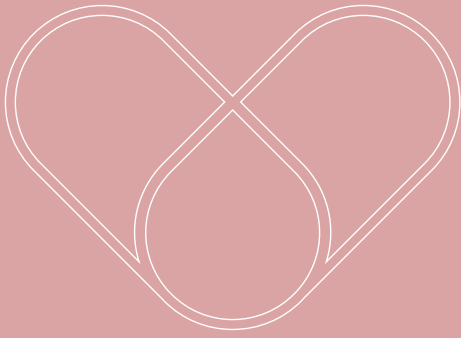




ADVANCED NUTRITION PROGRAMME™

Research Study | **Skin Youth Biome™**





Skin Youth Biome™

Key to skin health and healthy ageing is gut health, and key to gut health is a healthy microbiome. All good skin routines start with a biome.

Introduction

The human microbiome is the collection of microbes - bacteria, fungi, viruses and protozoa - that colonise different sites of the body. Both the gut and the skin have well established and specific microbiomes, essential for health.

The gut microbiome is the largest with an estimated 10^{14} microbial cells (1), and has the highest diversity of microbes (1). It is key to gut health, systemic health and skin health. In fact, the impact of the gut microbiome is so significant, that it has been considered an 'essential organ' (2).

Microbes produce numerous compounds which are required for healthy metabolic (1), immune (1), neurologic (3) and endocrine function (3). These include essential nutrients such as vitamin K and B12 (1), hormones and hormone-like substances (4), endocannabinoids (4), as well as neurotransmitters such as gamma-aminobutyric acid (GABA), serotonin, dopamine, tryptophan, noradrenaline, acetylcholine and histamine (5). Microbes also ferment indigestible complex polysaccharides to produce short chain fatty acids (SCFA) such as butyrate, acetate and propionate (1,4,5).

These compounds improve digestion and maintain the health and integrity of the intestinal barrier (5). They are also able to cross the intestinal barrier and enter the blood stream, regulating numerous physiological pathways and impacting systemic health including affecting brain and skin (1,3,4,5).

Gut brain axis

The gut microbiome communicates with, and regulates, the central nervous system (CNS) by neuroimmune and neuroendocrine mechanisms involving the vagus nerve and microbial metabolites (5,6) – known as the 'gut-brain axis'. This 'gut-brain axis' is now thought to contribute to the regulation of a multitude of metabolic, immune, endocrine and nervous system processes (3).

Gut skin axis

The gut microbiome also impacts the health of the skin – the 'gut-skin axis'. Many studies have shown a strong bidirectional link between gastrointestinal and skin health (1). This is largely through modification of the immune system (1). Researchers have gone further to propose that the gut-skin axis is also directly affected by the brain and should be referred to as the gut-brain-skin axis (3).

Effects of dysbiosis

Gut microbial dysbiosis (imbalance in microbial composition) has been associated with a range of medical conditions including irritable bowel syndrome (7), colorectal cancer (7), obesity and related disorders (4,7) and neurological disorders such as anxiety, chronic pain, Parkinson's disease and Alzheimer's Disease (7), amongst numerous other conditions.

It also has a negative impact on skin function and integrity (5), and has been linked to numerous skin conditions, in particular conditions related to inflammation (1). This includes inflammatory diseases such as acne, atopic dermatitis, psoriasis and rosacea amongst others (5), as well as skin cancer (1), poor wound healing (1) and accelerating ageing (8).

While there are numerous mechanisms accelerating ageing, a key mechanism is inflammation, known as inflammaging.

Intestinal dysbiosis results in the secretion of pro-inflammatory cytokines leading to chronic systemic inflammation and an abnormal immune response that disrupts skin health (4,5,8,).

Ensuring optimal bacterial balance in the gut is key to regulating the immune system and managing inflammation (5,9).



Probiotics and Postbiotics

Probiotics are defined by the World Health Organisation as living microorganisms that confer a health benefit when administered in adequate amounts (10). The use of probiotics leads to improvement and stabilisation of the gut microbiome (11), improvement in gut barrier function (11) as well as regulating the mucosal and systemic immune systems (9) and having an anti-inflammatory effect (9).

Postbiotics are defined as a “preparation of inanimate microorganisms and/or their components that confers a health benefit on the host” (12). Effective postbiotics must contain inactivated microbial cells or cell components, with or without metabolites, that contribute to observed health benefits (12). This includes heat-killed (tyndallized) bacteria.

