

**Appendix 1 (as supplied by the authors): Supplemental Table 1: Possible and actual interactions between cannabinoids and other medication<sup>1-8</sup>**

	<b>Tetrahydrocannabinol (THC)</b>  <b>Substrate of CYP3A4 and CYP2C9</b>  <b>Potential ↑ THC concentration with CYP3A4 and CYP2C9 inhibitors (see below)</b>	<b>Cannabidiol (CBD)</b>  <b>Substrate of CYP3A4 and CYP2C19</b>  <b>Potential ↑ CBD concentration with CYP3A4 and CYP2C19 inhibitors (see below)</b>
<b>Pharmacokinetic interactions*</b>		
<b>CYP3A4 inhibitors</b>  [e.g. macrolide antibiotics (clarithromycin and erythromycin only), azole antifungals, HIV protease inhibitors, diltiazem, verapamil, amiodarone]	Ketoconazole ↑ THC concentration nearly 2-fold. Similar interaction possible with other 3A4 inhibitors, resulting in enhanced THC psychoactive effects.	Ketoconazole ↑ CBD concentration nearly 2-fold. Similar interaction possible with other 3A4 inhibitors, resulting in enhanced CBD effects, including somnolence and transaminase elevations.
<b>CYP3A4 inducers</b>  (e.g. rifamycins, efavirenz, nevirapine, St. John's wort, carbamazepine, phenytoin, phenobarbital)	Rifampin ↓ THC concentration ~ 20%. Similar interaction possible with other 3A4 inducers. Clinical significance unclear.	Rifampin ↓ CBD concentration ~ 60%. Similar interaction possible with other 3A4 inducers. Combined use may decrease effectiveness when used for seizure disorders.
<b>CYP3A4 substrates</b>  [e.g. alprazolam, PDE <sub>5</sub> inhibitors (e.g. sildenafil), carbamazepine, HIV protease inhibitors, diltiazem, verapamil, fentanyl, cyclosporine, tacrolimus, sirolimus, simvastatin, atorvastatin, zopiclone)	No effect of THC on CYP3A4 substrates anticipated based on current knowledge.	CBD ↑ tacrolimus concentration 3-fold. Interactions with other 3A4 substrates possible. Monitoring for adverse reactions and/or selecting alternative agents recommended when clinically possible.
<b>CYP2C9 inhibitors</b>  e.g. (sulfamethoxazole, amiodarone,	May ↑ THC levels, enhancing psychoactive effects.	No effects anticipated of CYP2C9 inhibitors or inducers based on current knowledge.

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<p>metronidazole, fluconazole, voriconazole, valproic acid)</p> <p><b>CYP2C9 Inducers</b> (e.g. rifamycins, barbiturates, carbamazepine)</p> <p><b>CYP2C9 Substrates</b> (e.g. warfarin, rosuvastatin, phenytoin)</p>	<p>May ↓ THC levels, attenuating psychoactive effects</p> <p>THC may ↑ levels; monitor for adverse reactions; dose reduction may be required. Cases of increased INR and bleeding with smoked marijuana.</p>	<p>CBD may ↑ levels; monitor for adverse reactions; dose reduction may be required. Cases of increased INR and bleeding with smoked marijuana.</p>
<p><b>CYP2C19 inhibitors</b> (e.g. cimetidine, omeprazole, esomeprazole, ticlopidine, fluconazole, fluoxetine, isoniazid)</p> <p><b>CYP2C19 inducers</b> (e.g. barbiturates, St. John's wort, carbamazepine, rifamycins)</p> <p><b>CYP2C19 substrates</b> [e.g. aripiprazole, clopidogrel, citalopram, diazepam, N-desmethyloclobazam (nCBZ)]</p>	<p>No effects anticipated with 2C19 inhibitors, inducers or substrates, based on currently available knowledge.</p>	<p>Although a CYP2C19 substrate, no impact of omeprazole. Because of potential for interaction, monitor for CBD side effects.</p> <p>Similar effects possible as with 3A4 inducers.</p> <p>CBD ↑ levels of nCBZ 2- to 6-fold. Interactions with other 2C19 substrates possible. Monitor for toxicity. Because clopidogrel is activated by CYP2C19, CBD may compromise antiplatelet activity of this drug.</p>

<b>CYP2B6 substrates</b> (e.g. ,methadone, selegiline, meperidine)	THC may ↑ levels; monitor for adverse reactions; dose reduction may be required.	CBD may ↑ levels; monitor for adverse reactions; dose reduction may be required.
<b>CYP1A2 substrates</b> e.g. (clozapine, theophylline, olanzapine)	Smoked marijuana may ↑ clearance of these drugs. Monitor for loss of efficacy with chronic marijuana use. Conversely, smoking cessation may require dose reductions of 30% and 50% of olanzapine and clozapine, respectively to avoid toxicity.	Smoked marijuana may ↑ clearance of these drugs. Monitor for loss of efficacy with chronic marijuana use. Conversely, smoking cessation may require dose reductions of 30% and 50% of olanzapine and clozapine, respectively to avoid toxicity.
<b>P-glycoprotein substrates</b>  Substantial overlap with CYP3A4 substrates, and also includes dabigatran etexilate, digoxin and loperamide.	No effect of THC on p-glycoprotein substrates anticipated.	CBD may inhibit p-glycoprotein drug transport. Monitor for increased toxicity of substrates.
<b>Pharmacodynamic interactions</b>		
<b>Central nervous system depressants**</b> (e.g. alcohol, opioids, benzodiazepine receptor agonists, tricyclic antidepressants)	Additive cognitive and psychomotor impairment.	Additive cognitive and psychomotor impairment.
<b>Sympathomimetics</b> (e.g. amphetamines, cocaine, noradrenergic and anticholinergic agents)	Additive tachycardia, hypertension and fluid retention.	No interaction anticipated.

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\*List of substrates, inhibitors and inducers are representative only, and not exhaustive.

\*\* Increased risk among individuals with cognitive impairment or advanced age.

## REFERENCES

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