Menopause
Gut Barrier Changes

Charlotte Hunter
KBMO Diagnostics UK

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Meet the Team

Charlotte Hunter
Head of KBMO UK

Linette Petrillo
Customer Services

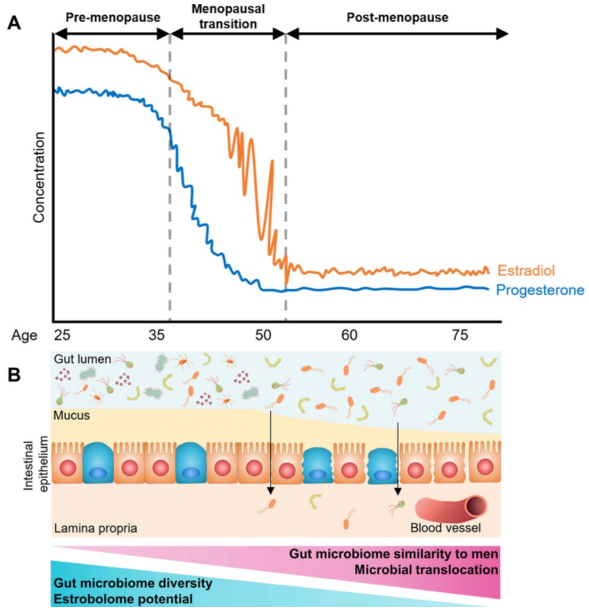
Kelly Hutson
Business Relationships

Clare Kennedy
Operations Manager

Natasha Khan
Practitioner Relationships

Emily Birch
Support & Communications

What Are We Covering Today?



- Menopause alters gut barrier integrity
- Hormonal changes impact microbiome and tight junctions
- Increased permeability linked to inflammation
- Clinical relevance: systemic symptoms beyond digestion
- Testing in practice

(Shieh et al., 2020)

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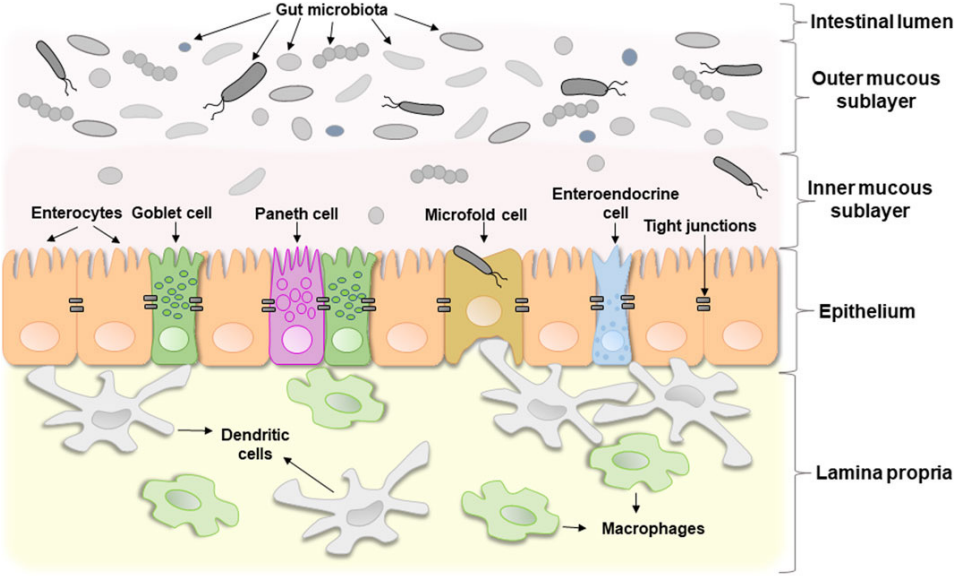
Gut Barrier Architecture & Hormone Modulation



(Dmytriv, Storey and Lushchak, 2024)

- Barrier = epithelium + tight junctions + mucus
- Tight junction proteins regulate permeability (Moonwiriyakit et al., 2022)
- Hormones influence epithelial integrity (Peters et al., 2022)
- Disruption raises paracellular permeability

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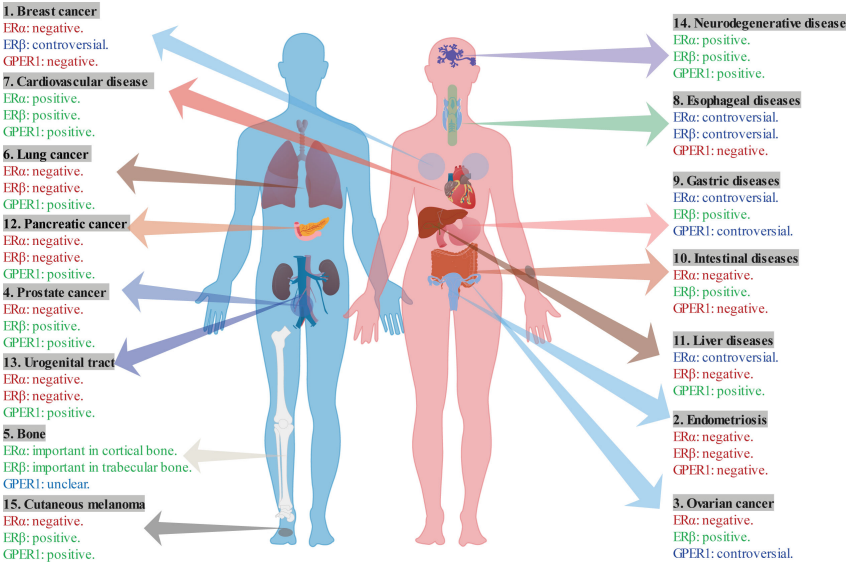
Oestrogen Receptors