Pro- and postbiotics have been shown to lead to improvements in numerous medical conditions including gastrointestinal disease, type 2 diabetes mellitus, obesity and related conditions, infections, anxiety and depression (13,14).

They've also been shown to support skin health, improve the management of acne and atopic dermatitis (11,13,14) and postulated to be beneficial in the treatment of general skin inflammation (3,5). They've also been shown to decrease the effects of ageing (30).

Skin Youth Biome™

Skin Youth Biome™ was created to support ageing skin. Pro- and postbiotic strains were chosen for their anti-ageing effect on skin, as well as an anti-inflammatory effect to mediate the effect of inflammaging.

Lactobacillus rhamnosus GG, *Pediococcus acidilactici* and *Bifidobacterium longum* have each been shown to improve immune function (16,19) and lead to an anti-inflammatory effect (15,16,17,18).

Lactobacillus reuteri has been shown to improve the skin barrier and decrease transepidermal water loss (TEWL) (20), increase production of type 1 procollagen in skin, decreasing wrinkle formation (21), and promote wound healing (20).

Postbiotic *Lactobacillus acidophilus* decreases wrinkles by increasing the production of type 1 procollagen and regulating MMPs (22), as well as having an anti-melanogenic effect (22). And postbiotic *Lactobacillus plantarum* has been shown to decrease TEWL, increase skin hydration, improve elasticity and decrease wrinkle depth leading to a smoother skin texture (23).

All strains were chosen to support gut health (15,17,18,24,25,26,27,28).



Objective

This study aimed to evaluate the effect of Skin Youth Biome™, a food supplement containing probiotics, postbiotics and vitamin C, on ageing skin when taken over 12 weeks.

Study method

Participants and procedure

This study was conducted over 12 weeks. Thirty women, aged 30 to 60 years (average 42 years), were enrolled. Participants were healthy women from a range of ethnic groups with signs of ageing such as fine lines, wrinkles, thinning and dull skin.

Participants were required to take one capsule of Skin Youth Biome™ daily with a main meal. They were instructed to avoid excessive UV light exposure, and not to make any changes to their skincare routine, undergo facial treatments or cosmetic alterations, or take food supplements except for medically prescribed supplements such as iron or vitamin B12. Individuals with soy or dairy allergies were excluded. A 2-week washout period was required before the start of the study to allow for the clearance of any previously taken food supplements. All subjects provided informed consent before participation.

Test product and ingredients

Each capsule of Skin Youth Biome™ contained 5 billion CFUs of *Lactobacillus rhamnosus* GG, *Pediococcus acidilactici* HA-524, *Bifidobacterium longum* Rosell-175, *Lactobacillus reuteri* HA-188, *Lactobacillus acidophilus* HA-122 and *Lactobacillus plantarum* HA-119, and 12 mg of vitamin C.

Assessment

Subjects were assessed at baseline and week 12. Facial areas measured included the mid-forehead, lateral canthus area (lateral to the eye) and mid-cheek.

The Courage & Khazaka™ equipment was used to measure properties of the skin. Courage & Khazaka™ are worldwide leaders in the production of dermatology testing devices.

Assessment included:

- **Direct measurement of skin using Courage & Khazaka™ probes:**
 - **Hydration** in the stratum corneum is assessed with a Corneometer® which measures the capacitance of the di-electric properties of the stratum corneum.
 - **Transepidermal water loss (TEWL)** is assessed with a Tewameter® which uses open chamber evaporimeters to measure TEWL. This together with the electrical method used by the Corneometer are the preferred techniques for measuring the water balance in the stratum corneum (29).
 - **Skin elasticity** is assessed with a Cutometer®, which uses suction methods to deform skin and a non-contact optical measurement system to measure the deformity and recoil, which is used to calculate the elastic and viscoelastic properties of skin.
 - **Melanin and erythema (haemoglobin)** are assessed with a Mexameter®, which emits 3 specific wavelengths of light and measures the reflectance of skin (light reflected back).
- **High-resolution imaging** of the skin surface with the **Courage and Khazaka™ Visioscan®**, a unique high resolution, UVA light video camera. This allows assessment of wrinkle depth, skin smoothness and skin roughness.



