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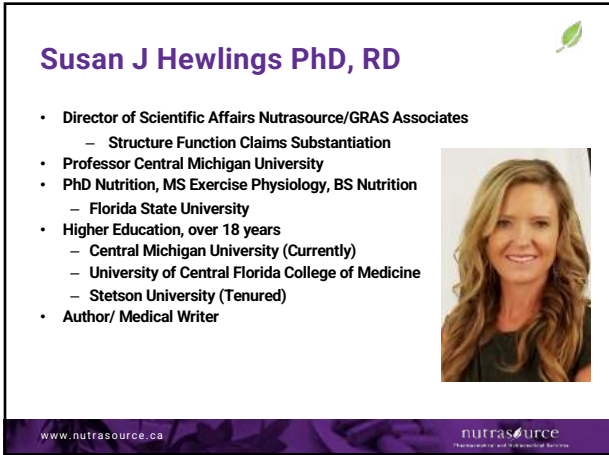
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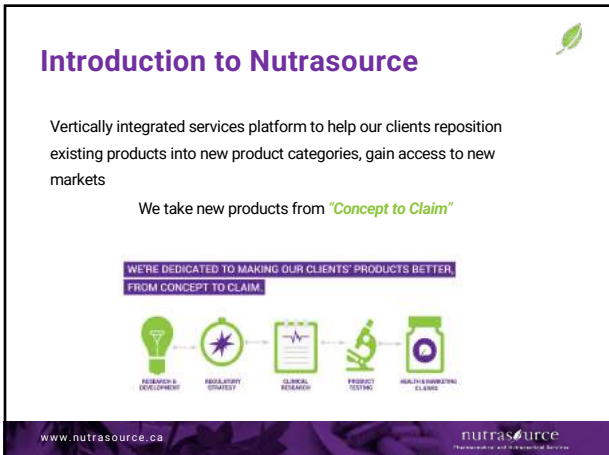
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### Introduction to Nutrasource

We deliver this across our four-pillar service platform, which includes:

- Full-Service Clinical Trials (ICH, FDA, Health Canada)
- Full-Service Regulatory (U.S.A., Canada, EU, Asia and Australia)
- Full-Service Bioanalytical (FDA inspected, Health Canada licensed, GLP)
- Full-Service Analytical (Inhouse and qualified vendors)



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### Today's Discussion

- Where have we been focused with the microbiome and health?
- What are some areas we are beginning to focus on and for good reason?
- There is a call for focus on the bigger picture
- The Human Microbiome is about so much more than the humans

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Where we have been focused

#### How The Gut Affects The Entire Body



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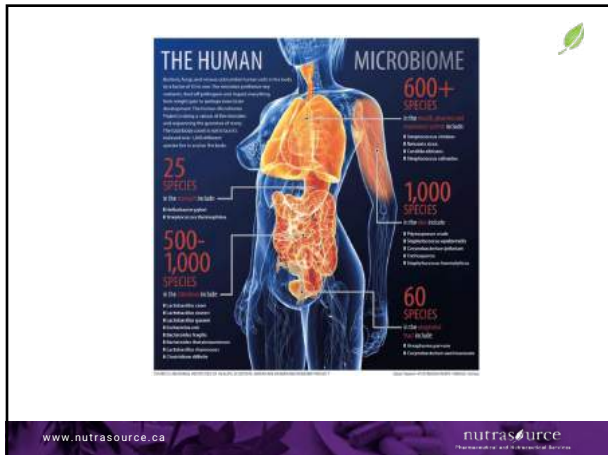
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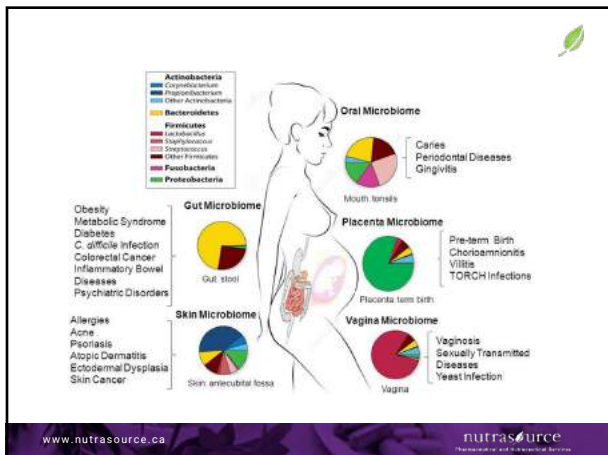
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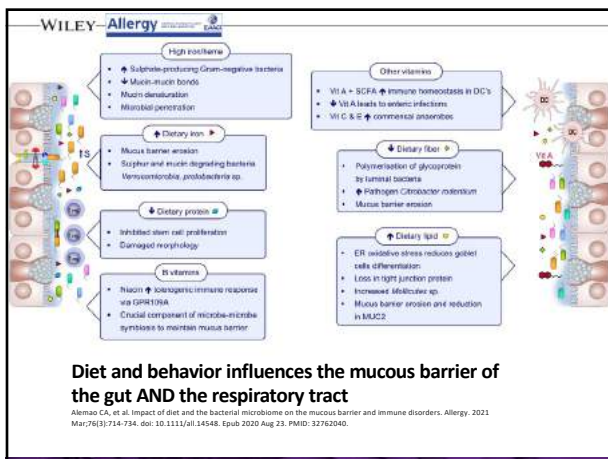
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### Damaged skin barrier with dysbiosis