(Chen, Li and Ou-Yang, 2022)

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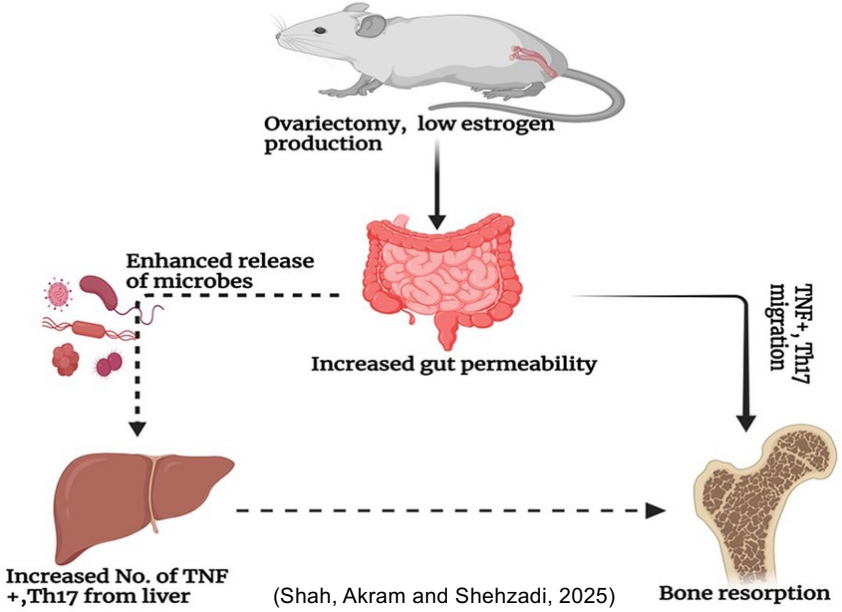
Oestrogen, Progesterone & Gut Barrier Integrity



(Shah, Akram and Shehzadi, 2025)

- Sex steroids regulate epithelial and immune function
- Oestrogen supports tight junction integrity
- Progesterone influences motility and immune tolerance
- Hormonal decline increases permeability risk

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Sex hormones act as **barrier regulators**, not just reproductive signals

Menopause reduces tolerance to previously manageable gut stressors

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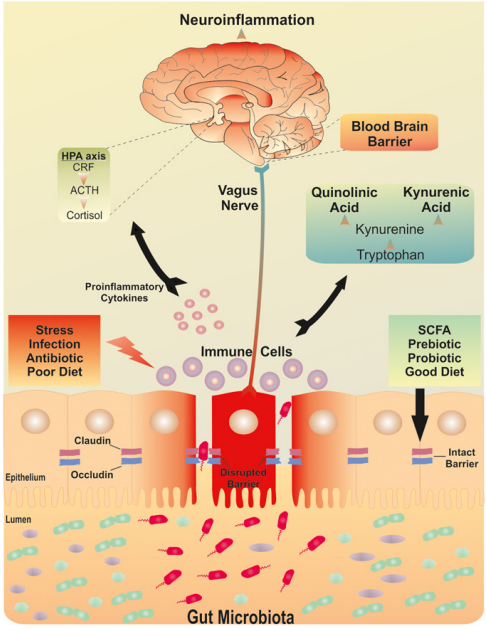
Stress, Cortisol & Gut Barrier Function



- HPA axis activity directly affects gut permeability
- Cortisol alters tight junction regulation
- Chronic stress increases microbial translocation
- Menopause amplifies stress–barrier interactions

(Kelly et al., 2015)

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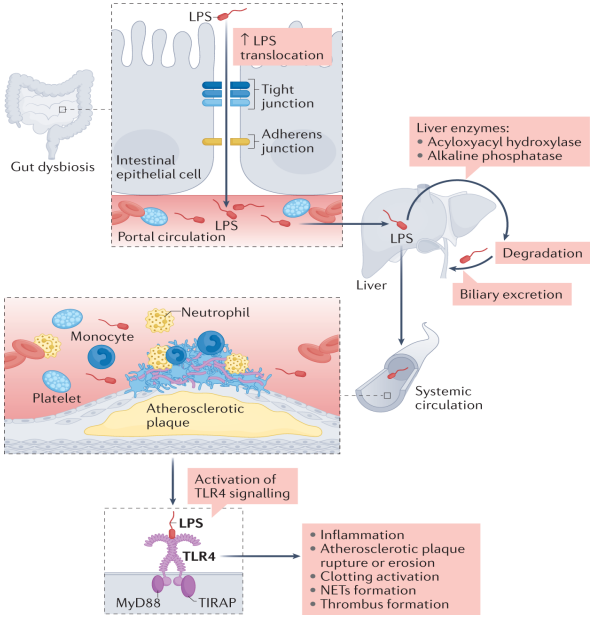
Inflammaging & Endotoxaemia



- Menopause is associated with rising low-grade inflammation
- Increased gut permeability facilitates endotoxin translocation
- Lipopolysaccharide (LPS) drives immune activation
- Systemic effects extend beyond the gut

(Violi et al., 2022)