- **Imaging** of of the full face using the Canfield® Visia equipment. This uses IntelliFlash®, cross-polarized and UV lighting to record and measure surface and subsurface skin conditions.
- **High-sensitivity C-reactive protein (hs-CRP)** was measured in 19 of the 30 participants. Not all participants agreed to having a blood sample taken.
- **Self-assessment questionnaire** administered at the end of the study.

Results

Skin measurements

Improvements were seen in TEWL after 12 weeks in the lateral canthus area (9.25%) and cheek area (4.26%), suggesting strengthening of the skin barrier integrity. These changes were seen even though in all participants TEWL was in the normal range at the start of the trial.

Melanin decreased by 6.11% on the forehead, 4.51% in the lateral canthus area and 7.62% in the cheek area; and erythema decreased by 3.54% on the forehead, 6.71% in the lateral canthus area and 10.14% in the cheek area.

- 97% of participants showed improvements in hydration, with 60% improving more than 15% over the 12 weeks.
- 83% of participants showed improvements in TEWL, with 73% improving more than 10%.
- 90% of participants showed a reduction in melanin, with 55% showing a reduction of more than 10%.
- 87% of participants showed a reduction in erythema, with 61% improving more than 10%.
- 80% of participants showed improvements in wrinkle depth, with 63% improving by more than 10%.
- 83% of participants had a reduction in skin roughness, with 62% improving by more than 50%.

While these changes were not statistically significant, this is likely a result of the small sample size.

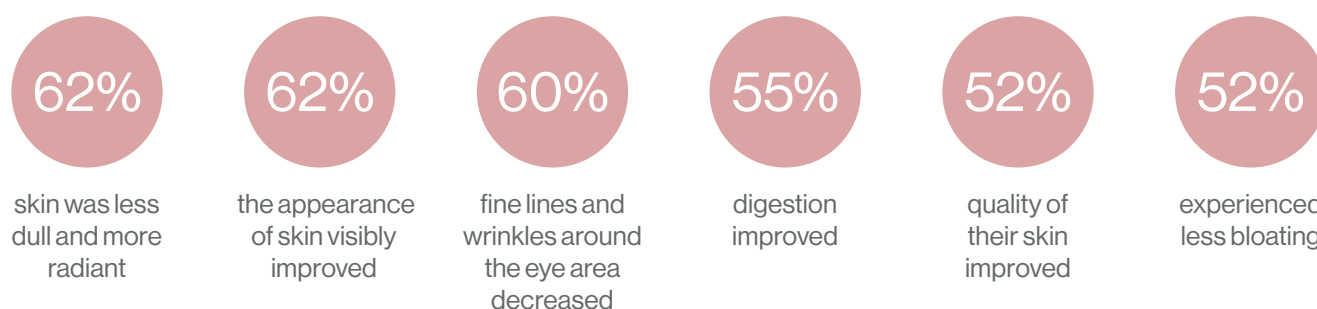
Hs-CRP

6 of the 19 participants had a high hs-CRP at the start of the study (range 1.5 to 9.9 mg/dL), with no clear causative medical conditions. 5 of these improved over the trial (decreasing from 5.2 mg/dL (range 1.8 to 9.9) at the start of the trial to 2.1 mg/dL (range 0.92 to 4.57) at 12 weeks. 1 participant increased from 1.5 to 2.9 mg/dL.

Self-Administered Questionnaire

The questionnaire consisted of 6 questions with 4 referring to skin health and 2 to digestive health. It was administered at the end of the study only.

Percentage of participants using Skin Youth Biome™ who agreed with the following statements





Case study 1

Participant DK216, a 58 year old woman showed improvements from baseline to 12 weeks, with increases in hydration in the forehead, lateral canthus area and cheek (22%, 18% and 7% respectively), increase in elasticity in the forehead, lateral canthus area and cheek (47%, 121% and 24% respectively), reduction in wrinkle depth in the lateral canthus area and cheek (7% and 8% respectively), reduction in erythema in the forehead, lateral canthus area and cheek (7%, 13% and 35% respectively) and reduction in melanin in the forehead, lateral canthus area and cheek (5%, 11% and 17% respectively) (Table 1). These improvements are evident in the before-and-after images in Figure 1.

Table 1. Measurement results for participant DK216 in different facial areas at baseline and after 12 weeks of once-daily use of Skin Youth Biome™.

