MedNut Mail

The How, What, Which, Where, When and Why of pharmaconutrition



MAOI dietary restrictions

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https://medicationsandnutrition.com/mednut-mail/

Navigating MAOI dietary restrictions is like driving on a dark, busy road, at night, and no-one has their lights on. And it is raining, and the road is full of potholes … and of course the roaming wildlife …

Introduction

The MAOI dietary restrictions encompass many factors including dietary components, transporters, gut microbiota and a history of perceived food-induced harm.

MAOIs (Mono-Amine Oxidase Inhibitors)

The monoamine oxidase system comprises 2 isozymes, being, MAO-A and MAO-B, and has 2 primary functions –

1. directly regulates the absorption and metabolism of tyramine and dopamine,
2. indirectly regulates the availability of histamine and serotonin.

MAO inhibition means removal of the regulators that control availability and uptake of tyramine, dopamine, histamine and serotonin. Excessive levels of these monoamines cause the precursors to be redirected to alternate systems, often with harmful outcomes.

MAOI drugs include isocarboxazid, linezolid, methylene blue, phenelzine, procarbazine, rasagiline, safinamide, high-dose selegiline (oral, transdermal), tranylcypromine.

Monoamines and MAOIs © 2026, Y Coleman, Nutrition Consultants Australia		
Isozyme	**MAO-A**	**MAO-B**
Site	Intracellular gut, liver and placenta	Intracellular brain, liver and platelets
Substrates	dopamine, histamine, tyramine, tyrosine	dopamine, histamine*, tyramine
Inhibiting drugs	isocarboxazid, linezolid (weak), phenelzine, procarbazine, selegiline oral - high dose, tranylcypromine, methylene blue, moclobemide	isocarboxazid, linezolid (weak), phenelzine, procarbazine, selegiline (oral, transdermal), tranylcypromine, rasagiline, safinamide
Histamine* - only if HNMT is deficient or inhibited		

Dietary factors

Harm perception

The potential harm, or perception of potential harm, of dietary tyramine causing a "hypertensive crisis" is longstanding. Even with effective management strategies, the limited understanding of this drug-food interaction continues to exacerbate the perception of harm.

Dietary matters

The primary substances of concern (SOCs) include dopamine, histamine and tyramine and their precursors histidine, levodopa, phenylalanine, tryptophan and tyrosine.

Aged/matured, dried, fermented, pickled, smoked or spoiled foodstuffs typically contain higher levels of SOCs**.**

Commencement of a MAOI intervention means the "potential risk of harm calculation" includes SOCs from both diet and supplements. Intake monitoring commences when a MAOI intervention is initiated, and continues for 2 weeks after the intervention has ceased. These restrictions also apply to the selegiline transdermal system at doses of 9+ mg/24 hours.

Tryptophan

Dietary tryptophan intake is usually not a problem. Because tryptophan supplements as 5-HTP (5-hydroxytryptophan) bypass the rate-limiter, they can cause significant serotonin-related problems.

Tyramine

Tyramine sources are both exogenous and endogenous. Exogenous sources include dietary intake and microbiota activity, whilst endogenous sources are very limited.

Dopamine levels regulate tyrosine hydroxylase activity. As dopamine levels increase, so tyrosine hydroxylase activity decreases.

Tyramine appears in the blood about 10 min after ingestion.

Histamine

Histidine conversion to histamine comprises 2 pathways -

1. DAO (Diamine oxidase) enzyme. Present in the intestinal epithelium, and protects the body from exogenous histamine (food, microbiota-generated).
2. HNMT (Histamine N-methyltransferase) enzyme. Appears to protect the body from intravenous or intradermal histamine.

Recent evidence indicates MAO-B can directly metabolize histamine in vivo, but only when HNMT is inhibited or deficient. Consequently, HNMT inhibitors likely cause histamine oxidation through MAO-B isozyme activity.

A 2018 meta-analysis encompassing a 54-year timeframe, determined histamine intoxication was due to fish (98%) and cheese (2%). Histamine levels are determined by the degree of food freshness ie the fresher the food the lower the histamine content.

Both alcohol and histamine are metabolised by the enzyme aldehyde dehydrogenase (ALDH), and alcohol is typically prioritized. This means alcohol intake increases risk of a reaction.

