

# Introduction to Cannify

A Cannabis Misuse Prevention Tool:  
Scientific Evidence-based Education

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Prepared for  
Substance Misuse Prevention Oversight &  
Advisory Council, July 22, 2024

**Cannify**<sup>®</sup>

 [www.cannify.us](http://www.cannify.us)  
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# Introduction to Linda Klumpers, Founder of Cannify in 2016

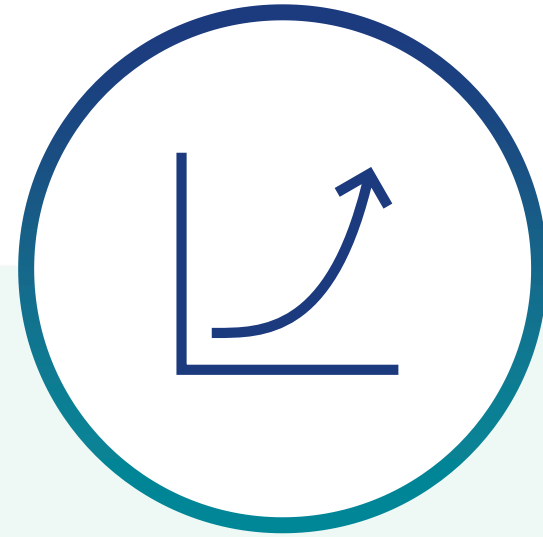
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- Ph.D. in Clinical Pharmacology of Cannabinoids  
Board-Certified Clinical Pharmacologist  
M.Sc. in Neuroscience
- Researching cannabinoids in humans since 2006 (14 peer-reviewed publications)
- Six honors and awards in cannabinoid and neuroscience
- Professor of Pharmacology, University of Vermont
- Scientific and Research Consulting, including cannabinoid intoxication reversal drug development
- \$2M in Dutch grants to study cannabinoids (2021-2025)
- Executive Editor, British Journal of Clinical Pharmacology

Most of our team members have been with Cannify for 5+ years

# Cannabis Use Increase: An Emergent Health Concern



## Increased Exposure

Cannabis liberalization leads to **an increasing number of people** becoming exposed to an increasing range of (new or high dose) cannabis products



## Substandard Education

**No easy way** exists to get objective information on what and how to use:

- Cannabis information on the internet: biased & unscientific
- Budtenders: no medical training
- Physicians and pharmacists: uneducated on cannabinoids



## Increased Health Risk

**Health risks** associated with cannabis use are grossly understated and include: adverse events resulting in hospital visits, impaired driving, medication interactions, and cannabis use disorder

Health care providers and patients show frustration and worry

# Physicians Struggle with Information Bias, Inadequate Peer Assessment, etc.

*"It is unethical that some doctors earn \$200 for 5 minutes without any proper consult"*



*"As opposed to many doctors who want to earn a quick buck, I make sure my patients are well educated."*

*Every patient receives a hand-out with educational websites, including Weedmaps and Leafly"*



*"Every website tells me to consult my doctor, but when I visit a doctor, they have no clue"*

These struggles lead to risks and safety issues for patients

# Sources for Cannabis Information are Mostly Untrustworthy

## Physicians

- Other physician peers
- Conferences
- The internet (e.g. Leafly, Weedmaps, Twitter)

*“Physicians see their influence on patients as weak compared with other [...] sources and have generally unfavorable attitudes toward [budtenders] and [Medical Cannabis Caregivers].”*

## Patients

- The internet
- Social media
- Friends or relatives

76% of **medical** cannabis users initiate use **without informing their HCP**<sup>1</sup>.

*“Patients frequently substitute cannabis for prescription drugs, often without PCP<sup>2</sup> knowledge”*

## Budtenders

- Own experience
- Social media
- The internet

*“[...] were skeptical of cannabis being addictive.”*

*“Majority of budtender perceptions regarding cannabis and its influence on mental health outcomes diverge from evidence-based knowledge.”*

Inadequate sources throughout a patient’s information search → Risky cannabis use

# Cannify is an Online Educational Platform for Patients and Health Care Providers

Cannify®

Start the Cannify Quiz to find products that match your needs.

Start the Cannify Quiz\*

v0.10.2

\* By clicking 'Start the Cannify Quiz' you accept our Terms and Conditions.

[Privacy Statement](#)

Cannify © 2023

*"Our mission is to understand the science of cannabis effects and share this knowledge with everyone."*

- Cannify

- Developed by Cannabinoid Pharmacology PhDs
- Founded 8+ years ago
- We are independent and driven by evidence

Cannify's value:



For **patients**:

- Objective Education
- Product Information
- Personalized science-based report



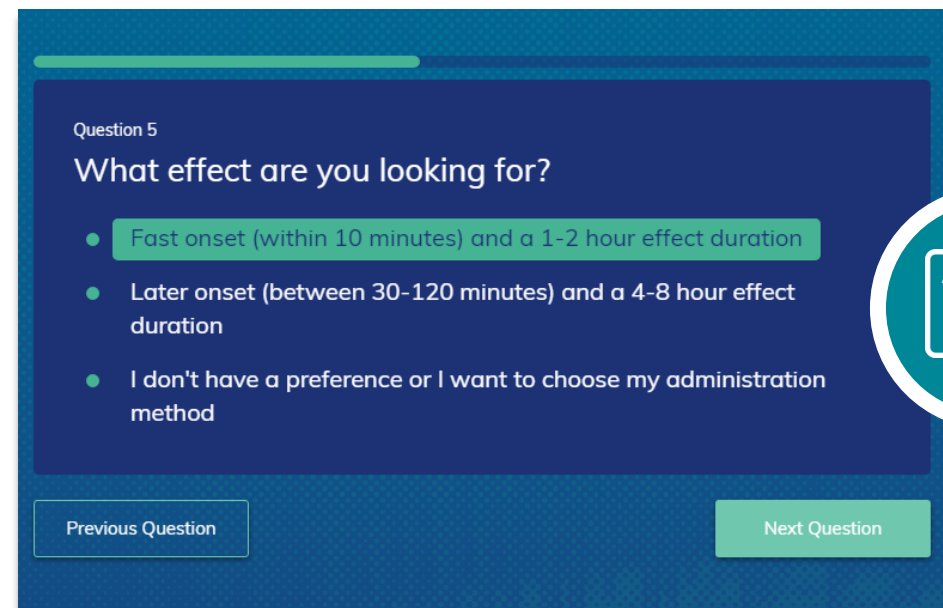
For **HCP<sup>1</sup>**:

- Professional-Grade and Personalized Science Information
- Data Insights
- CME-level<sup>2</sup> Education

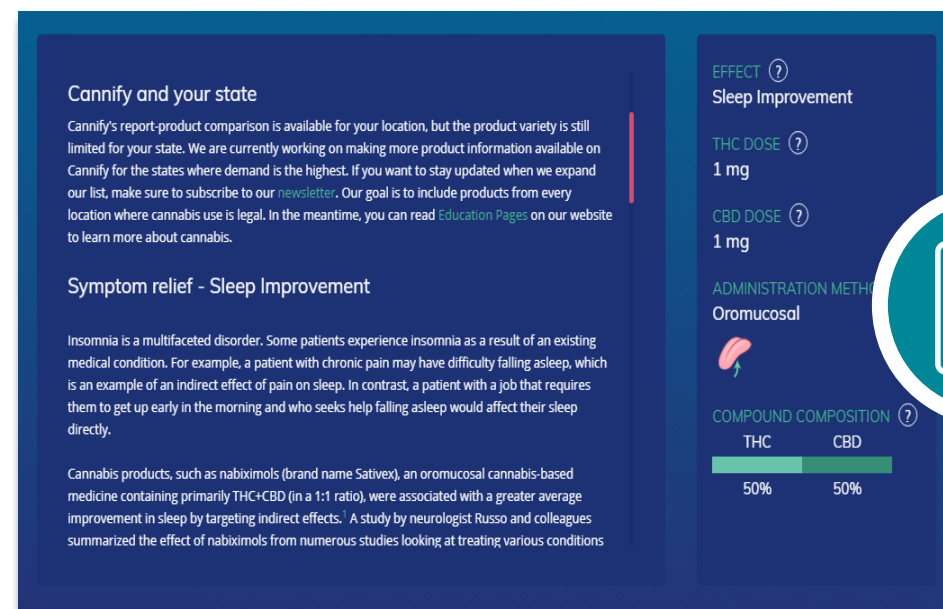
<sup>1</sup> HCP = Health Care Provider,  
<sup>2</sup> CME-level = Continuing Medical Education

