

Administration and Formulations

Routes of Administration

- Inhalation (vaporization; smoking not yet allowed)
- Oral, Oro-mucosal, Sublingual
- Topical (applied to skin)
- Rectal

Common formulations

- Herbal cannabis, Resin
- Chemically-extracted concentrates
- Edibles, Tinctures
- Lozenges, Lollipops
- Nabiximols
- Prescription cannabinoids (dronabiol, nabilone)

*This section was adapted from the online presentation
“An Introduction to the Biochemistry & Pharmacology of Medical Cannabis”*

www.doh.dc.gov



DAILY DOSAGE AMOUNT LIMITS FOR 5 IDENTIFIABLE “FORMS” OF MEDICAL CANNABIS

	THC (mg)	CBD (mg)
Daily Dose Amount Limits	1000	1500
Inhalation	750	1500
Oral	1000	1500
Rectal	600	1000
Sublingual	1000	1500
Topical	600	1000

“Forms” reflects different routes of administration or delivery rather than flower, oil or topical cream formulations.

Inhaled cannabinoid drugs are available in several formulations

- Herbal cannabis
- Resin
- Chemically-extracted concentrates
- A typical cannabis “joint” contains 0.5 to 0.8 grams of cannabis with about 8% THC.
 - About 20-70% of THC (~5 mg) reaches the lungs.
 - About 30% of THC enters systemic circulation and becomes bioavailable.
- The short onset of action makes dose titration possible, by spacing inhalations at 90-second intervals.
- THC peaks in plasma in 3 to 10 minutes, and is cleared in about 3 hours.
- Psychoactive effects appear within 90 seconds, and last 1-4 hours
- Vaporizers heat cannabis to the boiling point (155-250 deg C), but well below the combustion point.



Vaporization

- Vaporizers specifically made for cannabis go back to the 1970s.
- Vaporizers cause trichomes to burst and vaporize their contents, leaving behind a toasted brown chaff that smells a bit like popcorn.
- There are a wide variety of vaporizers commercially available. Options include The Volcano[®], vapor pens, and other hand-held devices. The Volcano[®] (Storz & Bickel, Germany) has been evaluated, clinically tested, and approved as a medical device. It retails for \$380-\$480.
- Other portable vaporizers are shaped like pipes or e-cigarettes. They are less expensive, but their extraction efficiency and reproducibility have not been adequately tested.



The Volcano[®]
(Storz and Bickel 2009)



Portable vaporizers
(© John McPartland 2015)

Topical Administration

Topical cannabinoid drugs are available in several formulations

- Herbal cannabis
- Resin
- Chemically-extracted concentrates
- Types of topicals
 - ✓ Creams (oil and water in equal proportions)
 - ✓ Ointments (oil and water in a 80%:20% ratio)
 - ✓ Transdermal patches (10 mg THC mixed in a polymer matrix and ethanol carrier)
 - ✓ Herbal poultices



Resins

Resin (hashish) is composed of glandular trichomes mechanically extracted from flowering tops and upper leaves, formulated as powder or pressed into solids.

Potency

THC content in hashish is usually 15-20%.



Magnified view of glandular trichomes (plant hairs) on a high-yield cultivar (Psychonaught 2009)

Chemically-Extracted Concentrates

Formulations include yellow waxy chips, dark brown viscous oil, and cartridges similar to electronic cigarettes (e-cigarettes) made from concentrates of dabs, wax, budder, honey oil, shatter and butane hash oil. THC and CBD are lipophilic, so polar solvents, such as butane, hexane, or liquid carbon dioxide, must be used.

Potency

Varies (up to 70% THC)



Potential Problems associated with chemical extraction

- The extraction processes may leave residual solvents. For example, extraction with lighter fuel may leave mercaptans behind.
- Amateur attempts at butane extraction using open systems have resulted in explosions and injuries.
- E-cigarette formulations often contain propylene glycol. Vaporizing propylene glycol may create carbonyls such as formaldehyde (Marco 2015).
- Chemical extraction often removes terpenoids, which have medical benefits.



Oral cannabinoids

Available in various formulations.