	Baseline	Week 12
Hydration		
Forehead	47.83	58.30
Lateral canthus area	53.82	63.40
Cheek	43.20	46.20
Elasticity		
Forehead	48.95	72.10
Lateral canthus area	28.35	62.80
Cheek	48.05	59.60
Wrinkle depth		
Forehead	216.37	157.30
Lateral canthus area	111.26	103.80
Cheek	243.50	224.10
Erythema		
Forehead	346.50	321.50
Lateral canthus area	222.00	193.00
Cheek	298.50	195.50
Melanin		
Forehead	158.00	150.50
Lateral canthus area	128.50	114.00
Cheek	119.00	98.50



Figure 1. Photographs of the forehead and area around the eye of participant DK216 at baseline (before) and 12 weeks late (after).

Case study 2

Participant SK210, a 52 year old woman showed improvements from baseline to 12 weeks, with increases in hydration in the forehead, lateral canthus area and cheek (15%, 30% and 40% respectively), increase in elasticity in the lateral canthus area (17%), reduction in wrinkle depth in the forehead and lateral canthus area (2% and 35% respectively), reduction in erythema in the forehead, lateral canthus area and cheek (11%, 13% and 51% respectively) and reduction in melanin in the forehead, lateral canthus area and cheek (23%, 6% and 4% respectively) (Table 2). These improvements are evident in the before-and-after images in Figure 2.

Table 2. Measurement results for participant SK210 in different facial areas at baseline and after 12 weeks of once-daily use of Skin Youth Biome™.

	Baseline	Week 12
Hydration		
Forehead	59.93	68.80
Lateral canthus area	65.20	84.80
Cheek	41.20	57.50
Elasticity		
Forehead	56.90	49.70
Lateral canthus area	61.95	72.70
Cheek	72.20	54.30
Wrinkle depth		
Forehead	219.67	215.53
Lateral canthus area	261.97	171.53
Cheek	265.60	309.80
Erythema		
Forehead	347.50	311.00
Lateral canthus area	272.50	236.00
Cheek	515.00	254.50
Melanin		
Forehead	166.00	127.50
Lateral canthus area	159.50	149.50
Cheek	99.00	95.50



Figure 2. Photographs of the right eye and the surrounding area of participant SK210 at baseline (before) and 12 weeks later (after).

Conclusion

Skin Youth Biome™ was created to support ageing skin and form a key component of any skin care routine.

With ageing we see wrinkles, discoloration, and a dry, rough appearance (8). These are associated with pathophysiological changes in both the dermis and epidermis, including disruption of the skin barrier function (8, 10 – 12). One of the key mechanisms leading to these changes and accelerating ageing is inflammation.

The pro- and post-biotic strains in Skin Youth Biome™ were chosen for their anti-ageing effect on skin, as well as their anti-inflammatory effect to mediate the effect of inflammaging. In keeping with the literature, in this study we saw improvements in skin barrier function as evidenced by decreased TEWL, improved hydration, decreased melanin and erythema, and decreased skin roughness and wrinkle depth. We also saw a reduction in inflammation (as measured by hs-CRP) in 5 of the 6 participants who started the trial with evidence of systemic inflammation.

The health of the gut has a significant impact on the health of the skin via the gut-brain-skin axis. This pilot study showed that an oral probiotic, containing bacterial strains known for their beneficial effect on skin ageing, decreased systemic inflammation and improved several of the signs of ageing. Skin Youth Biome™ is therefore a valuable addition to any treatment regimen to support ageing skin.



Testimonials

*My skin is far less dry, friends have commented on how it appears dewy, my hair has grown thicker, my digestion has improved exponentially, and I no longer bloat. **Alix** (51)*

*My skin is more balanced and less oily, which was a nice surprise and I have fewer hair breakages and loss. There have also been some reductions in fine lines. I would recommend this product especially as it is quick to use and works around my busy lifestyle **Nira** (31)*

*I felt that my skin looked a little bit dry around the creases of my nostril before, but there was extensive improvement while using this product. My skin feels very much improved after. I would use this product again and may recommend it to others. My scalp became less dry, and my nails looked healthier. **Enid** (57 years)*

*After a couple of weeks of taking the product, I felt my skin being brighter and glowing more. My skin was a bit dull, but now it feels fresher and more radiant. I would continue to regularly take this product. **Clotilde** (46)*