# The Cannify Quiz is our central feature

## How Does Cannify Work?



The questionnaire has a **science-based algorithm**



...generating a **personalized cannabinoid report**



...and **matching products** at the user's location



Do

- Fill in **symptom + personal characteristics**
- (e.g. gender, cannabis experience, personality)

Get

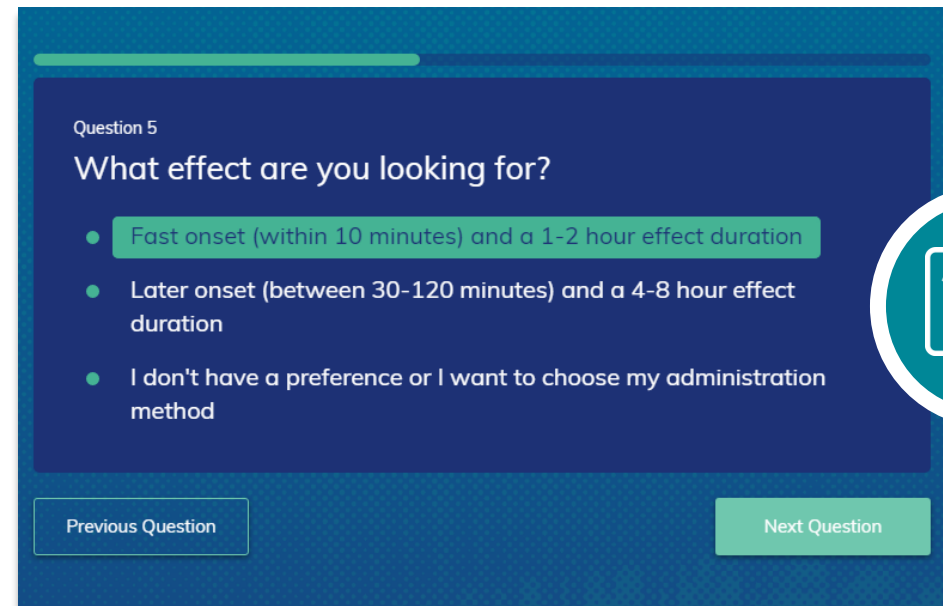
- Get a **report** with cannabis-based treatments that helped people with comparable profiles, and safety information

Discover

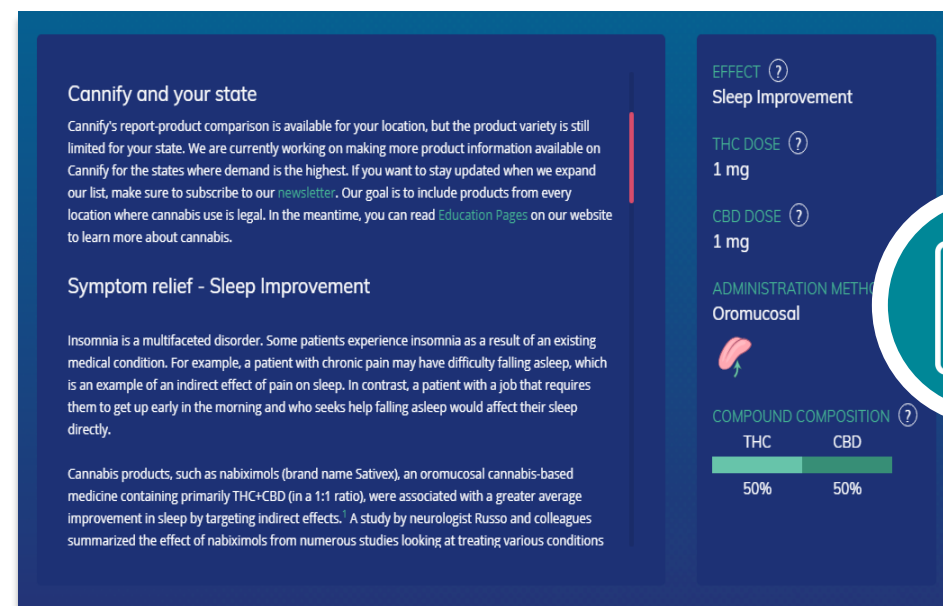
- Learn about **cannabis & symptom** of choice from your report
- **Compare** your report with available products

# The Cannify Quiz is our central feature

## How Does Cannify Work?

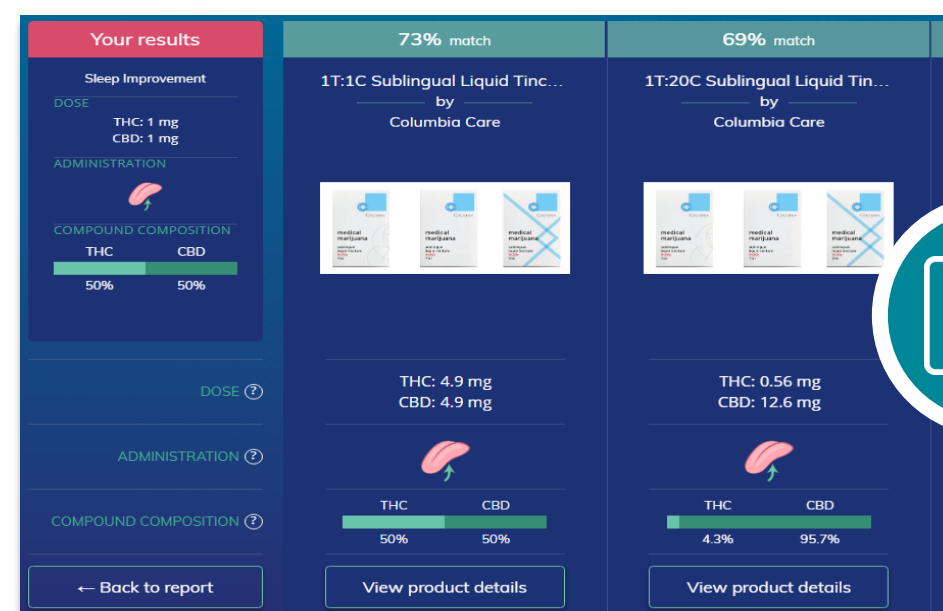


The questionnaire has a **science-based algorithm**



*The report includes evidence-based information, including warnings, and information on side-effects, drug-drug interactions, special populations, etc.*

*All statements are supported by scientific literature references.*



...and **matching products** at the user's location

Do

- Fill in **symptom + personal characteristics**
- (e.g. gender, cannabis experience, personality)

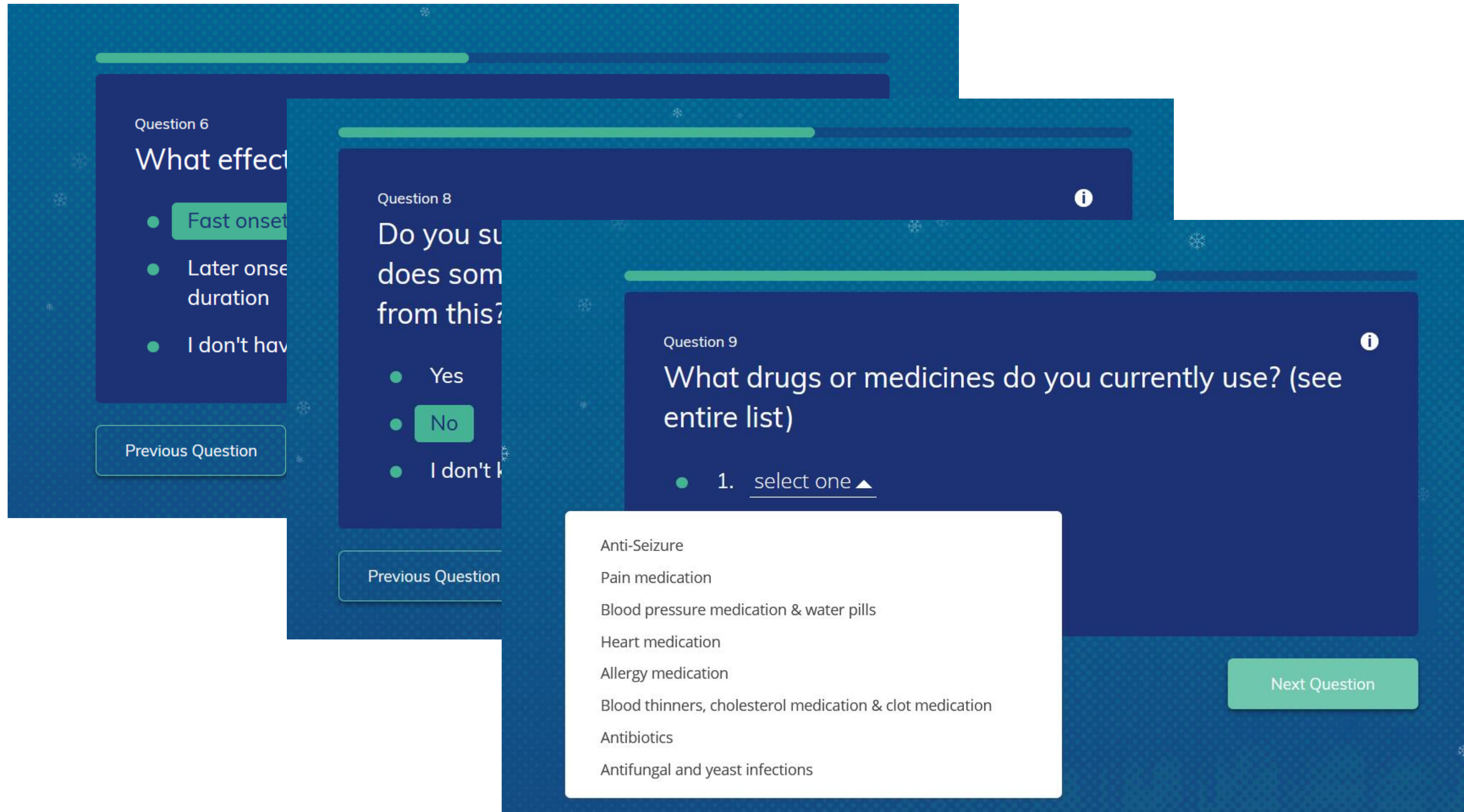
- Get a **report** with cannabis-based treatments that helped people with comparable profiles, and safety information