- “Edibles”
- Tinctures
- Prescription cannabinoids: dronabinol, nabilone
- Pharmacokinetics:
 - ✓ Delayed onset of action (about 90 minutes)
 - ✓ Lasts longer, as peak plasma concentrations achieved in 1-6 hours, with terminal half-life of 20-30 hours Low and erratic gastrointestinal bioavailability
 - ✓ Undergo first-pass metabolism; 50% of THC metabolized to 11-OH-THC before entering systemic circulation

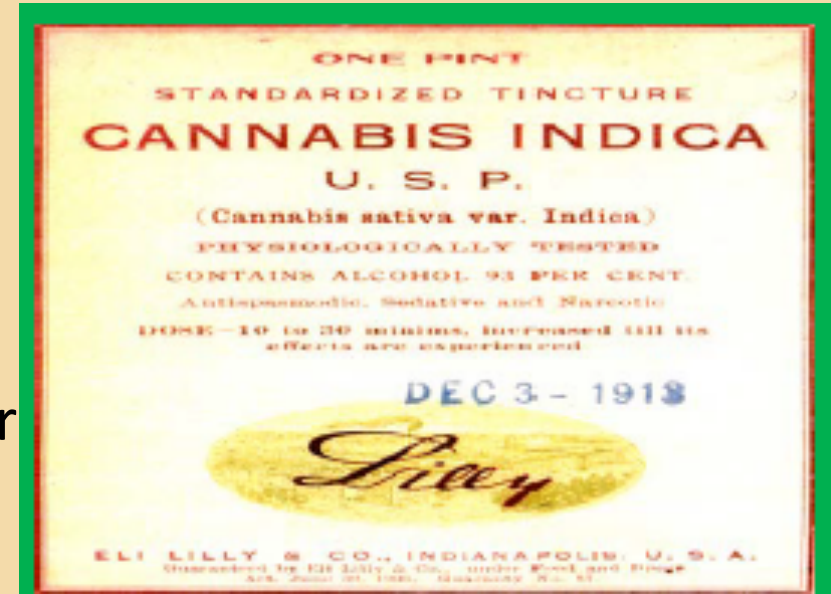


Edibles, Tinctures, Oils

- ✓ Edibles (brownies and cookies), tinctures, and oils are formulated from herbal cannabis, resin, or concentrates.
- ✓ Brownies and cookies use butter or oil to extract cannabinoids and terpenoids.
- ✓ Tinctures and beverages use glycerin or ethanol to extract cannabinoids and terpenoids.

Potency

- ✓ The cannabinoid dosage in a commercial product must be labeled
- ✓ THC dosage is usually in the 10-25 mg range.



Cannabis ethanol tincture from 1913. Note small print regarding dosage titration: "10 to 30 minims, increased till its effects are experienced"

(© Mary Lynn Mathre 2015)



Oro-mucosal or Sublingual Route

- ✓ Lozenges, lollipops, and mouthstrips
- ✓ Tinctures dispensed with an atomizer spray
- ✓ Standardized whole-plant extract (nabiximols) dispensed in a metered-dose spray pump

Pharmacology

- ✓ Mixed absorption spectrum: some of the drug passes through the oral mucosa directly into the bloodstream, but the majority undergoes first-pass metabolism.
- ✓ Onset of action and peak plasma concentrations (C_{max}) occur sooner than the oral route
- ✓ C_{max} values from nabiximols are below those reported from inhaled cannabis, imparting less psychoactivity



Lozenges and Lollipops

Description

They are based on herbal cannabis, resin, or concentrates, extracted using glycerin, ethanol, or butane.

Potency

The amount of THC in a product is labeled and is usually in the 10 mg range.



Child-proof container of cannabis lozenges. Label states “not tested for contaminants or potency, consume with caution.”

(© John McPartland 2015)

Summary

- Cannabis in various formulations is a remarkable medication for a range of ailments.
- The cultivation, preparation and dispensation of cannabinoid medications is a serious responsibility that requires attention to details delineated by the Florida Department of Health Office of Medical Marijuana Use.
- Rules, regulations and procedures must be followed meticulously by all 3BF Dispensary Staff
- Infractions will incur a range of penalties from fines to suspension/withdrawal of the license.