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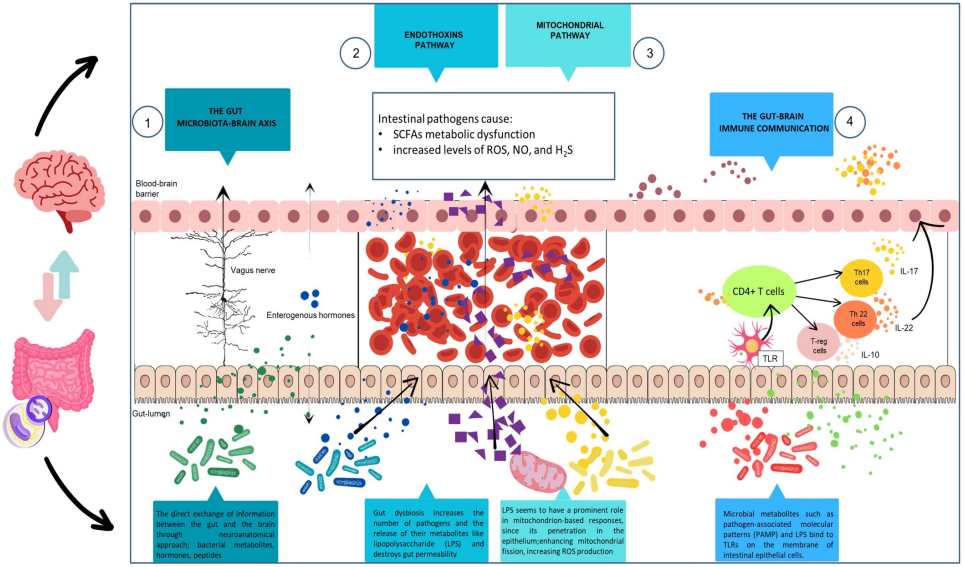
Metabolic Endotoxaemia



(Chmielarz, Sobieszczańska and Środa-Pomianek, 2024)

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Menopause **lowers tolerance** to endotoxin exposure

Gut barrier dysfunction contributes to **systemic inflammation**, not just gut symptoms

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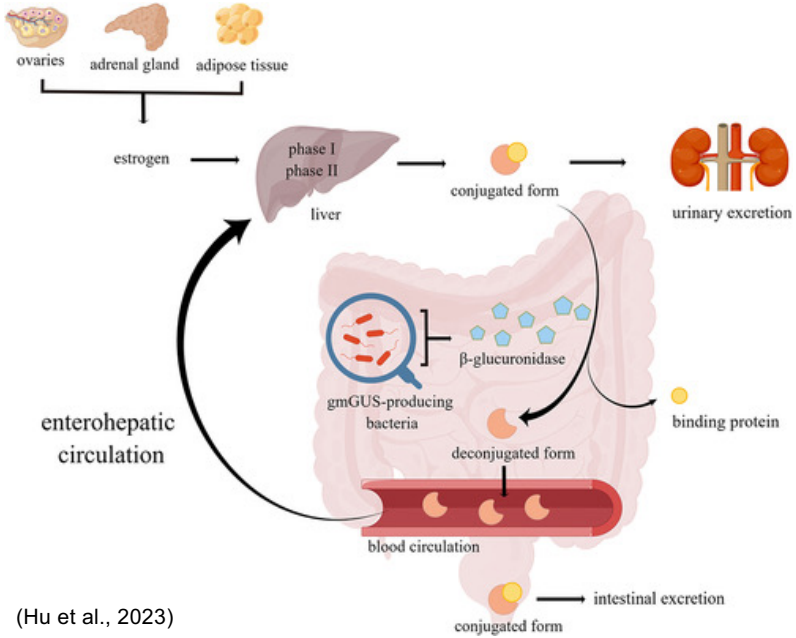
Microbiome & Oestrobolome



(Hu et al., 2023)

- Gut microbes influence oestrogen availability
- The oestrobolome regulates deconjugation
- Barrier dysfunction amplifies hormone recirculation
- Dysbiosis alters systemic oestrogen signalling

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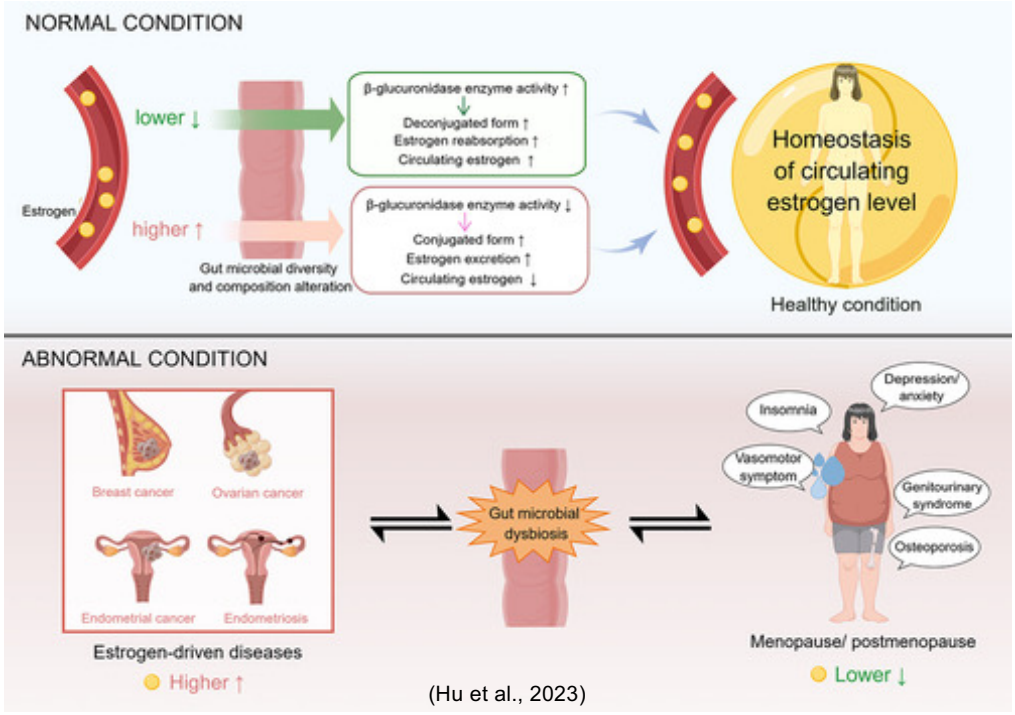