Discover

- Learn about **cannabis & symptom** of choice from your report
- **Compare** your report with available products



# The Quiz Questions Look Like This:



# During the Quiz, Relevant Warnings can Appear

Question 5 i

## Are you lactating?

- Yes
- No

[Previous Question](#) [Next Question](#)

If you use cannabis during breastfeeding, your infant can drink 1% of your cannabis intake. Are you sure you want to continue?

[Go to Report](#)

# After the Quiz, You Get a Personalized Report

Download as PDF   Store in my Account   E-mail me the report   **Go to product comparison**

## Report

Thank you for completing this questionnaire! We are proud to have you fill out the basic Cannify Quiz and we are happy to know you value scientific proof as much as we do. The information in your report is taken from various studies (referenced below) and applied to your symptoms and preferences. Keep in mind that this questionnaire comprises only necessary information needed to create your basic cannabinoid report.

Create a free [Cannify account](#) to get an extensive cannabinoid report.

Having an account also enables you to save your cannabinoid reports and gives you the access to all our educational quizzes (there are more options coming soon). Keep reading for the list of information that the comprehensive Cannify Quiz provides.

### Cannify and your state


Cannify's report-product comparison is limited or not available for your location at this moment. If you'd like it to be, let us know [here](#) so we can help make such information available.

We are currently working on making product information available on Cannify for the states

**EFFECT** ⓘ  
Sleep Improvement

**THC DOSE** ⓘ  
1 mg

**CBD DOSE** ⓘ  
1 mg

**ADMINISTRATION METHOD** ⓘ  
Oromucosal  


**COMPOUND COMPOSITION** ⓘ

THC	CBD
50%	50%

All scores are calculated by scientific algorithms


# Your Report Score is Compared with Product Matching Scores, IF there is Evidence that Cannabinoids can be Effective

Showing 30 products. Sort on: sponsored

### Your results











Sleep Improvement

DOSE  
THC: 1 mg  
CBD: 1 mg

ADMINISTRATION  


COMPOUND COMPOSITION

THC	CBD
50%	50%

73% match	73% match	71% match	63% match	63% match
				
Blend Tincture   300mg ... by Sunset Lake Cannabis	THC+CBD Terpene Enhanced... by Upstate Elevator	Balance Blend Tincture   600... by Sunset Lake Cannabis	Snoozeberry 1:1: Gummies 5... by Highly Rooted	Peach Hibiscus   5... by Alchemy Na
THC: 5 mg CBD: 5 mg	THC: 5 mg CBD: 5 mg	THC: 10 mg CBD: 10 mg	THC: 5 mg CBD: 5 mg	THC: 5 mg CBD: 5 mg
				
THC 50% CBD 50%	THC 50% CBD 50%	THC 50% CBD 50%	THC 50% CBD 50%	THC 50%
<a href="#">View product details</a>	<a href="#">View product details</a>	<a href="#">View product details</a>	<a href="#">View product details</a>	<a href="#">View product</a>

[← Back to report](#)

# A Personalized Report Does Not Always Lead to Product Comparisons...

## Report

### Global availability

Today, Cannify's report-product comparison is only available in the United States. We hope that the next country for which Cannify can offer this information will be Canada. If you'd like to stay up-to-date with the new locations or any other changes, sign up to our [newsletter](#).

If you want Cannify's product comparison to be available in your country, let us know [here](#) and we will do what we can to make it happen.

Our goal is to include products from every location where cannabis use is legal. In the meantime, you can read [Education Pages](#) on our website to learn more about cannabis.

### Symptom relief - Other Reasons

You indicated that you wanted to use cannabis to treat the symptoms of depression. While cannabis can produce a euphoric high, this effect is transient.<sup>1</sup> Research has actually found that cannabis use is likely to cause depression and worsen the symptoms of existing depression.<sup>2, 3, 4, 5, 6, 7</sup> In particular, some studies reported that the more frequently cannabis is used, the stronger the association with depression,<sup>4, 5</sup> whereas other studies found an association with depression in casual users,<sup>6</sup> and even in people with any cannabis use.<sup>7</sup> Danielsson and colleagues showed that women were more prone to developing depression with cannabis use than men.<sup>2</sup>

### Information in this basic Quiz

Note that this quick quiz and product matching report cover a small part of many important cannabis studies. For example, we haven't asked or provided information on the following: study findings on pregnancy, lactation, and statistical relationship between cannabis use and the consequences for men who plan on having a child/recently had a child; your preferred administration method; whether you recently changed your cannabis use, potentially influencing your tolerance levels; potential side effects; potential sensitivity to THC.

We hope you have enjoyed reading about the science of cannabis, but if you want complete information, [create a free account](#) and take the comprehensive Cannify Quiz that, in addition to the questions in this Basic Quiz, provides the above information as well.

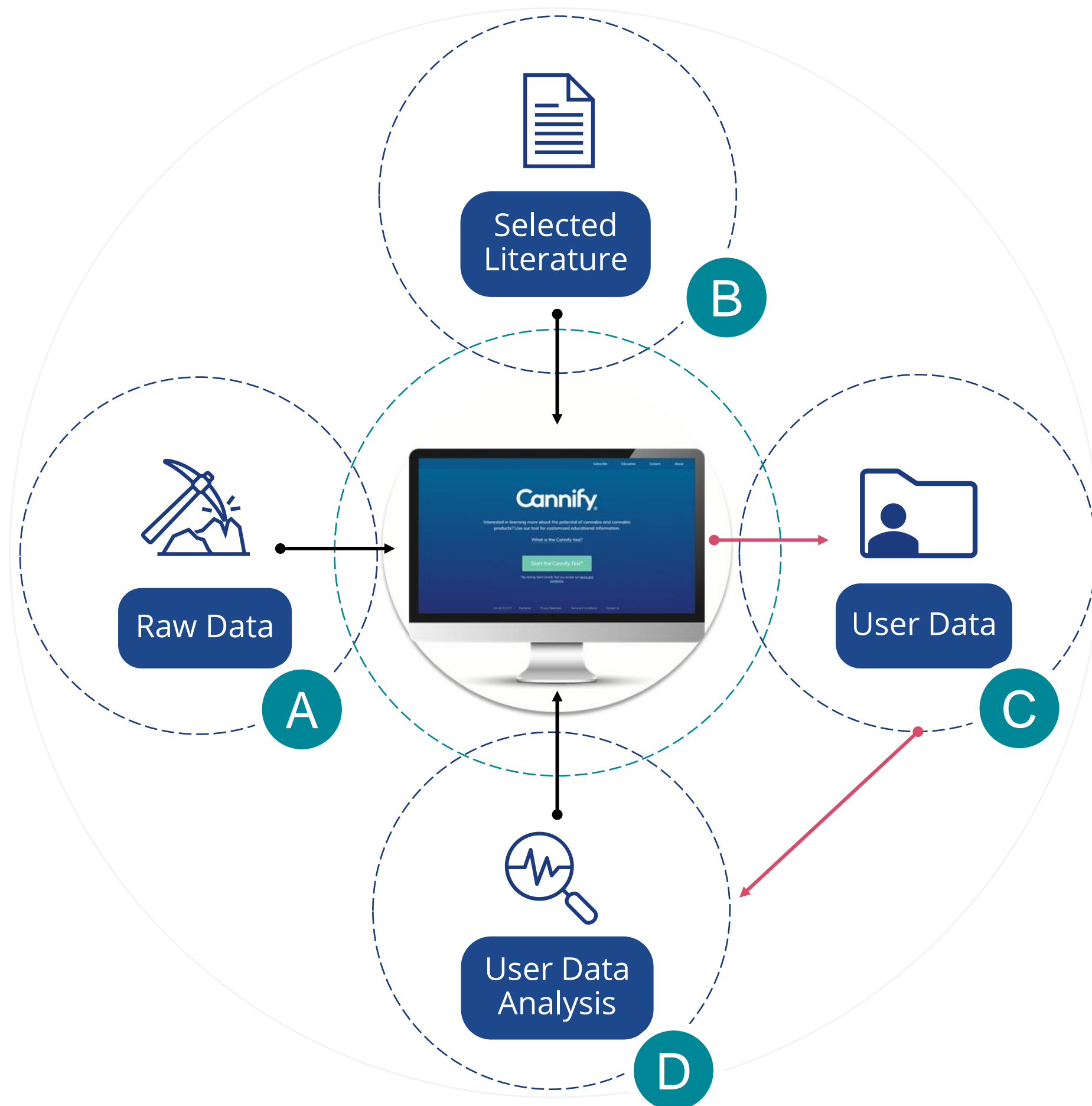
# ...and Reports Always comes with a Clickable Reference List

