

EVIDENCE REVIEW 06 • TESTING METHODS

Can DNA barcoding verify a herbal supplement?

DNA methods identify plant species, but processing destroys DNA and an identity match cannot measure dose or purity. The famous 2013 study was retracted.

REVIEWED 9 SEPT 2026 3 SOURCES SOURCE-CHECKED

BOTTOM LINE

DNA barcoding is a useful identity tool for suitable plant material, but it cannot judge a processed herbal product on its own. The widely repeated claim that most herbal products are mislabelled traces to a 2013 paper that was retracted in 2024 after a finding of data fabrication, and should no longer be cited.

KEY POINTS

- DNA barcoding compares short genetic regions against reference libraries to identify a species.
- Heat, extraction and purification degrade DNA, so a genuine extract may yield little to amplify.
- A DNA match cannot establish dose, active-chemical content, absence of contaminants or effectiveness.
- The "59% of herbal products" claim comes from a paper BMC Medicine retracted in July 2024.

If you have read that most herbal supplements on the shelf are not what they claim to be, you have almost certainly read a descendant of one 2013 paper. That paper no longer stands.

This review covers two things: what DNA testing can and cannot establish about a herbal product, and what happened to the study that made the technique famous.

What DNA testing can do

A laboratory amplifies a standardised region of DNA from a sample and compares it against a curated reference library. Where intact genetic material is present, the method can confirm an expected species or flag undeclared biological material.

Metabarcoding and next-generation sequencing extend this to mixtures. Results still depend on primer choice, the quality of the reference library, contamination control and how the data are interpreted — none of which is visible in a headline result.

Why finished products are difficult

Grinding, heating, solvent extraction, purification, fermentation and long storage all fragment or remove DNA. A genuine, high-quality extract may therefore yield very little amplifiable plant DNA, and a negative result can reflect the manufacturing process rather than a substitution.

The reverse error is also possible. Trace DNA from a filler, or from the handling environment, can be detected even where it has no pharmacological meaning at all.

Both failure modes point the same way: a DNA result on a processed botanical product is a weak instrument used alone.

The correction that changed the evidence base

The 2013 study by Newmaster and colleagues, published in *BMC Medicine*, reported that a large share of tested North American herbal products contained unlisted ingredients. Its headline figures — commonly quoted as 59% problematic, with about a third of products containing no detectable target species — drove years of media coverage and a 2015 New York Attorney General investigation.

BMC Medicine retracted that paper in July 2024. The retraction followed a University of Guelph investigation that found evidence of data fabrication in relation to the article; the journal stated it no longer had confidence in the data. Four of the authors have publicly disagreed with the retraction. Canada's research-integrity body subsequently judged Guelph's initial investigation inadequate and directed the university to open a second one.

Two things follow, and they are easy to confuse. The first is that the 59% figure should not be cited as evidence — not because a better number replaced it, but because its source is no longer reliable. The second is that the retraction is not a clean bill of health for the herbal supplement industry. Other work has found authenticity problems; the rates vary by product, region, method and definition. The retraction removes one widely used piece of evidence. It does not settle the question in either direction.

What stronger quality control looks like

No single test authenticates a botanical product, which is the practical conclusion underneath all of this.

Macroscopy and microscopy identify intact plant structure. Chromatography and spectroscopy measure characteristic marker compounds. DNA methods support species identity where usable DNA survives. Separate assays test for microbial contamination, heavy metals, pesticides and undeclared pharmaceuticals.

The strongest position comes from a fit-for-purpose combination of these, a documented supply chain, validated reference materials and stated acceptance criteria. A consumer cannot audit that directly, which is why the certification

question is a separate one — covered in [what a “third-party tested” seal actually proves](#) (/evidence/third-party-tested-supplement-seals/).

For New Zealand buyers, the labelling rules that govern what a product may claim are set out in [what supplement labels are allowed to claim in New Zealand](#) (/supplements/what-supplement-labels-can-claim-in-nz/).

SOURCES

01. Retraction Note: DNA barcoding detects contamination and substitution in North American herbal products

BMC Medicine

<https://bmcmmedicine.biomedcentral.com/articles/10.1186/s12916-024-03504-x>

02. Journal retracts DNA barcoding paper that sparked 2015 NYAG herb investigation

NutraIngredients

<https://www.nutraingredients.com/Article/2024/07/05/Journal-retracts-DNA-barcoding-paper-that-sparked-2015-NYAG-herb-investigation/>

03. BMC Medicine retracts flawed 2013 publication by Newmaster et al on DNA barcoding

American Botanical Council

<https://www.herbalgram.org/news/press-releases/2024/bmc-medicine-retracts-flawed-2013-publication-by-newmaster-et-al-on-dna-barcoding-to-authenticate-ingredients-in-herbal-products/>

Medical note. General information only. Not personalised nutrition or medical advice. This review explains published research and cannot diagnose or treat a condition. Ask a qualified clinician or pharmacist about your own health, medicines and supplement use.

Source of record. The current version of this review, with working links, is at <https://www.proteinnotes.com/evidence/dna-barcoding-herbal-supplements/>