(Hu et al., 2023)

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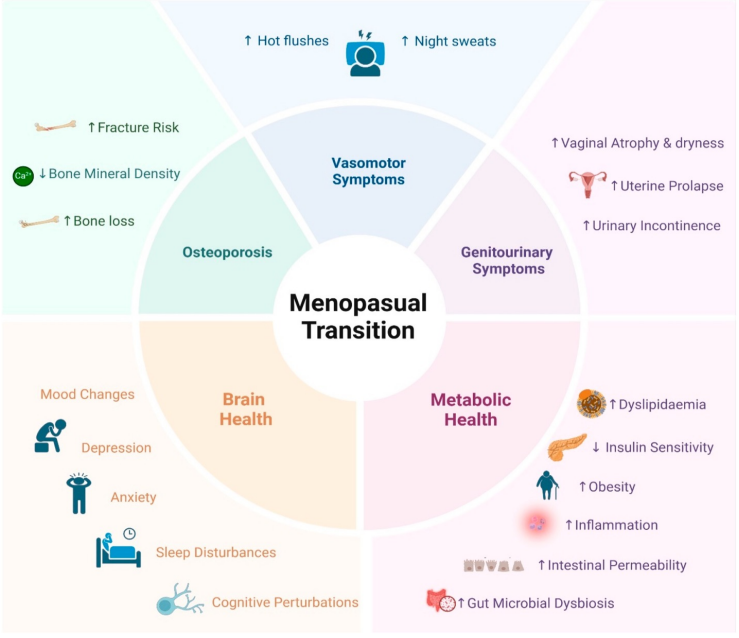
Food Reactions in Menopause?



- Barrier dysfunction increases antigen exposure
- Oestrogen modulates mast cell and histamine activity
- Immune tolerance declines with permeability
- “New sensitivities” reflect loss of resilience

(Liaquat et al., 2025)

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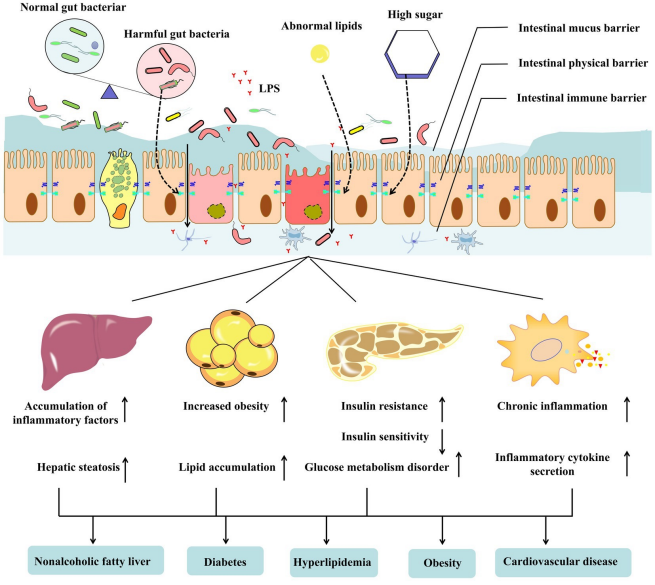
New food reactions in menopause often reflect barrier and immune dysregulation

Metabolic Risk After Menopause



(Zhang et al., 2023)

- Increased permeability raises endotoxin exposure
- LPS drives insulin resistance and inflammation
- Visceral adiposity amplifies barrier stress
- Menopause lowers metabolic resilience

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Clinical Signs & Symptoms

(Newson, 2025)

- Symptoms extend beyond the gut
- New or worsening food reactions
- Inflammatory and neuroimmune features
- Disproportionate response to stressors

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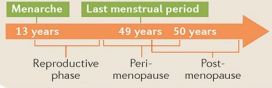
For the Primer, visit doi:10.1038/nrdp.2015.4

Menopause is defined as the cessation of the menstrual cycle. Natural menopause is an age-related process involving the failure of ovarian function; secondary menopause is the consequence of iatrogenic interventions, such as the removal of the ovaries or chemotherapy.

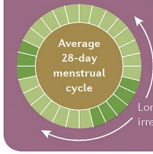
EPIDEMIOLOGY

Globally, natural menopause occurs in most women around the age of 49 years, although it occurs earlier in Africa, Latin America and the Middle East, and later in Europe and Australia. The last menstrual period is preceded by the perimenopausal phase during which hormone levels fluctuate and the first symptoms occur. Perimenopause ends 1 year after the last period, when it is very likely that no further cycles will occur.