*My skin concerns were fine lines and dull tired skin, during the use of this product I noticed my skin looked so brighter and fine lines plumped. I have felt more energetic and have noticed a better feeling of general well-being. I would definitely use this product again and recommend it to family and friends. **Emma** (36)*

*Before the study my skin was pretty dry and flat, I feel like after using the product my skin is more bouncy and feels fuller and softer to the touch. I am going to incorporate it into my daily routine forever! **Hester** (30)*

*My skin was quite dry before. It now feels more evenly moisturised. People who have not seen me for a while commented on how well I look. **Clare** (50)*

*My skin looks much healthier and plumper after using the product. **Ania** (40)*

*After taking the product, my skin feels great. It is clear and bright, and friends have remarked on my skin appearance. I have also less bloating than before and better digestion. I would definitely like to continue using this product as it has made a difference in my skin. **Trupti** (58)*



ADVANCED
NUTRITION
PROGRAMME™



8 of 9

100% SKINCARE

**Skin
Youth Biome™**

Targets ageing skin
Supports youthful, radiant skin
Gut-skin support
Patent-pending technology

Food Supplement

60 Capsules

Awards



Social & Personal Awards 2024

Winner: Editors Choice

Advanced Nutrition Programme
Skin Youth Biome™



The Beauty Shortlist Mama & Baby Awards 2024

Winner: Best Beauty Supplement

Advanced Nutrition Programme
Skin Youth Biome™



CEW Beauty Awards 2023

Finalist: Best New Beauty Supplement

Advanced Nutrition Programme
Skin Youth Biome™



Marie Claire Awards 2022

Winner: Best New Skin Product

Advanced Nutrition Programme
Skin Youth Biome™



Pure Beauty Awards 2022

Finalist: Wellness Best New Beauty Supplement

Advanced Nutrition Programme
Skin Youth Biome™



References

1. Pessemier, B. de, *et al.* (2021). Gut–skin axis: Current knowledge of the interrelationship between microbial dysbiosis and skin conditions. In *Microorganisms* (Vol. 9, Issue 2, pp. 1–33). MDPI AG.
2. Ding, R. *et al.* (2019). Revisit gut microbiota and its impact on human health and disease. In *Journal of Food and Drug Analysis* (Vol. 27, Issue 3, pp. 623–631). Elsevier Taiwan LLC.
3. Arck, P., *et al.* (2010). Is there a “gut-brain-skin axis”? In *Experimental Dermatology* (Vol. 19, Issue 5, pp. 401–405).
4. de Vos, W. M., *et al.* (2022). Gut microbiome and health: mechanistic insights. *Gut*, 71(5), 1020–1032.
5. Chen, G., *et al.* (2021). Gut–Brain–Skin Axis in Psoriasis: A Review. In *Dermatology and Therapy* (Vol. 11, Issue 1, pp. 25–38). Adis.
6. Dicks, L. M. T. (2022). Gut Bacteria and Neurotransmitters. In *Microorganisms* (Vol. 10, Issue 9). MDPI.
7. Chen, Y., Zhou, J., & Wang, L. (2021). Role and Mechanism of Gut Microbiota in Human Disease. In *Frontiers in Cellular and Infection Microbiology* (Vol. 11). Frontiers Media S.A.
8. Teng, Y., *et al.* (2022). The Role of Probiotics in Skin Photoaging and Related Mechanisms: A Review. In *Clinical, Cosmetic and Investigational Dermatology* (Vol. 15, pp. 2455–2464). Dove Medical Press Ltd.
9. Cristofori, F., *et al.* (2021). Anti-Inflammatory and Immunomodulatory Effects of Probiotics in Gut Inflammation: A Door to the Body. In *Frontiers in Immunology* (Vol. 12). Frontiers Media S.A.
10. Food and Agriculture Organization and World Health Organization Expert Consultation (2001). Evaluation of health and nutritional properties of powder milk and live lactic acid bacteria. Córdoba, Argentina: Food and Agriculture Organization of the United Nations and World Health Organization.
11. Polak, K., *et al.* (2021). Microbiome modulation as a therapeutic approach in chronic skin diseases. In *Biomedicines* (Vol. 9, Issue 10). MDPI.