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How is our science integrated?

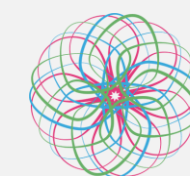
# All Input is Analyzed by Cannify's Science Team



Our data input and output sources:

- A** The Cannify Quiz collects data from top tier research organizations\*, qualified by our scientific team.
- B** The team selects the literature, mitigating for (1) wrong data interpretation, (2) mixed results, and (3) design issues
- C** The output is User Data which is based on user's symptom of choice and characteristics
- D** The user data is shared and used as input for user data analysis

\*We collaborate with **top tier organizations** for our raw data sample collection:



CHDR



Leiden University  
Medical Center



# How are the Report Information & Matching Score Calculated?

## Product Information Example: Condition & Compound

Patient is interested in the anxiety symptom



Anxiety can be increased by THC, and can be decreased by CBD



Only display literature with CBD results

## Matching Score Example: Starting dose

Report: 2 mg, product: 2 mg



The starting dose and the product unit dose are equal



If other properties are similar, this product gets a high matching score



## Cannify Quiz According to Users

Feedback that we learned from Cannify's Follow-up Quiz:

*"The dosing guide has been helpful. I am still a relatively new user and this helps get **symptom reduction without as much impairment**"*

*"Very informative - lots of links to great information, and in depth profile."*



*"Simple and easy to understand. Especially when you have **older patients** that may struggle with something online. Also like that you take into account weight and other factors. I ran several scenarios and all the recommendations made sense. I've been in the cannabis industry for over a decade. **I plan on using this service with our patients.**"*

*"The research information **helps me to better understand** how cannabis can help me specifically."*

# Cannify and Data-driven Research

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- **Past:**

- *Development of A Data-driven Tool to Educate Patients on Efficacy and Tolerability of Cannabis-based Products*, on tool feasibility, basic demographic and use data, 2018
- *Analysis Of Covariates Associated With Self-reported Cannabis Use Disorder Symptoms*, on characteristics of a potential Cannabis Use Disorder (CUD) population vs potential non-CUD population, 2019

- **Ongoing:** Continuous data gathering and various analyses (demographic changes over time, indirect comparisons with survey-literature, etc.)

- **In preparation:** Public Health Studies

# Cannify<sup>®</sup>

Try the Cannify Quiz and let us know what you think!

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 [www.cannify.us](http://www.cannify.us)

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**cannify.us**



# HARBORING PUBLIC HEALTH IN AN EXPANDING CANNABIS MARKET

## EDUCATION STRATEGIES

**Cannify**<sup>®</sup>  
**2024**



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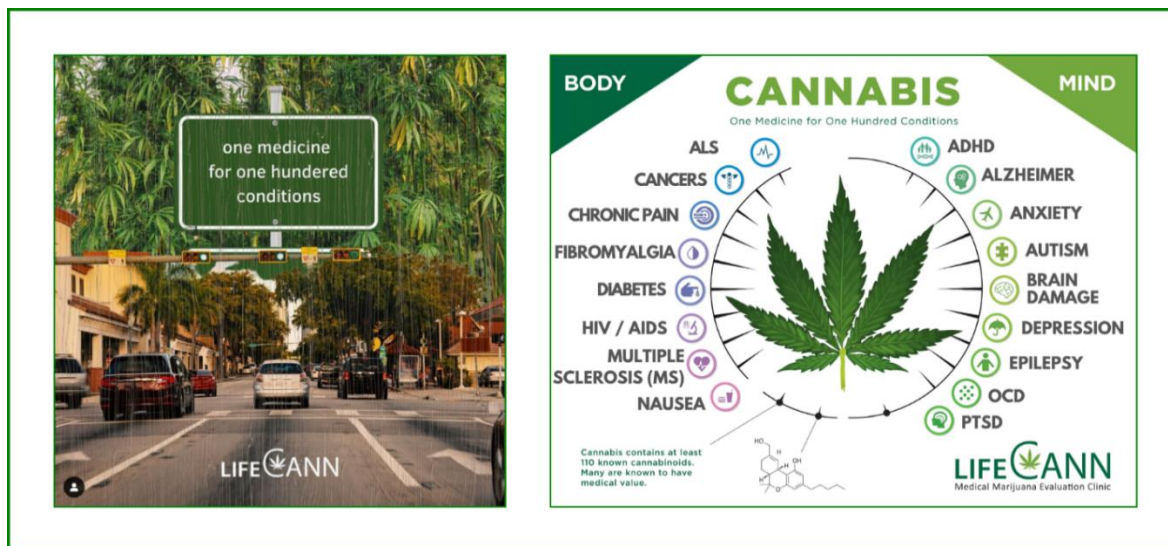
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## Introduction: Emerging Cannabis Market and Its Challenges for Public Health

The cannabis market has been expanding along with the changing legal landscape throughout the United States (Spindle et al., 2019). The Department of Health and Human Services recently recommended rescheduling marijuana to Schedule III, which would have implications on state medical marijuana programs for patients, and recreational programs (Sacco & Sheikh, 2023). It seems that the market will only continue to grow (Reiman, 2023a) with individual states changing their regulations and more states legalizing (adult) cannabis use. As a result, an increasing number of people, including children, are being exposed to cannabis, which, in turn, has consequences for consumer and public health (e.g. Wang, 2017).

The State of Vermont adopted a medical cannabis program almost 20 years ago, and in 2022, it opened a recreational cannabis marketplace (Act 164, 2020). Consequently, a wider audience now has access to cannabis, and the assortment of cannabis-derived products has expanded. For example, it has diversified to products of various effect strength (potency), administration route, ingredients and formulation, etc. This diversification is not just a contrasting palette compared to the lower effect strength, raw flower used recreationally decades ago, but also to the limited number of pharmaceutical products studied in clinical trials (University of Vermont professors and industry professionals, personal communication, 2020-2023).

This new marketplace creates various levels of confusion. Most importantly, companies, 'medical marijuana doctors', and other professional parties market and recommend cannabis products or cannabinoids (cannabis molecules), often as a panacea (see the image below), or as a healthy supplement that anyone could use, like daily vitamins (e.g. Denton, 2023).



Contrary to scientific findings, these figures present misleading and wrong information as advertisements of a physician in Florida. They are no exception in spreading such information. Sources: LifeCann Instagram (<https://www.instagram.com/p/CzEbF4ssbHL>) and website (<https://lifecannmd.com/consumer-reported-uses-of-medical-marijuana-for-ocd/>)

Next to that, once a patient has determined that a cannabis product might benefit their symptoms, the product array and product information can be overwhelming and confusing. Therefore, patients, although often held back by the fear of being stigmatized or otherwise shamed, turn to their healthcare providers, which is where another issue arises: physicians and pharmacists are generally uneducated on cannabinoids. At the same time, sales associates at cannabis retail stores, or budtenders, oftentimes have no scientific or health-related background. Moreover, 39% of sales associates reported that they receive sales commission, which biases their recommendation to patients (Peiper et al., 2017). All these issues combined can complicate consumer health related to use of cannabis and cannabis-derived products.