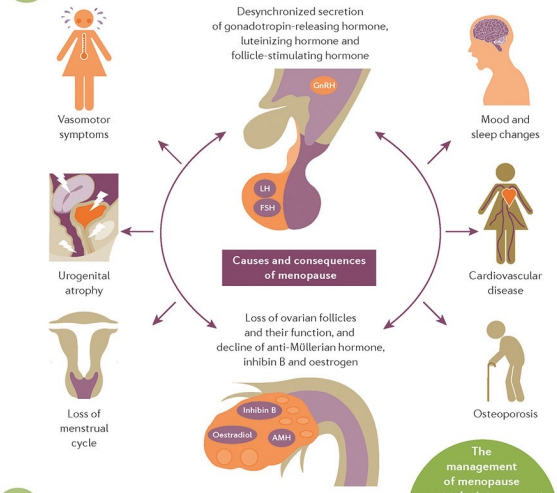


SCREENING & PREVENTION

Menopause is a clinical diagnosis that is based on the history of menstrual cycles. It is not yet possible to predict the age of menopause, although it would be helpful for family planning. Measuring hormone levels and ultrasonography of the ovaries are not useful to predict menopause due to perimenopausal fluctuations of ovarian function.



MECHANISMS



MANAGEMENT

Aside from lifestyle and diet modification, a wide range of hormonal and non-hormonal therapies are available to manage menopausal symptoms. To combat the effects of declining hormone levels, oestrogen — sometimes in combination with progestogen — can be given. Long-term systemic oestrogen therapy mandates careful evaluation of benefits and risks, such as cardiovascular and cancer risks. Tissue-specific selective oestrogen receptor modulators and low-dose or local oestrogen therapy can mitigate these risks.

The management of menopause must take into account symptom severity and the personal preferences of the woman, as well as individual risk factors.

QUALITY OF LIFE

The impact of menopause on quality of life depends on the presence and intensity of symptoms. Vasomotor symptoms, such as hot flushes and sweating, are among the most common, with up to 75% of women affected. Urogenital atrophy and its consequences, as well as mood changes and sleep disturbance, are frequent too. The longer menopause and its symptoms last, the more quality of life is affected and the more medical consultations are needed. Several hormonal and non-hormonal treatments have been shown to effectively decrease symptom severity and, in turn, to increase quality of life.

The duration of the menopausal transition correlates with decreases in physical and emotional wellbeing.

OUTLOOK

Menopause is a complex, multifactorial process and the exact steps leading to the loss of ovarian function are incompletely understood. More research and a better understanding of the underlying mechanisms would be helpful to develop new diagnostic and therapeutic options. Unfortunately, menopause is not a priority on the agenda of many pharmaceutical companies and funding agencies. Menopause affects all women, some of them for decades, and more safe and effective therapies are needed.

Investment in the research, diagnosis and management of menopause will translate to health benefits for up to half of the lifetime of women who are alive today.

Designed by Laura Marshall

Article number: 15054; doi:10.1038/nrdp.2015.54; published online 23 April 2015

Symptoms Associated With ‘Leaky Gut’

- Bloating and abdominal distension
- Gas and flatulence
- Abdominal pain
- Early satiety / postprandial fullness
- Nausea
- Diarrhoea
- Nutritional deficiencies
- Weight changes / difficulties
- Thyroid dysfunction
- Food sensitivities

- Fatigue
- Headaches
- Join pain
- Skin conditions
- Anxiety
- Depression
- Brain fog
- Cognitive changes
- Frequent illness

Note: Studies point towards correlative data, not causation.