12. Salminen, S., *et al.* (2021). The International Scientific Association of Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics. In *Nature Reviews Gastroenterology and Hepatology* (Vol. 18, Issue 9, pp. 649–667). *Nature Research*.
13. Maftei, N. M., *et al.* (2024). The Potential Impact of Probiotics on Human Health: An Update on Their Health-Promoting Properties. In *Microorganisms* (Vol. 12, Issue 2). Multidisciplinary Digital Publishing Institute (MDPI).
14. Ji, J., *et al.* (2023). Probiotics, prebiotics, and postbiotics in health and disease. In *MedComm* (Vol. 4, Issue 6). John Wiley and Sons Inc.
15. Jeong, D. Y., *et al.* (2020). *Pediococcus acidilactici* intake decreases the clinical severity of atopic dermatitis along with increasing mucin production and improving the gut microbiome in Nc/Nga mice. *Biomedicine and Pharmacotherapy*, 129.
16. Dong, J., *et al.* (2022). Immunomodulatory effects of the *Bifidobacterium longum* BL-10 on lipopolysaccharide-induced intestinal mucosal immune injury. *Frontiers in Immunology*, 13.
17. Donato KA, *et al.* (2010) *Lactobacillus rhamnosus* GG attenuates interferon- γ and tumour necrosis factor- α -induced barrier dysfunction and pro-inflammatory signalling. *Microbiology*.
18. Yan, F., & Polk, D. B. (2002). Probiotic bacterium prevents cytokine-induced apoptosis in intestinal epithelial cells. *Journal of Biological Chemistry*, 277(52), 50959–50965.
19. Weiss, G., *et al.* (2010). *Lactobacillus acidophilus* induces virus immune defence genes in murine dendritic cells by a Toll-like receptor-2-dependent mechanism. *Immunology*, 131(2), 268–281.
20. Han, N., *et al.* (2019). *Lactobacillus reuteri* extracts promoted wound healing via PI3K/AKT/ β -catenin/TGF β 1 pathway. *Stem Cell Research and Therapy*, 10(1).
21. Valentina, I., *et al.* (2020). Effect of *Lactobacillus reuteri* Administration on Wrinkle Formation and Type I Procollagen Levels in UVB-Exposed Male Balb/c Mice (*Mus musculus*). *Molecular and Cellular Biomedical Sciences*, 4(3), 113.
22. Lim, H. Y., *et al.* (2020). Antiwrinkle and antimelanogenesis effects of tyndallized *Lactobacillus acidophilus* KCCM12625P. *International Journal of Molecular Sciences*, 21(5).
23. Lee, D. E., *et al.* (2015). Clinical evidence of effects of *Lactobacillus plantarum* HY7714 on skin ageing: A randomized, double-blind, placebo-controlled study. *Journal of Microbiology and Biotechnology*, 25(12), 2160–2168.
24. Kawashima, T., *et al.* (2018). The molecular mechanism for activating IgA production by *Pediococcus acidilactici* K15 and the clinical impact in a randomized trial. *Scientific Reports*, 8(1).
25. Jones, S. E., & Versalovic, J. (2009). Probiotic *Lactobacillus reuteri* biofilms produce antimicrobial and anti-inflammatory factors. *BMC Microbiology*, 9.
26. Talarico, T. L., & Dobrogosz, W. J. (1989). Chemical Characterization of an Antimicrobial Substance Produced by *Lactobacillus reuteri*. In *Antimicrobial Agents and Chemotherapy* (Vol. 33, Issue 5).
27. Fatih Ozogul, Hatice Yazgan, Yesim Ozogul, (2022) Lactic Acid Bacteria: *Lactobacillus acidophilus*, *Encyclopedia of Dairy Sciences* (Third Edition), Academic Press, 2022, Pages 187-197.
28. Capurso, Lucio MD. Thirty Years of *Lactobacillus rhamnosus* GG: A Review. *Journal of Clinical Gastroenterology* 53():p S1-S41, March 2019.
29. E. Berardesca, M., *et al.* (2018) The revised EEMCO guidance for the in vivo measurement of water in the skin, *Skin Research Technology*, 24: p. 351-358
30. Landete, J. M., *et al.* (2017). Probiotic Bacteria for Healthier Aging: Immunomodulation and Metabolism of Phytoestrogens. In *BioMed Research International* (Vol. 2017). Hindawi Limited.