While typically being aware of the issues related to bias and the lack of knowledge by health care providers and budtenders, patients often refer to the internet for cannabis-related information. An initial analysis by Cannify on popular cannabis effect search terms on Google found that over 80% of the information is unscientific and mostly unhelpful. A far majority of information still comes from biased sources.

To understand how and to what extent cannabis can affect consumer health, researchers around the world have been studying its effects in numerous conditions. There is a plethora of evidence that shows both positive and negative effects of cannabis, depending on the patient, dose, administration method, etc. However, scientific reports are often too complicated for a lay person to fully understand.

A glaring gap between complex science, biased (online) information, and an overabundance of cannabis products has been bridged with a simple educational tool called the Cannify Quiz, developed by Dr. Linda Klumpers in 2016 after observing a similar discrepancy in the earlier emerging cannabis markets. **Its main purpose is to bring together people and cannabis science to help avoid unsafe, wrong, and potentially unnecessary use of cannabis and cannabis-derived products.**

Below are key points that will be addressed in depth:

- What Cannify Does
- How the Cannify Quiz Works
- How Cannify Was Built
- Cannify Use Cases
- Cannify in Practice

## About the Founder, Dr. Linda Klumpers

Dr. Klumpers earned a M.Sc. in Neuroscience from the University of Amsterdam and a Ph.D. in Clinical Pharmacology of Cannabinoids from Leiden University. She is also a registered Clinical Pharmacologist. Her research on cannabis in humans started in 2006. She has (co-)authored numerous [publications](#) and her cannabis-related scientific work has received six honors and awards. She is a Research Assistant Professor of Pharmacology with the University of Vermont, and co-founder of Verdient Science, a drug development consulting company. Next to her teaching and consulting work, she is actively involved in various clinical trials, including the ones that are performed under a four-year €1.9M (≈ \$2M) grant that was awarded by the Netherlands Organization for Health Research and Development (ZonMw).

After moving to the United States in 2015, she identified a lack of objective and actionable cannabis information: much of the education contained incorrect information, was provided by the industry or other biased sources, or was not useful, for example by being too complex to understand. As a result, she founded Cannify.

## What Cannify Does

**Patient-Science Matching:** In the sea of biased information on the risks and benefits of cannabis products, Cannify has found its purpose as the first company that matches patients and others to relevant scientific information. It translates complex cannabis science into simple reports, customized for personal symptoms and characteristics. Cannify only relies on scientific information from human studies, as the human body can never directly compare to the body of a lab animal.

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“Our mission is to understand the science of cannabis effects and share this knowledge with everyone.” - Cannify

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**Data Gathering & Analysis:** Another purpose of Cannify is to gather (anonymous) data from users for scientific analyses. Using data collected via the Cannify Quiz, Cannify has presented various work at scientific conferences, including the “Analysis of Covariates Associated with Self-



Reported Cannabis Use Disorder Symptoms” at the 29<sup>th</sup> Annual Symposium of the International Cannabinoid Research Society in the USA, 2019 by Dr. Klumpers.

Cannify’s main feature is the Cannify Quiz which will be described in depth in the following section.

Other features:

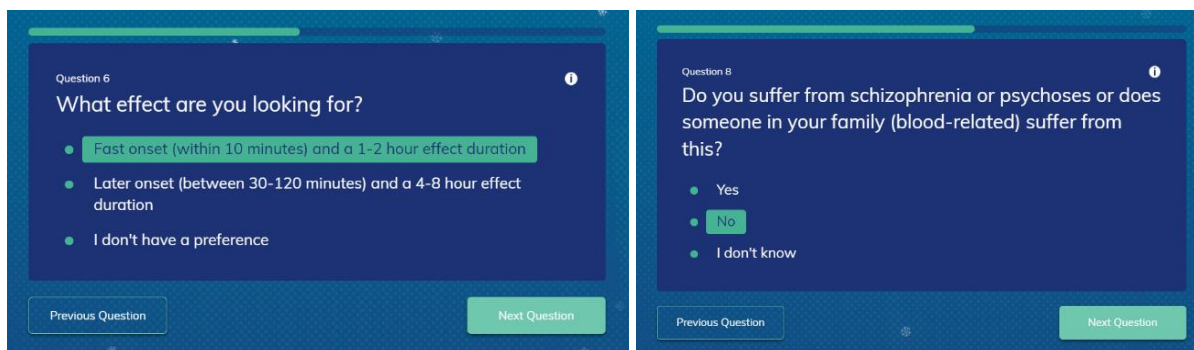
- Education Pages
- Educational Quizzes
- Cannify Account Features, including product searching and saving

## How the Cannify Quiz Works

In a nutshell, the quiz works as follows: a questionnaire lets one fill in information including the symptom of interest and personal characteristics, such as gender and cannabis experience, as well as preferences. Next, a report with scientific information and cannabis-based treatments that helped people with comparable profiles is generated, after which one can compare the report with Cannify’s cannabis and cannabis-derived product database.

## Questionnaire

All questions of the Cannify Quiz need to be answered truthfully to get a report with as relevant information as possible. Filling out the Cannify Quiz is anonymous, and no information provided can be traced back to the person filling it out. Examples of questions can be found below.



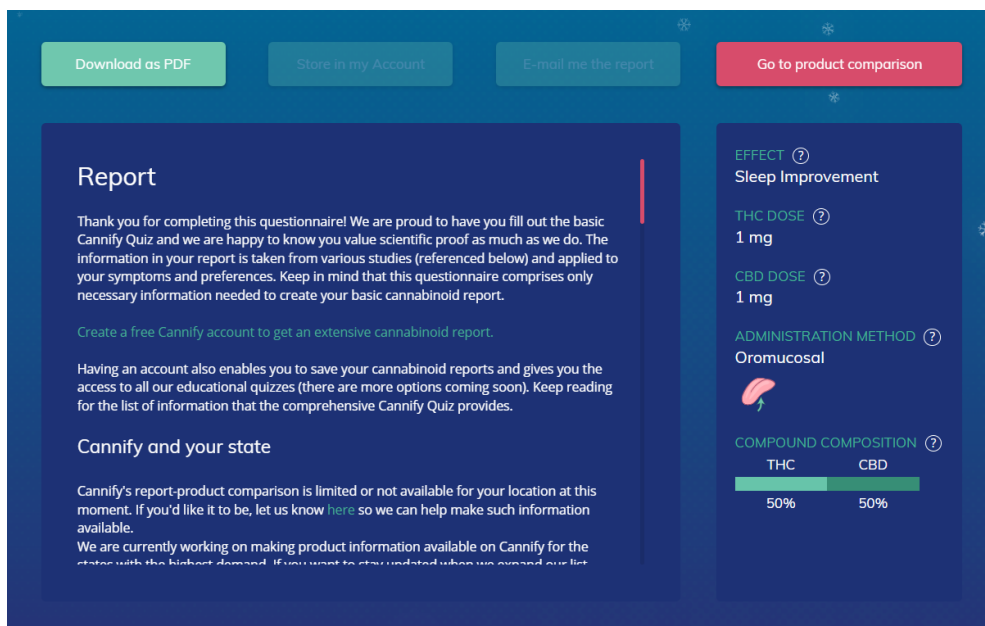
*Questions from the Cannify Quiz as an example*

## Report

After completing the questionnaire, a personalized report will be instantly generated by selecting relevant information from hundreds of peer-reviewed studies. The report contains, if applicable:

1. A narrative containing a summary of findings from studies with cannabis products that were performed in people with similar personal characteristics and the symptom of interest.
2. Educational information about cannabis-related science and research findings.
3. A visual summary of the report that lists the symptom of interest, relevant compound (THC and/or CBD) and their doses, administration method, and the visualized compound ratio.
4. The button linked to the products matching page (see the following section).
5. A list of referenced studies.

The report allows one to learn about cannabis products and the symptom of interest. An example report is shown in the figure below.



*Part of the personalized report with the visual report on the right-hand side*

## Product Matching Overview

The product matching page contains the visual report summary and lists the products available in the user's state with the highest matching scores. More information about the product matching score is provided in the section Product Matching .