### The research surrounding the interactions between skin, environment and health are changing skin care

**Figure 1** Concept of barrier and hygiene. The loss of natural substances in liquid or soap forms subsequently also decreases the water content in the stratum corneum, which leads to a higher TEWL. The barrier and hygienic measures also affect the natural substances in the skin. At the same time, the use of antibacterials leads to a higher TEWL. The barrier and hygienic measures also affect the natural substances in the skin. At the same time, the use of antibacterials leads to a higher TEWL.

Srisio R, Egerl M, Gempeler M, Voegeli R, Campiche R. Revealing the secret life of skin - with the microbiome you never walk alone. *Int J Cosmet Sci.* 2020 Apr;42(2):116-126. doi: 10.1111/ics.12584. Epub 2019 Dec 23. PMID: 31743445; PMCID: PMC7155096.

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### Awareness of the interactions of behavior, environment and life-stage are changing the way we address women's health

Pre-Puberty	Pre-Menopausal (ST, L, K, B1 and V)	Perimenopausal	Post-Menopausal (M1, M2, M3)
Thin vaginal epithelium Thick layer of mucus Low estrogen levels Low glycogen Low lactobacilli spp. High microbial diversity High vaginal pH	Thick vaginal epithelium Thick layer of mucus High estrogen levels High glycogen High lactobacilli spp. Low microbial diversity Low vaginal pH	Thinned/absent vaginal epithelium Thin layer of mucus Low estrogen Low glycogen Low lactobacilli spp. High microbial diversity High vaginal pH	Thinned/absent vaginal epithelium Thin layer of mucus Low estrogen Low glycogen Low lactobacilli spp. Low microbial diversity Low vaginal pH

Muhleisen AL, Herbst-Kraebwitz MM. Menopause and the vaginal microbiome. *Maturitas.* 2016 Sep;91:42-50. doi: 10.1016/j.maturitas.2016.05.015. Epub 2016 Jun 9. PMID: 27451320

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### Where We Need to Focus

**Fig 4** A shift in the understanding of the microbial has contributed from the "dysbiosis" theories to the holistic approach. The focus and the associated therapies are now moving from a reductionist view, whereby different organisms are considered to describe the composition of the "dysbiosis" approach to a more holistic approach, where the composition of the microbiome is considered to be a whole, and not just a collection of parts. The connection between host and its associated microbes may be the underlying bridge both in pathogenesis based on negative research or in health based on positive research. The most emergent pathogenesis is opportunistic pathogens and dysbiosis, given that towards holistic approach in the combination therapy (lower part of the figure). The holistic approach sees the host and its associated microbes as one and the same, and that their connection is one entity. According to the holistic approach, holobiont disease may be linked to dysbiosis, low diversity of the associated microbe, and their inability to establish a "holobiont" state. The healthy state, on the other hand, is accompanied with robust, high diversity, and stability of the associated microbe. The dynamic flow of microorganisms from one host to another and to the environment, described by the One Health concept, underpins the holistic approach to the combination.

