

1. Arkell et al. (2021) — *Clinical Chemistry*

Title: *The Failings of Per Se Limits to Detect Cannabis-Induced Driving Impairment*

Key finding

The authors conclude that:

“There appears to be a **poor and inconsistent relationship between magnitude of impairment and THC concentrations in blood or oral fluid.**”

Policy implication

Per-se THC limits **cannot reliably identify impaired drivers** and risk criminalising individuals who are not impaired.

2. McCartney et al. (2021) — Lambert Initiative (University of Sydney)

Title: *Determining the relationship between THC concentration and driving impairment*

Key finding

Across **28 experimental studies**, researchers found:

- Weak correlations between THC levels and impairment.
- **No consistent relationship in frequent users.**

Policy implication

Blood THC thresholds **do not function as a reliable impairment metric**, especially for regular or medical users.

3. Ramaekers et al. (2006) — *Psychopharmacology*

Title: *Dose-related risk of motor vehicle crashes after cannabis use*

Key finding

Driving impairment from cannabis is **moderate and highly variable**, and experienced users show **substantial tolerance**.

Policy implication

A single legal threshold cannot capture the **heterogeneous impairment profile** of cannabis users.

4. Hartman & Huestis (2013) — *Clinical Chemistry*

Title: *Cannabis Effects on Driving Skills*

Key finding

The review concluded:

“Blood THC concentrations are **not reliable indicators of cannabis-induced impairment.**”

Policy implication

Toxicology results **cannot be used in the same way as blood alcohol concentration** to infer impairment.

5. Compton & Berning (2015) — *U.S. National Highway Traffic Safety Administration*

Title: *Drug and Alcohol Crash Risk Study*

Key finding

After controlling for confounding factors:

- Cannabis use was **not associated with increased crash risk** compared to sober drivers.

Policy implication

Population crash data **do not support strong impairment assumptions based solely on THC presence.**

6. Rogeberg & Elvik (2016) — *Accident Analysis & Prevention*

Title: *The effects of cannabis intoxication on motor vehicle collision risk*

Key finding

Meta-analysis showed **small increases in crash risk**, but far lower than alcohol.

Policy implication

Cannabis impairment exists but **does not scale with blood THC levels** in a predictable way.

7. Metrik et al. (2026) — *Review on cannabis-impaired driving*

Title: *Recent Advances in the Science of Cannabis-Impaired Driving*

Key finding

The literature shows **weak or absent correlations between THC concentration and impairment measures.**

Policy implication

Biological concentration alone **cannot serve as a scientifically robust legal standard for impairment.**

8. Grotenhermen et al. (2007) — *Addiction*

Title: *Developing limits for driving under cannabis*

Key finding

THC blood levels **do not correspond consistently with behavioural impairment**, especially in chronic users.

Policy implication

Per-se limits risk **misclassifying unimpaired drivers as impaired.**

9. Sewell, Poling & Sofuoglu (2009) — *American Journal on Addictions*

Title: *The effect of cannabis compared with alcohol on driving*

Key finding

Cannabis-impaired drivers often compensate by:

- driving slower
- increasing following distance

Policy implication

Cannabis impairment **differs qualitatively from alcohol impairment**, undermining alcohol-style legal thresholds.

10. Huestis et al. (2015) — *Drug Testing and Analysis*

Title: *Cannabis and Driving: A Scientific and Rational Review*

Key finding

THC pharmacokinetics are **highly variable**, and blood levels **decline rapidly even while impairment persists or vice versa.**

Policy implication

THC concentration **cannot function as a reliable proxy for impairment.**

11. Arkell et al. (2020) — *JAMA*

Title: *Effect of Cannabidiol and Δ 9-THC on Driving Performance*

Key finding

Driving impairment varied significantly between participants despite **similar THC exposure levels**.

Policy implication

Individual variability makes **fixed THC thresholds scientifically problematic**.

12. Strohbeck-Kühner (2007) — *Cannabinoids*

Title: *Fitness to drive in spite (because) of THC*

Key finding

A subject with ADHD demonstrated **normal driving performance with 71 ng/ml THC in blood**.

Policy implication

Tolerance and individual neurobiology can **decouple THC concentration from impairment**.

Core Scientific Consensus

Across toxicology, psychopharmacology, and traffic safety research:

1. **THC blood concentration correlates poorly with impairment.**
 2. **Tolerance significantly alters impairment profiles.**
 3. **Cannabis impairment is heterogeneous and context-dependent.**
 4. **Alcohol-style per-se thresholds are not scientifically equivalent.**
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Strategic note

- Alcohol laws work because **BAC strongly correlates with impairment**.
- Cannabis laws using THC concentration **lack that scientific foundation**.

That point appears **repeatedly across toxicology and clinical chemistry literature**.