MAOI INHIBITION POINTS

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Phenylalanine		Histidine		Tryptophan
↓		↓		↓
Phenylalanine hydroxylase		Histadine decarboxylase		Tryptophan hydroxylase
Tyrosine		Histamine		5-Hydroxytryptophan
↓	↓	↓	↓	↓
Tyrosine hydroxylase Tyrosine decarboxylase (gut microbiota)	Tyrosine decarboxylase (gut microbiota)	Requires DAO MAOI inhibition	Requires HNMT for metabolism	
Levodopa	Tyramine (within gut)	Imidazole acetaldehyde	Methyl histamine	Serotonin
↓	↓	↓	↓	↓
Aromatic L-amino acid decarboxylase Tyrosine decarboxylase (gut microbiota)	CYP2D6			Requires MAO MAOI inhibition
Dopamine		Imidazoleacetic acid	Methylimidazole acetaldehyde	5-Hydroxyindole acetaldehyde
↓	↓	↓	↓	↓
	Dopamine dehydroxylase (gut microbiota)			
Pathway continues	Tyramine (within gut)	Pathway continues		Pathway continues

Shaded yellow-green – key rate-limiter; Shaded green – MAOI inhibition point

Longstanding standard advice

This advice, and its variations, is extensive.

Avoid foods that have been matured/aged, fermented, pickled, smoked, or contaminated. Also avoid cheeses (especially aged varieties), pickled herring, beer, wine, liver, yeast extract (including brewer's yeast in large quantities), dry sausage (including Genoa salami, hard salami, pepperoni, and Lebanon bologna), pods of broad beans (fava beans), yogurt, and excessive amounts of caffeine and chocolate.

Recent advice

To cause a noticeable Blood Pressure (BP) increase, a MAOI consumer requires about -

- 10+ mg of tyramine if tyramine-sensitive;
- 20+ mg of tyramine, if not tyramine-sensitive.

For most MAO I consumers, safe serves of high tyramine content foodstuffs include cheese ~ 25 g, and soy sauce ~ 10 mL.

Toxicity risks

The risk of toxicity includes both the total SOCs intake per meal plus trigger factors. For example, a platter of artisan cheeses (SOCs), served with a glass of wine (trigger). Actual triggers include related monoamines, individual responses, and synergies between foodstuffs ie not easy to identify.

Tyrosine + MAOI case study

Issue: Whether the concurrent administration of parenteral nutrition formula containing tyrosine, and a prescribed MAOI, can cause a negative reaction.

Intervention: The parenteral nutrition amino acid source provided 39 mg tyrosine/100 ml of solution.

Outcome: The intervention was closely monitored and deemed uneventful.

Monoamine content

Reliable resources that encompass the content of monoamines and their precursors are limited. However, work in other areas such as PKU (phenylketonuria) has clarified the phenylalanine content of many foods. We can also look to those addressing histamine intolerance, perhaps food intolerances, and other areas.

Levodopa, high levels. Mucuna genus plant leaves and pods, especially Mucuna pruriens (velvet beans), Vicia faba, (broad beans), Cassia and Bauhinia seeds.

Phenylalanine. Rule of thumb content calculation –

Fruits and vegetables - ~ 40 mg/100g

Animal proteins - ~ 50 mg/100g

Monoamine and amino acid content of some food resources © 2026, Y Coleman, Nutrition Consultants Australia	
Title	**Links and foodstuffs**
Maximum biogenic amine content reported in fermented food categories	https://pmc.ncbi.nlm.nih.gov/articles/PMC10830535/ histamine, phenylalanine, tryptophan, tyramine
Phenylalanine database	https://pmc.ncbi.nlm.nih.gov/articles/PMC5509543/ phenylalanine
Histamine intolerance diet table	https://pmc.ncbi.nlm.nih.gov/articles/PMC12470264/. histamine

Other factors

Caffeine/coffee/chocolate

CYP1A2

A recent study found co-administration of coffee or caffeine with rasagiline resulted in significantly increased dopamine levels. This finding indicates concurrent caffeine plus rasagiline intake are likely inadvisable.

Both rasagiline and caffeine are substrates of CYP1A2 (cytochrome 1A2), which may be a relevant mechanism of action. If so, then potentially other substances that are substrates and/or inhibitors of CYP1A2 may also negatively impact the MAOI-1A2 interaction.