*Product matching page*

## How Was the Cannify Quiz Built?

### Questionnaire

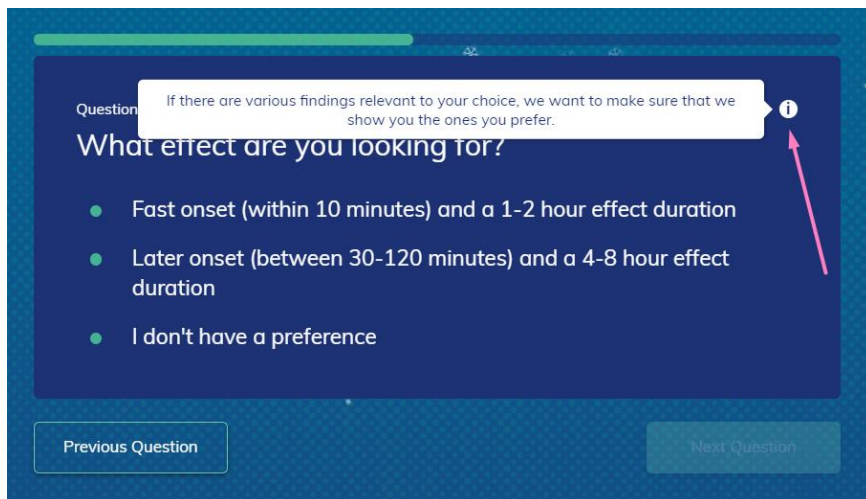
The questionnaire part of the Cannify Quiz has been built as a structured, targeted, and interactive means of getting the necessary information from the user to provide the relevant customized scientific information. Observing inconsistency in scientific information by healthcare providers, (social) media, industry, and other sources, a standardized questionnaire is the best way for Cannify to result in the structured and consistent approach that was lacking.

All answers are anonymous and cannot be traced back to the user.

The questions in the Cannify Quiz are necessary for one of three reasons:

- 1) For the algorithm to generate a personalized report that is as relevant and as accurate as possible.
- 2) For research purposes by the Cannify's scientific team.
- 3) For improvement of the Cannify Quiz.

Each question has a tooltip icon in the top right corner (see the image below) that explains the reason it is asked.



*An example question with a tooltip*

The Cannify Quiz contains two sets of algorithms:

- 1) Personalized report algorithms
- 2) Product matching algorithms

These algorithms have different types of input.

### Personalized Report Algorithms

The report is generated based on multiple factors: the symptom of interest as the most important one, but also use frequency, potential drug interactions, etc. The algorithm will select relevant findings on the symptom in relation to our data input that is explained below. The information shown aims to be evidence-based and risk-averse. These are some simplifications of what our algorithms could look like:

1. The patient's symptom of choice is anxiety. Since studies have shown that anxiety can be decreased by CBD and by THC, but with a risk of increasing anxiety with THC, the conservative algorithm will filter out only the literature that has focused on CBD as a treatment for anxiety.
2. The patient reports daily use of cannabis products, which puts them in the heavy user category. Since studies have shown that heavy use of cannabis can lead to THC tolerance, a higher starting dose will be presented in the report. In contrast, a user who has never used cannabis will be presented with a much smaller THC dose compared to the heavy user.

These algorithm results are generated using three input sources:

- 1) Scientific literature: Cannify's scientific team mostly uses peer-reviewed literature as their source of information. Only the highest quality publications are selected, based on factors such as study design, statistical analysis, bias, etc. This selection process mitigates aspects such as wrong data interpretation, mixed results, and design issues. In various cases when there is not enough conclusive data on the Quiz user's interest, it will be stated so in the report.

- 2) Clinical data sets: Besides the scientific literature, Cannify collects raw data from top tier national and international research organizations. Reviewing data from multiple studies, including pooling data (when possible), can provide new insights, some of which Cannify plans on publishing in the coming years.
- 3) User feedback: The personalized report output containing unidentifiable user data can be supplemented by a follow-up questionnaire to assess what the user did after taking the Cannify Quiz, and to potentially understand more about the perceived effectiveness of the product of choice. It also allows collecting feedback about the Cannify Quiz in general. The follow-up answers create new data for analyses, leading to more unique input that can be used for improving the Cannify Quiz.

Depending on client needs, the literature sources are updated every 3-9 months, while research data and follow-up data inputs are updated as needed.

### Product Matching Algorithms

A matching score is a relative representation of the extent a product matches the product summary described in the report compared to other cannabis products. It is not a validated number, nor a recommendation, but a rough estimation that helps patients understand the importance of distinguishing between the parameters used for calculating the score, including: the compound, dose, and quality. As of December 2023, the matching score comprises six matching score algorithm categories, consisting of various parameters per category including for example compounds and starting dose.

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Cannify algorithms never include financial compensation nor other incentives irrelevant to science, quality, and regulations.

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It is emphasized in the disclaimer of the personalized report that medical and recreational cannabis products are not tested in clinical trials and cannot replace pharmaceutical products registered for treating symptoms as approved by the FDA. For product information, Cannify is dependent on the information provided by manufacturers and other relevant third-party sources. Therefore, Cannify does not hold responsibility over the information accuracy. These are some simplifications of what product matching algorithms could look like:

- 1) The report shows that systemic exposure which oral products provide has shown to be effective for the chosen symptom. On the product matching page, oral products will have a higher matching score than, e.g., topical products that work locally.
- 2) The report shows that 2 mg of THC as a starting dose could be beneficial to treat the symptom of interest. Products with the same administration method and the same starting dose will have a higher matching score than, e.g., a product with the same administration method containing 10 mg of THC per unit.

## Product Database

There are multiple ways of entering products in Cannify's database which contains 1800+ products as of December 2023.

**Manual entry:** Most of the products have been entered manually. After locating a product web page or online shop of the manufacturer/dispensary of choice, a data entry clerk checks the availability of the following product information needed for the product matching algorithm:

- name
- net quantity
- compound
- THC and/or CBD concentration/dose
- regulatory category (medical or recreational use)
- administration method

If available, the clerk enters the above information, but also the additional information such as ingredients, product description, etc.

**Bulk import:** Products can be entered automatically, for example, by using an Excel list. It is preferred that the third party's product list contains all the required information.

**Product import using an API:** Cannify has an option to automatically import data from, e.g., a POS system with API functionality.

Product information is entered as it is listed on the product website at the time of the entry and Cannify does not hold responsibility for its accuracy.

## Use Cases for Cannify

The following use cases are examples of how Cannify has been used in the past and present, and how it could be used in the future.

## Governmental Organizations and Regulatory Bodies

Half of cannabis store visitors in Canada do not know beforehand what product they want to buy, which is similar to the US (Andrew Duffy, SparkPlug, formerly Best in Grow, personal communication, 2017). Consequently, at least half of cannabis store visitors make decisions based on information they find in the store, such as in-store signage and budtender recommendations, with 81% of budtenders reporting in one study that they commonly make strain recommendations to patients (Peiper et al., 2017). Not just recreational users, but also patients self-report to rely on dispensary staff (between 30-43%), even more so than on health care providers (<15%) as reported by MS patients in a 2022 study (Salter et al., 2022). The strong influence of budtenders was confirmed by physicians and companies working in and

researching this space, arguing that the actual number might be even higher than 90% of storage visitors relying on, or at least being influenced by budtenders (Physician survey for Cannabis Masterclass, 2019, data on file; Andrew Duffy, SparkPlug, formerly Best in Grow, personal communication, 2017). Other self-reported sources of information for product decision-making include friends and family (56%), websites or apps (38%), or celebrities (17%) (Irvine, 2021).

For public health and other government departments and organizations, the information transfer from store promotions and budtenders is opaque. Budtenders often receive their training and product information directly from product manufacturers and other biased sources. Budtenders are interested in finding and sharing information, and most of them do so typically via social media (Peiper et al., 2017).

**Cannify can bridge this gap in the objective cannabis product information and create transparency in the black box created by industry-dominated in-store communications.**

There are various ways which can be applied separately or simultaneously:

- 1) The Cannify Quiz provides objective information that is customizable depending on local rules and regulations, and other relevant desires.
- 2) Additionally, Cannify can provide ready-made education, customized articles, and professional curricula (e.g. sales associates, medical professionals).
- 3) The Cannify Quiz and other relevant quizzes (e.g. follow-up, educational) provide a dataset that can be used to study the population and their habits, as well as factors such as dispensary visit and product experiences.

If you are a Governmental Organization or Regulatory Body, the following Use Cases sections can also be applicable to your organization.