Berg G, et al. Microbiome definition re-visited: old concepts and new challenges. *Microbiome.* 2020 Jun 30;8(1):103. doi: 10.1186/s40168-020-00875-0. Erratum in: *Microbiome.* 2020 Aug 20;8(1):119. PMID: 32605663; PMCID: PMC7329523.

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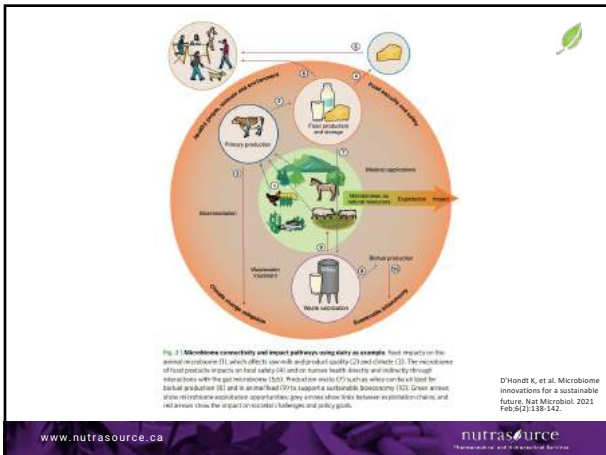
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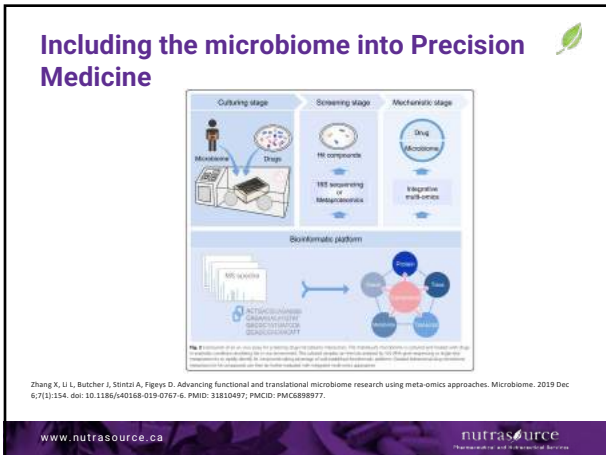
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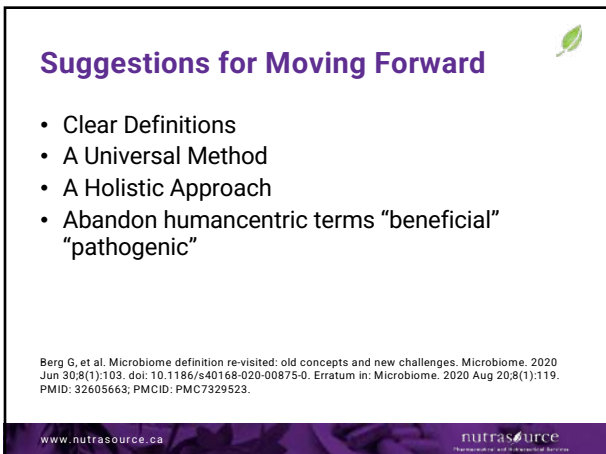
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**Questions?** 

- Additional Resources:
  - <http://www.nutrasource.ca/solutions/>
  - <http://www.nutrasource.ca/resources/>
- Contact:
  - Dr. Susan Hewlings [shewlings@Nutrasource.ca](mailto:shewlings@Nutrasource.ca)

**THANK YOU FOR ATTENDING & PARTICIPATING!**

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For more information visit [www.nutrasource.ca](http://www.nutrasource.ca) or email [info@nutrasource.ca](mailto:info@nutrasource.ca)

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