Methylene blue is an inhibitor of CYP1A2 which means increased availability of caffeine (and rasagiline).

MAOI inhibition

The recommendations to limit or avoid caffeine/chocolate/coffee relate to dopamine being a precursor for norepinephrine and epinephrine. Because MAOIs inhibit the breakdown of dopamine, norepinephrine, epinephrine, their levels remain high for a longer period, causing negative responses.

Food processing changes

Compared to mid-20th century standards, current food production processes have significantly reduced the levels of tyramine and other relevant monoamines. These significant reductions mean fewer, less-severe negative impacts. Notably, the older data (last century) is no longer indicative of current content.

Food processing systems that limit or inhibit monoamines include additives, hydrostatic pressure, irradiation, oxidizers (typically microbiota), packaging, pasteurization, smoking, starter cultures and temperature.

Transporters

LAT1 (large neutral amino acid transporter)

Function - the transport of a wide range of neutral amino acids, especially those with large branched or aromatic side chains.

Locations - high levels in the brain, spleen, bone marrow, testis, and placenta.

Substrates – tyrosine, levodopa, phenylalanine, histidine, tryptophan, baclofen, gabapentin, melphalan and pregabalin.

Bidirectional transport - histidine and tyrosine.

High affinity - histidine, phenylalanine and tryptophan.

Many amino acid-drug compounds that primarily utilize LAT1 can also interact with other transporters. Identified examples include OATPs (Organic Anion Transporting Proteins) and SNATs (Sodium-coupled neutral amino acid transporters). These LAT1+OATP and LAT1+SNAT combinations are secondary and tertiary transporter interactions that can significantly alter outcomes. These interactions become important if LAT1 is unavailable ie inhibited, saturated or dysfunctional.

- **OATPs.** Influx transporters that can carry relatively hydrophilic (water-based) and hydrophobic (oil-based) substrates from blood into organs and cells.
- **SNATs**. Transmembrane proteins that facilitate the cellular uptake of neutral amino acids in sodium- and pH-dependent manners.

B0AT1 (B^0 amino acid transporter)

Co-expression of collectrin is essential for stable expression of B0AT1.

Function – primary transporter for the absorption of neutral amino acids in the intestine and their reabsorption in the kidney.

Location - high levels in the brush-border of kidney and intestinal epithelial cells, and low levels in the brain.

Substrates include phenylalanine, tryptophan and histidine.

If BOAT1 is unavailable ie inhibited, saturated or dysfunctional, then precursor availability may also be altered.

Gut microbiota

Conversion of levodopa to dopamine and tyramine

A range of microbiota can -

- convert levodopa to dopamine utilizing tyrosine decarboxylase,

- dopamine to m-tyramine by a dopamine dehydroxylase.

Altered blood pressure

The combination of improved food production processes and increased dietary awareness means the risk of increased blood pressure is limited.

Increases in blood pressure further to excessive tyramine intake typically peak within 2 hours.

Regular blood pressure monitoring is recommended whilst a MAOI is prescribed, as a quick detection strategy for hypertensive crises.

Hypertensive definitions - systolic BP ≥ 180 mmHg and/or diastolic BP ≥ 110 mmHg -

- urgent - without end-organ damage;

- emergency - with end-organ damage.

Clinical concerns

Currently, a key focus of the MAOI-food interaction is monoamine tyramine content of foodstuffs. However, there are several other contributors that seem to be overlooked. Since most of the monoamines and their precursors are mostly present in similar foodstuffs, tyramine content may well be a useful guide.

Some key questions arise –

- Whether the gut microbiota be manipulated, (diet, pharmaceuticals), to produce less tyramine?
- Should the tyramine and histamine content of foodstuffs, and tryptophan form in supplements, be included on labels?
- Whether LAT1 and BOAT1 should be added to the FDA list of required transporters for drug discovery purposes?
- Could a comprehensive list of LAT1 and BOAT1 inhibitors be included in the MAOI Product Information documents?

Clinical questions

When you see someone prescribed a MAOI, will you -

- review their caffeine intake, and consider a decaffeinated alternative?
- clarify total intake of substances of concern?
- discuss food choices of concern, as highlighted in their diet history?

Conclusions

MAOI dietary restrictions typically require awareness and limited intake of a small number of foods likely to cause a reaction.

Researched and written by the author.

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