal Database
How Much Did I Intake(mg)	Experienced: 10-20 mg THC
Length Of Effect	30 min - 1 hr
How much did you pay for your cannabis?	
Where did you buy it?	

6335 Ferris Square, Suite B, San Diego, CA 92121 | 800.814.4550



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