## Patients

Most patients are intentional users (Reiman, 2022) and try to find more information about their symptoms, condition, treatment options, and scientific backgrounds via friends and the internet. This often leads to exposure to biased and wrong information on cannabis products. Cannify intends to provide objective information to these patients and others interested in cannabis products, such as their caretakers. They can find Cannify online, or on devices in stores or healthcare providers' offices, allowing them to explore the correlation between specific symptoms and personal traits on one side, and various types of cannabis-based products on the other, based on science (Irvine, 2021). Better understanding the science behind how cannabinoids work, their dosing, and their benefits and harms, allows people to find a product in a more cautious way than 'browsing the internet', or discourage them from trying products unnecessarily. Both outcomes should lead to lower rates of overdosing and safer, educated use. The seriousness of proper scientific information is facilitated by the option to download the personalized report as a PDF for, for example, to share during a doctor's appointment.

Cannify can be used by anyone in the US who is at least 21 years old. For valid medical marijuana cardholders, the minimum age is 18 years old.

## Healthcare Providers: Physicians, Pharmacists, PAs, NPs, etc.

The human endocannabinoid system and cannabinoid drugs are not part of regular medical curricula, and most of our healthcare providers lack sufficient education to feel confident on discussing these topics with their patients (Benavides et al., 2020; Kruger et al., 2022). The Cannify Quiz is there to help these healthcare providers help their patients. It allows them the following:

- 1) For treatment and special populations - Find targeted science-based information on therapeutic and side effects of cannabis products. Difficult and specialized topics such as therapeutic effects ('Does cannabis help treat condition x?'), drug-drug interactions, use during pregnancy, etc. can be discussed with supporting literature references after taking a patient through the Cannify Quiz and generating a personalized report.
- 2) For prevention of toxicity and after care - Poison centers and emergency departments receive calls and visits from patients with cannabinoid intoxication. From Cannify's experience in Colorado, healthcare providers can feel empty-handed when they get cannabis-specific questions, or when discharging these patients, knowing that an overdose might happen again. Cannify helps these healthcare providers inform their patients by providing information to prevent overdosing or negative side effects in the future. The personalized report, as well as the FAQ and other information on Cannify's theme-structured education pages help healthcare providers find scientific backgrounds of common starting doses, dose titrations, and other relevant information of pharmaceutical cannabinoid products or study products, putting in perspective common misconceptions regarding product strength ('the more potent, the better'), product types ('indicas make you feel relaxed and wind you down'), wrong use of compounds ('use CBD to mitigate THC's side effects'), and other applicable fables. The information can also be shared with patients as an educational tool at home, or accessed via electronic devices such as tablets in waiting rooms, general practice offices, hospitals, etc.

Next to the Quiz, Cannify can also provide data insights and continuing medical education-level curricula to health care professionals who are interested in more in-depth and intense cannabinoid studies.

## Other Parties

### Dispensaries

As per a 2023 Consumer Survey released by New Frontier Data, 43% of present consumers indicate physical dispensaries are the main source of cannabis products for cannabis users in adult use and medical use states (Reiman, 2023b). For improving customer-dispensary



interaction, data gathering on clientele and assortment decisions, customer satisfaction, and various other reasons, dispensaries have been working with Cannify on their websites and on in-store devices. For example, inside dispensaries, budtenders can help the customers go through the Cannify Quiz, understand the personalized report, and the product overview that follows. More information on dispensary options can be provided upon request.

## Manufacturers

Cannify's in-house research found that manufacturers can find the distance to the end-user troublesome. Despite online advertisements, (in-house) signage, promotions, budtender training, etc., manufacturers perceive the end-user communication as challenging as distributors and/or dispensaries often stand between them. The Cannify Quiz and Cannify's blog posts and education material are used by manufacturers to narrow this distance. Data analytics (explained in section 'General note on Data Analytics and Feedback Loop') are used to understand more about user desires, needs, and behavior.

## Marketing, Media, and Other Parties

Cannify offers a Web Widget that can be embedded into any website interested to offer cannabis education to website visitors, without leaving the website. It is used by, for example, online magazines to make the website more attractive by adding a trustworthy, science-based source. The personalized aspect of the Quiz in the Web Widget keeps website visitors engaged.

## General note on Data Analytics and Feedback Loop

Cannify can provide periodical analytical reports on the data gathered. Intermittent exchange of insights and suggestions can improve service offering and data collection for any organization. The objectives of periodical data analytics should be discussed as early as possible during licensee-Cannify interactions. Reports can comprise the following information:

- User demographics
- Symptoms of interest
- Cannabis use habits
- Common cannabis side effects
- Most often reviewed and saved products
- Correlations between various parameters (e.g. risk of developing cannabis use disorder and demographics)
- Parameter development over time

## Cannify in Practice: Implementation Steps

This section describes examples of a typical pathway to implementation of Cannify. Adjustments of the different steps and elements can be discussed.

### 1. Definition of the Objectives

Every Cannify licensee has different needs and circumstances, and therefore each plan starts with the definition of the specific high-level objectives and their prioritization. After an estimation of the resources for the specific scenarios is made, the final high-level objectives and their prioritization can be decided upon, and an agreement can be put in place.

### 2. Customization Plan

Once the high-level objectives are in place, specific objectives and a customization plan can be created. The Cannify Quiz is highly customizable. The questions can be adjusted to reflect state rules and regulations (e.g. medical conditions approved for cannabis treatment), product assortment can be adjusted based on location and approved suppliers, and links to external/third-party product delivery and other ordering platforms (POS) can be added. Many other customizations can be made, dependent on the objectives and mutual agreement.

A licensee, such as the State of Vermont or the Cannabis Control Board (CCB), may request one or multiple Cannify features with desired customizations (e.g. a basic Quiz version vs. an extensive version, an adjusted symptom list in the Cannify Quiz, links to an online purchasing platform). The Cannify IT team can custom-build and test the requested feature.

Upon building and testing completion, the feature will be sent to the licensee for implementation. Cannify will present the feature to the State and explain its functions. The licensee will perform tests and send feedback to Cannify. If needed, Cannify will further adjust the feature. After the licensee and Cannify have confirmed that the feature functions as intended, it will be brought online.

Cannify will offer support directly to the licensee in case of any technical or content-related questions. Handling of inquiries on Cannify feature(s) by third parties will only be handled by Cannify if agreed on in the License Agreement.

### 3. Train the relevant people on the Quiz

To fully benefit from Cannify's implementation, be it online or on-site, e.g., in a hospital or dispensary, it is best for some user groups to be guided through the Cannify Quiz by trained personnel, e.g., health care professionals or budtenders. Cannify has on-site courses available to train dispensary personnel, dispensary managers, healthcare providers, and other relevant professionals. The basic training session for dispensary personnel takes 1.5 hours including Q&A, and can be expanded with educational content on plant, product, pharmacology, and people-interaction, and use of the Cannify account section. CME-level courses can take

anywhere from a few hours to three days. Cannify provides qualified trainers and course leaders to ensure high quality.

The basic dispensary personnel Cannify Quiz training session typically consists of these parts:

- The Cannify Quiz – understanding the background of the questionnaire
- Personalized report and product matching page interpretation
- Practicing with guiding patients through the questions, and answering typical questions patients might ask
- A knowledge quiz after each part checks whether the training was successful or whether additional training needs to be provided.

At the end of a training session, the participants will be provided with information on where to find additional readings, answers to follow-up questions, and contact information of relevant people.

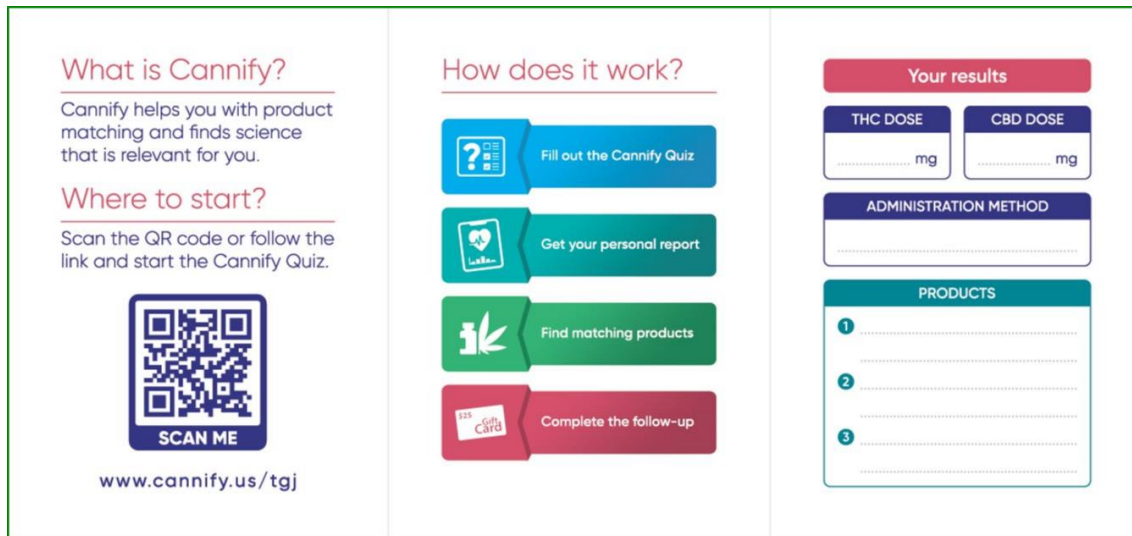
For understanding the situation at the site, lowering the threshold, getting more information from the personnel that you might otherwise not hear, and rapport building, we recommend training sessions to take place in person on site whenever feasible. The knowledge quiz can be performed at the site, or remotely. A system needs to be mutually agreed on with the licensee for intermittent knowledge checks, notifying trained people of significant changes, and refresher training sessions.