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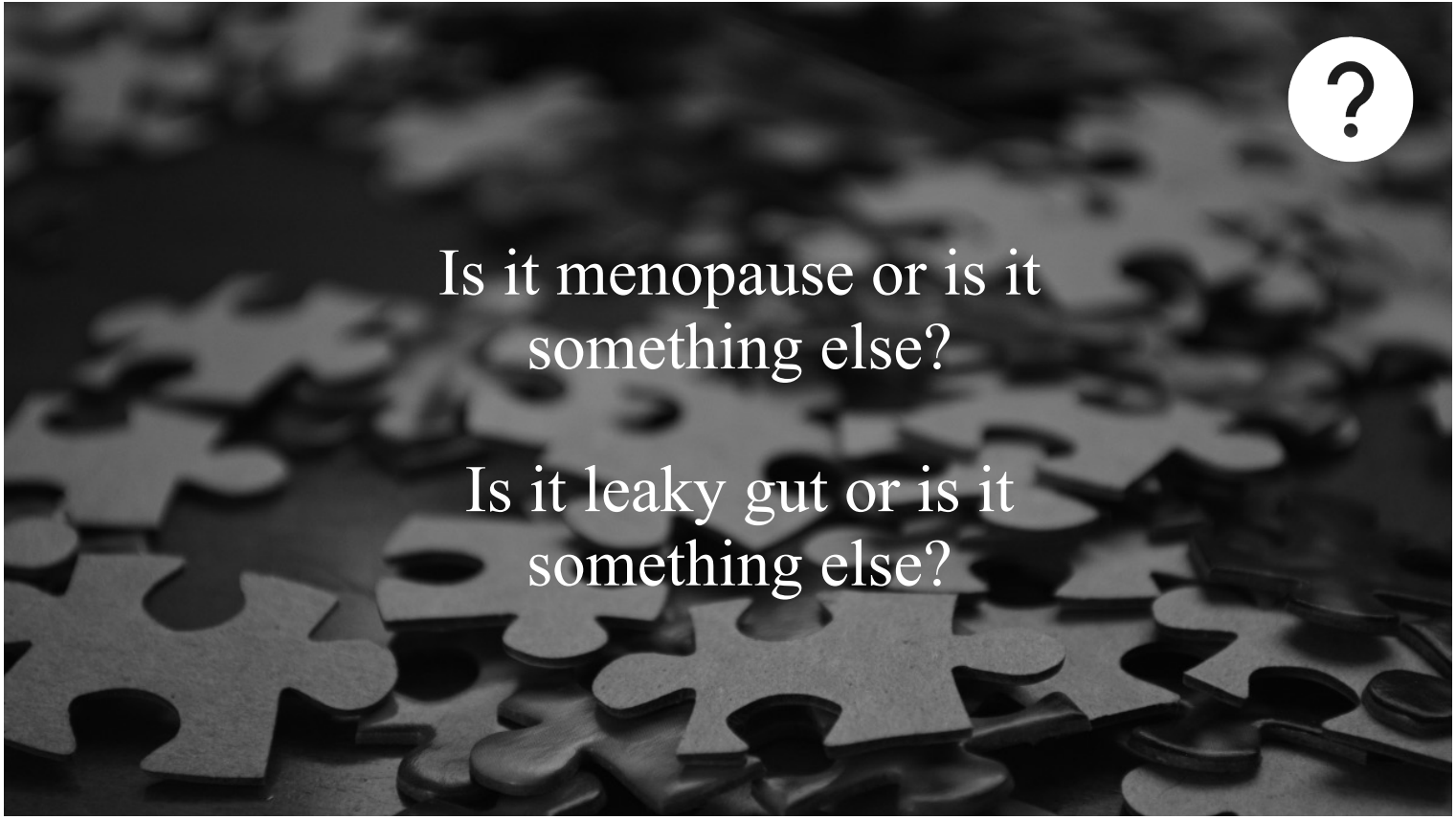
?
Is it menopause or is it something else?
Is it leaky gut or is it something else?

Assessing Gut Barrier Function

- No single marker defines barrier dysfunction: markers reflect permeability, immune response, and microbial load
- Candida reflects barrier and immune imbalance, not just dysbiosis
- Hormonal context alters interpretation and patterns matter more than cut-offs

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Not Every Mechanism Deserves Airtime!


Avoid
everything
everywhere all
at once!
Image Source: Netflix

Common Testing Patterns in Menopause

Gut Barrier Panel				
	IgG1-4+C3d		IgA1-2	
		Cut off		Cut off
Candida	Negative		Negative	
Zonulin	Negative		Positive	
Occludin	Negative		Negative	
LPS	Negative		Negative	

- Mixed permeability and immune activation patterns
- Stress-sensitive rather than disease-driven changes
- Microbial imbalance with reduced tolerance
- Results often look “borderline”, not extreme

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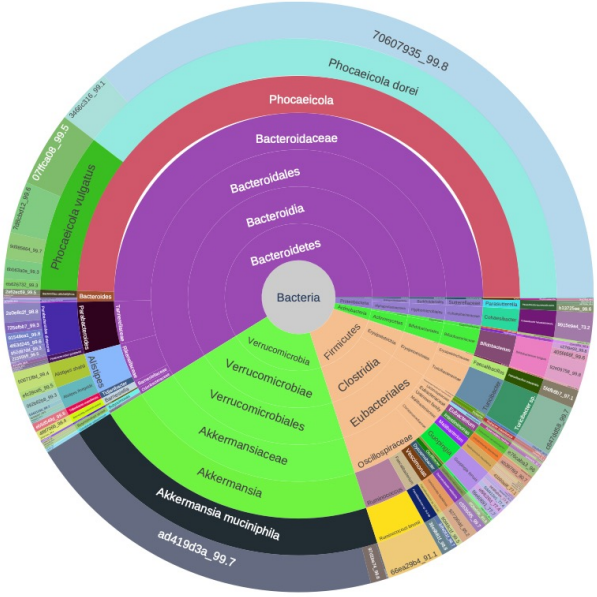
Menopause Patterns
Do they *really* exist in clinical practice?

Common Interpretation Pitfalls



- Treating single markers as diagnoses
- Ignoring hormonal and stress context
- Over-attributing symptoms to microbes
- Chasing optimisation during instability

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Menopause is not always a time for perfect numbers; stabilisation and **improved tolerance** are often more appropriate goals.

Clinical goals: **patterns, plausibility,** and **proportional response**

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Where Should I Start?

- Stabilise physiology before targeting microbes or GBP markers
- Reduce barrier stressors first
- Support tolerance, not elimination
- Interventions should be proportionate

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FIT and Gut Barrier Testing Nearly Always Trumps Elimination Diets!