## 4. Promotion and Awareness

Customized promotion plans are made depending on the agreed objectives. In this section, we lay out some examples of Cannify's experience with Quiz promotion that has helped increase awareness.

Multichannel advertisement of the Quiz and promoting objective educational content was established directly via Cannify, and Cannify's partners. Examples include:

- Online efforts, e.g., newsletters, social media, Google advertising
- In-person courses, e.g., budtender training programs and CME-level education programs for healthcare providers
- Other static advertising, e.g., shopping bag cards (see the image below), stickers and brochures, (educational) videos on in-store TV screens
- Other dynamic advertising based on behaviors in the digital and real world, e.g., visits to specific places or brand preferences.



The inside of a three-panel shopping bag card used by a dispensary chain in Colorado. Budtenders explain the Cannify Quiz to the customers and show them where to copy the results in the card so that they can bring it to the next dispensary visit.

Furthermore:

- As indicated under the last bullet: objectives are typically made and discussed after market analysis.
- Cannify works with specialized advertising agencies.

## Free Version vs. Premium License

Cannify provides two product offerings to accommodate various user preferences: a free version and a premium license version. The free version is intended for easy access to the basic features of our tool. Additionally, for professionals and those seeking advanced features, our premium license version offers enhanced capabilities. The differences are outlined in the table below.

	Free	Premium License*
Free basic Quiz version	✓	✓
Science updates	Occasional	At least 4x/year
Questionnaire adjustment (e.g. additional symptoms)	✗	✓
Target group Quiz adjustments (e.g. for consumers, patients, or HCPs)	✗	✓
Report text adjustment (e.g. addition of terpene information, information on counseling or other services)	✗	✓
Product selection display	State-dependent	Licensee-specific
Product import upon request	✗	✓
Product information**	Basic	Full
Data insights and analytics	✗	✓
Web Widget custom theme	✗	✓
Education Quizzes upon request	✗	✓
Feature customization (e.g. product notes, advanced report sharing)	✗	✓
Quiz training, remotely or on location	✗	✓
General cannabinoid educational courses, remotely or on location	✗	✓
Quiz promotion	Cannify social media posts	Licensee's Quiz promotion to a targeted audience
Customer service	✗	✓

\*Charges may vary depending on the quantity or frequency of updates, imports, and other activities.

\*\*The product page always displays the product and manufacturer names, active compound(s), starting dose, and administration method. The premium licensed products include additional information (when available), such as a product image, a vendor or manufacturer-provided product description, and the list of ingredients.

## Patient-Budtender Use Case Examples

There are various ways that Cannify can be used in practice by various parties. The following examples are just illustrative use cases that do not represent the array of all possible use cases.

## Case I

The following are roles in this case:

- Patient
  - Healthcare provider
  - Budtender
- 1) A long-suffering chronic pain patient, increasingly bothered by recent sleep issues, seeks a higher treatment dose despite troublesome side effects. They schedule a new appointment through their healthcare provider's website for the following week.
  - 2) While on the healthcare provider's website, something different catches their eye: the Cannify Quiz widget. "Learn more about the science of cannabis and cannabinoids". Why is this on my doctor's website: isn't cannabis an illicit drug?
  - 3) Curious, the patient takes the basic version of the Cannify Quiz on the website, to explore the effects of cannabis on sleep. The report brings the patient to education pages where they learn that a pharmaceutical product made with cannabinoid compounds does not improve sleep itself but can help sleep by making pain bearable.
  - 4) The patient wonders whether their doctor is aware of this and if it applies to them. The patient saves their report on their computer and sends it along with an appointment request for next week. Additionally, they create a Cannify Account to retain the information for later use.
  - 5) The following week, the patient sees the physician. Before the appointment, the doctor reviews the patient's Cannify report and finds in the scientific literature that a cannabis product might have a positive risk-benefit ratio. The physician guides the patient through the comprehensive Cannify Quiz for more insights, ensuring that the report results are saved in the patient's account.
  - 6) From the report, product matching page, and the scientific literature, the physician finds that pharmaceutical product nabiximols (Sativex®) aid the patient's pain and, consequently, their sleep. Unfortunately, as it is not available in the US, the doctor can't prescribe it, disappointing the patient. When asked about alternatives, the physician states that no alternative pharmaceutical option exists. The patient asks about similar cannabinoid products from dispensaries that they have heard about from friends. The physician discusses Cannify's product matching page, highlighting the lack of clinical trials, quality standards, and inability to prescribe the non-pharmaceutical products. Drawing from experience, the physician can tell the patient about products that seemed to satisfy other patients but stresses the lack of scientific evidence for their effectiveness, and their typical side effects.

- 7) At the doctor's office, the patient, logged into their account on their phone or tablet, saves the products in the Favorites section. They delve deeper into the report and referenced literature after getting home.

#### Scenario A:

- 8) The patient, interested in trying one of the saved products, clicks through the product detail page and is directed to an online purchasing platform. The product is ordered and tried out, according to its descriptions and the physician's notes.
- 9) Cannify automatically sends the patient a reminder to follow-up on their actions: did they try a product, and if so, what did they try, how did they try it, and what happened? Depending on the licensee's desires, this information may or may not be shared with the patient's physician. The notes are stored in the patient's Cannify Account and can serve for:
  - a. Non-medical physician feedback (if relevant)
  - b. Non-medical patient future reference
  - c. Improvement of the Cannify Quiz
- 10) After trying the product, the patient and physician can decide to continue, modify, switch, or stop using cannabinoid products.
- 11) The patient can retake the Cannify Quiz whenever their situation changes (symptom improvement, change of symptoms) and refer to the previous results and product notes. Also, they can retake the Quiz every one to five years for updates on the latest scientific developments in the relevant field.

#### Scenario B:

- 8) The patient plans to try a saved product and heads to the nearest dispensary that sells this product listed on Cannify. At the dispensary, the budtender invites the patient to take the Cannify Quiz on an in-store tablet, but the patient already has their report and product information on their smartphone.
- 9) The patient shows their saved products to the budtender for purchasing and use information. While the budtender cannot give any medical information, they can discuss other patients' experiences, and provide information about the product and its ingredients, how to use it comfortably, the product availability and supply, and related topics.
- 10) The product is bought and tried out, according to product descriptions and physician notes. From here, follow steps 9-11 from Scenario A.

## Case II

The following are roles in this case:

- Patient or non-patient dispensary customer
  - Budtender
- 1) A patient or other customer seeks a cannabis product that can help improve their sleep based solely on a friend or family member's advice, without going to a physician's office. The customer heads to a local dispensary recommended by their friend.
  - 2) The budtender, being the only point of contact inside the dispensary, recommends the customer to always see a healthcare provider for medical questions and information on the pharmaceutical-grade cannabis products.
  - 3) The budtender offers the customer to take the Cannify Quiz on an in-store, but discreet, tablet. The budtender assists the customer in answering questions, explains their relevance, stresses the importance of truthful answers, and helps the customer feel comfortable.
  - 4) Upon completion, the personalized report is generated, and the budtender highlights the crucial aspects of the report, like the visual summary and symptom explanation for the customer.
  - 5) When relevant, the budtender will take the customer through the product matching page, and through the various products that are displayed and are of the customer's interest.
  - 6) The customer can decide to save their report and product overview and look at it at their convenience.
  - 7) The customer can decide to go home or to buy the product immediately. In case of the product purchase, the budtender provides product information and supplies a shopping bag card containing the budtender's name and contact information, Quiz results summary, and space for product information and other notes. The shopping bag card can be taken home for future dispensary visits.

Notes to this case: If, for example, the customer chooses not to fill in the Quiz on-site, the budtender can provide the customer with the Cannify website URL and QR code and explain what it does and how to take it. They can also bring a (partially) filled out Cannify shopping bag card (see point 7).

## Contact Information

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