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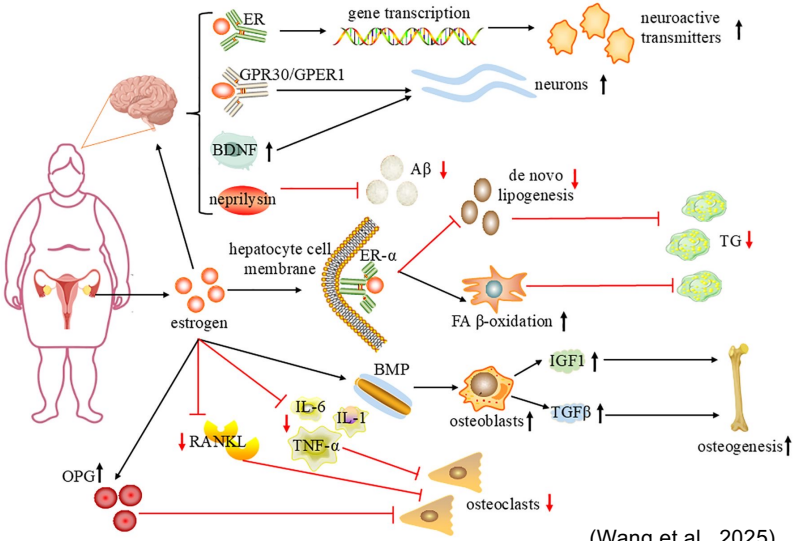
Supporting Hormones & Gut Barrier



(Wang et al., 2025)

- Gut barrier support does not replace hormone care (obviously)
- Hormonal change alters tolerance thresholds
- Aim to increase resilience, not ‘control’ hormones
- Systems respond better than single targets

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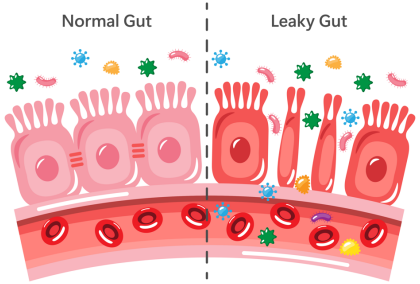
Menopause support is a team effort!

Gut Barrier Panel				
	IgG1-4+C3d		IgA1-2	
		Cut off		Cut off
Candida	Negative		Positive	
Zonulin	Negative		Positive	
Occludin	Negative		Negative	
LPS	Negative		Positive	



Our unique Gut Barrier Panel acknowledges that leaky gut occurs across a spectrum and includes the gatekeeper markers: Candida, Zonulin, Occludin and Lipopolysaccharide (LPS).

For each marker we measure IgG 1-4 / C3d, in addition to IgA 1-2.

Candida

Naturally occurring yeast, residing in the GI tract as part of the normal microbiome. Overgrowth is problematic.

We measure and use any candida overgrowth in the stomach/dysbiosis as a precursor to leaky gut occurrence

Zonulin

A marker of intestinal permeability. We use unique next generation Zonulin IgG **antibody** screening – a more stable and specific marker, exclusive to KBMO.

Developed by Dr Alessio Fasano & Dr Brent Dorval

Occludin

A marker of intestinal tight junction stabilization and optimal barrier function.

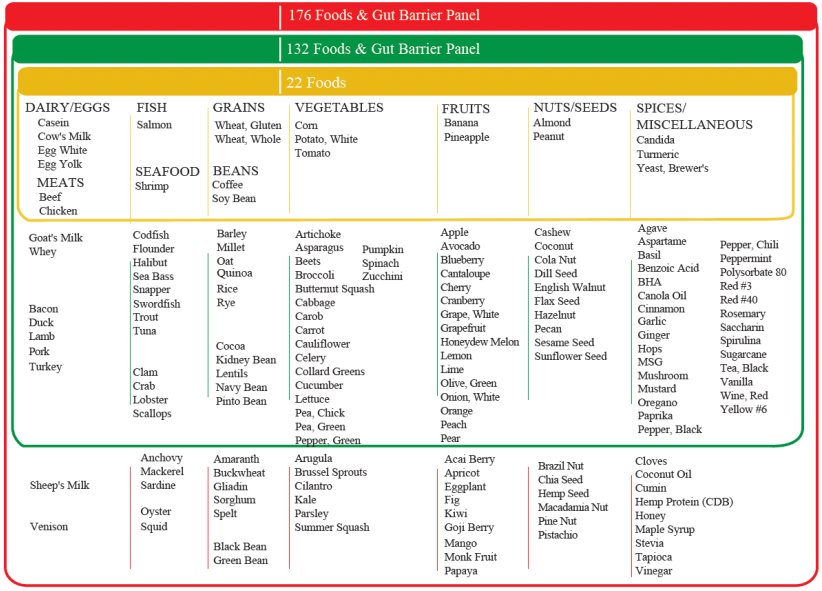
Elevated occludin indicates that the tight junctions between intestinal epithelial cells are breaking down

LPS

Potent endotoxin, present in outer surface membrane of gram-negative bacteria - many of which are pathogenic.

Major inducer of inflammatory response - triggers inflammatory cytokine release, can create direct epithelial damage in the gut, crosses the blood brain barrier.

Foods We Test



Food selection contains ‘real-world’ foods, encompassing raw and cooked.

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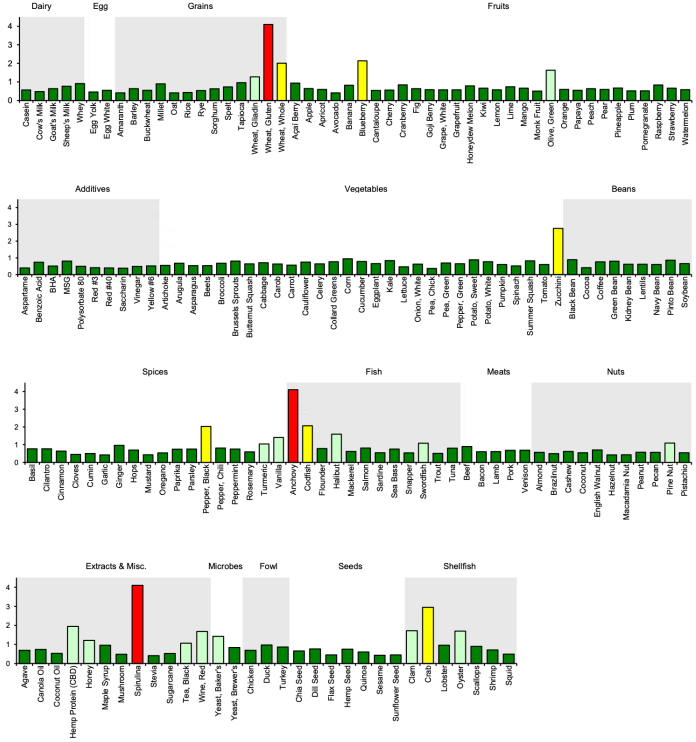
List of Restricted Foods:	
4+ Reactions:	Wheat, Gluten Anchovy Spirulina
3+ Reactions:	
2+ Reactions:	Wheat, Whole Blueberry Zucchini Pepper, Black Codfish Crab



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Gut Barrier Support

Optimise dietary fibre - feed the microbes so they don't eat your mucins!

Polyphenol-rich diet - berries, pomegranate, blackcurrant, green tea, cacao

Gut Supporting nutrients - Glutamine, Glycine, Zinc, EFA's, A, B vitamins, tryptophan

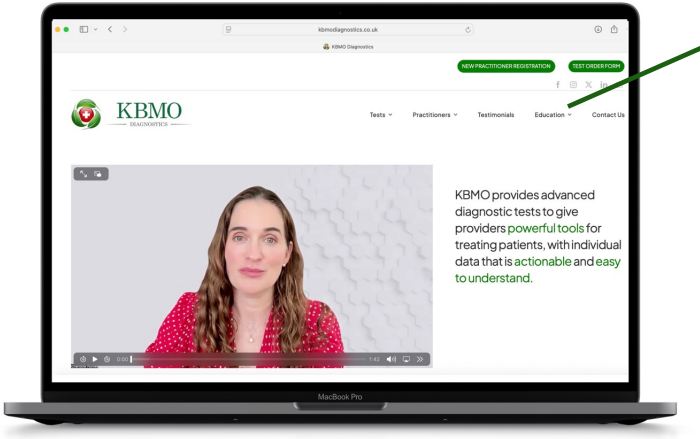
Mucopolysaccharides / glucosaminoglycans - Bone broth, fish/poultry skin, flaxseeds, aloe vera, oats, okra, medicinal mushrooms, apples, citrus peel, slippery elm, marshmallow

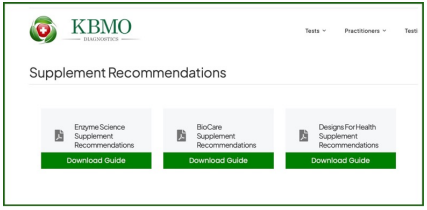
Address food sensitivities / food-mediated inflammation - Eliminate & rechallenge

Mindful eating

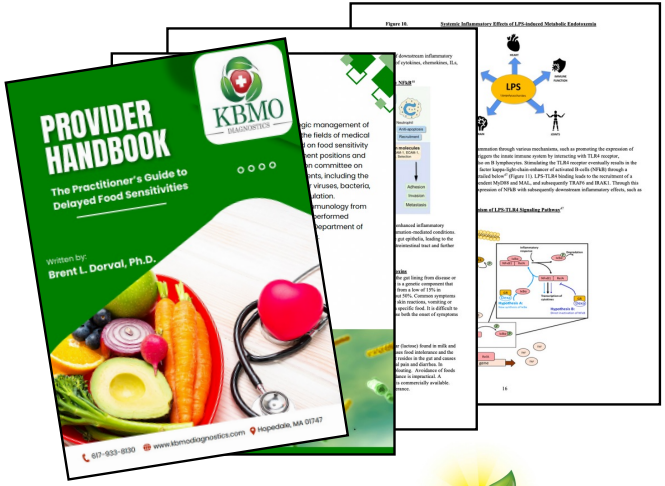
Stress reduction, sleep optimisation, breathing techniques

Supplement Guidance





Clinical Support



- East to read patient reports
- Educational videos and webinars
- Provider handbook
- Supplementary handouts and leaflets
- Supplement protocols
- Website resources
- Webinars
- Support calls

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THE PRACTITIONER DIVISION OF ENZYMEDICA

FIT - A Powerful Clinical Tool

- Useful pre- initial consultation screening tool for every client
- Data you can use straight away
- Improves client engagement & compliance
- No guess with with problematic foods from the get-go
- It’s not a ”so what?” test, it’s insightful and useful
- Financial benefit for you, with a practitioner mark-up of your choice
- Clear, concise reports mean less need for long support calls and assistance = freeing up your time

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Key Takeaways

1. Menopause reduces gut barrier resilience
2. Symptoms reflect lowered tolerance, not new “pathology’
3. Gut barrier testing is an important tool when working with (peri)menopause clients
4. FIT and GB testing provide quick wins, structure and a baseline
5. Gut findings must be interpreted in hormonal context
6. Pattern recognition guides proportionate care
7. Therapy guided by the client’s signs, symptoms, history and resilience

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Thank You

ukoffice@kbmodiagnostics.com

www.kbmodiagnostics.co.uk

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