IMPORTANCE OF SEASONAL DIET ON GUT MICROBIOME

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GUT MICROBIOME

"All disease begins in the gut"

Hippocrates460 BC 370BC

"Health is determined by the microbiota in our gut"

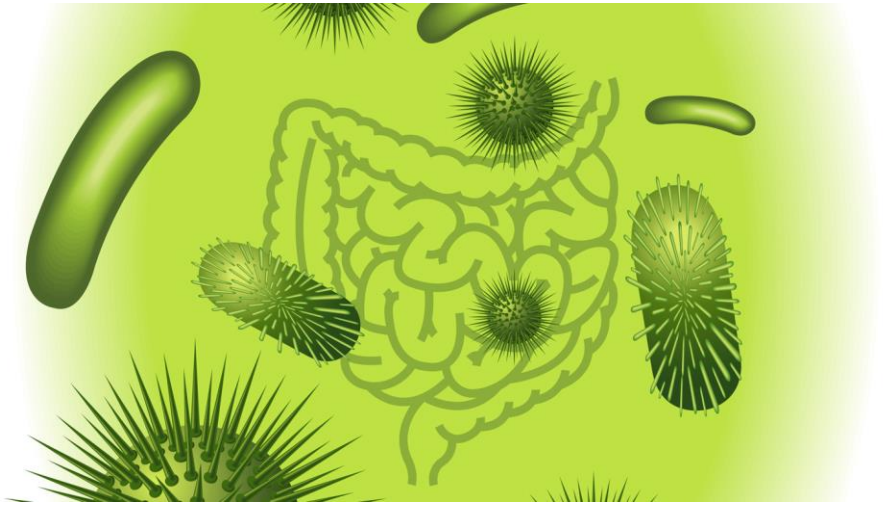
The Power of the Microbiome

WHO AND WHAT IS IN THE GUT

- Microbiota in the gut weigh 1-2kg (similar to weight of adult human brain)
- Microbiome consists of genetic material of bacteria, viruses, fungi, archae inhabiting the gut. Estimated 100 trillion organisms. Co-exists with gut pathogens.
- Regulates the immune and endocrine system. Stress and sleep deprivation are known to increase cortisol which causes overgrowth of bad bacteria. 1
- 70% serotonin produced in the gut by the microbiome (Candida, Streptococcus, Escherichia, Enterococcus)
- GABA, Dopamine, Acetylcholine and Noradrenaline are all made by gut bacteria

- 1. Dinan et al. Psychoneuroendocrinology 2012

THE GUT AS AN ECOSYSTEM



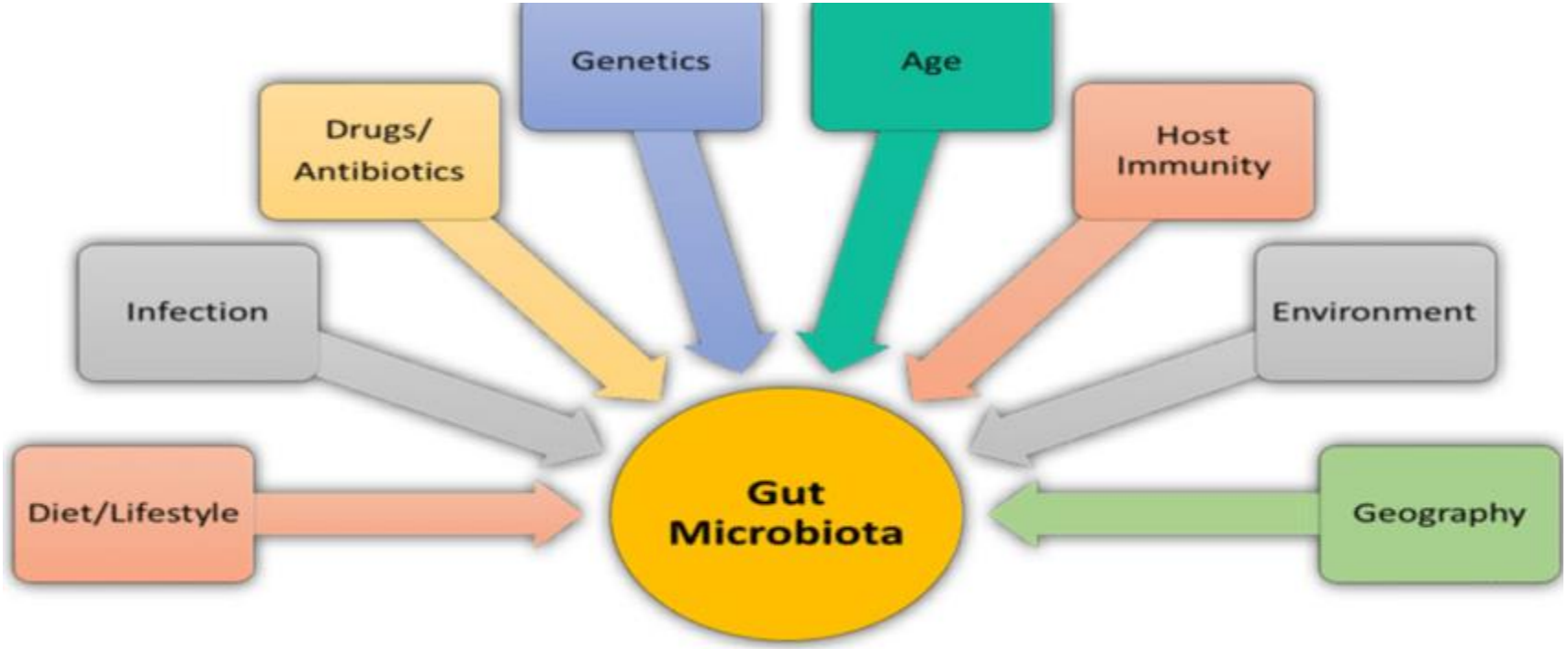
Gut “flora” when in balance facilitate:

- -digestion
- -train our immune system
- -detoxification
- -production of vitamins
- -produce healing metabolites
- -regulate hormones

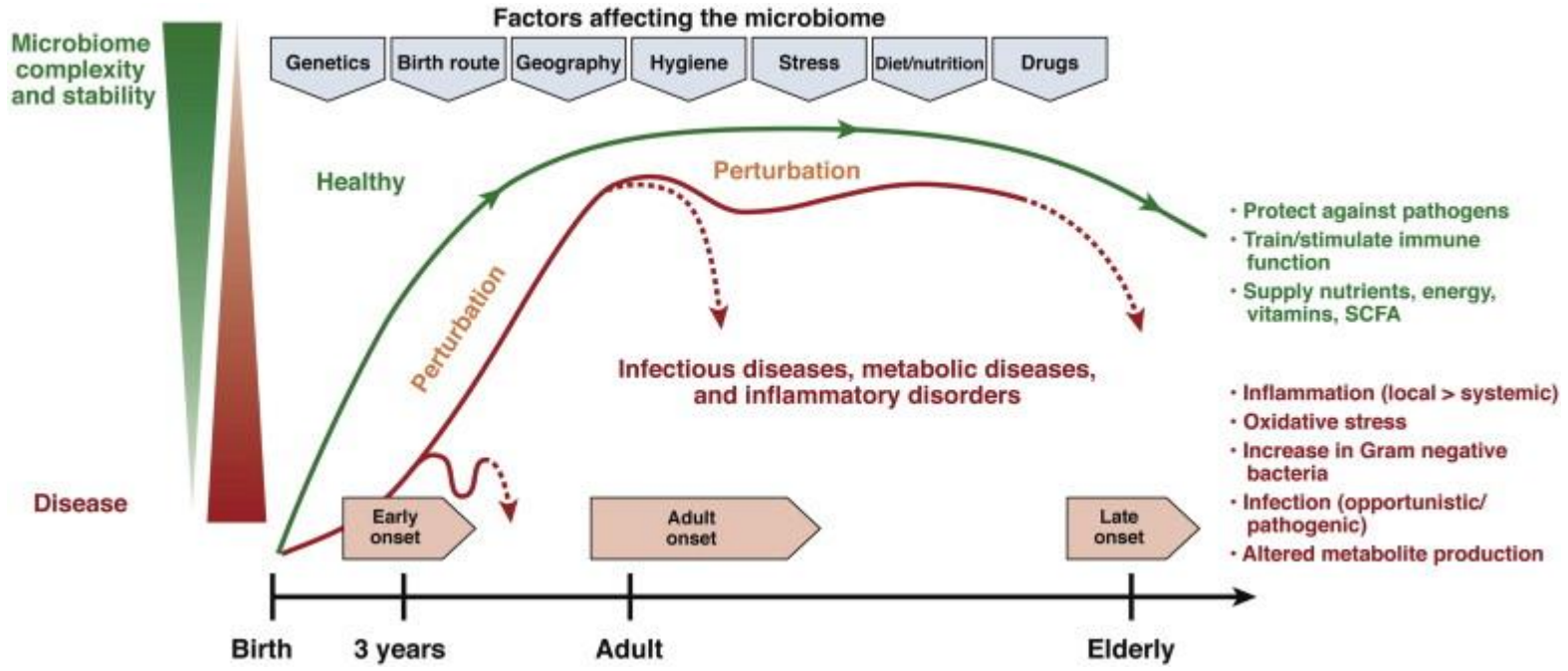
EXPANSION OF HOST METABOLIC CAPACITY BY MICROBIOME

- Bacteria express glycoside hydrolase which converts glycans into useable sugars
- No enzyme encoded in human genome is capable of digesting glycans—only bacterial enzymes
- Many carbohydrates are digestible only by bacteria and produce SCFAs—primary fuel for colonocytes
- 10-15% of adult energy may be generated by SCFA production or stored as fat

Factors affecting Gut Microbiome



Factors affecting Gut Microbiome



MANY DISEASES MAY RESULT FROM DYSREGULATED GUT MICROBIOME

- Diabetes
- Obesity
- Metabolic syndrome
- Stress/anxiety
- Heart disease
- Allergic disorders
- IBD
- Cancer

DIET SHAPES THE MICROBIOME

Diet helps shape the composition of the intestinal microbiota. Differences in the distribution of bacteria are associated with dietary patterns and this influences host exposure to microbial metabolites.

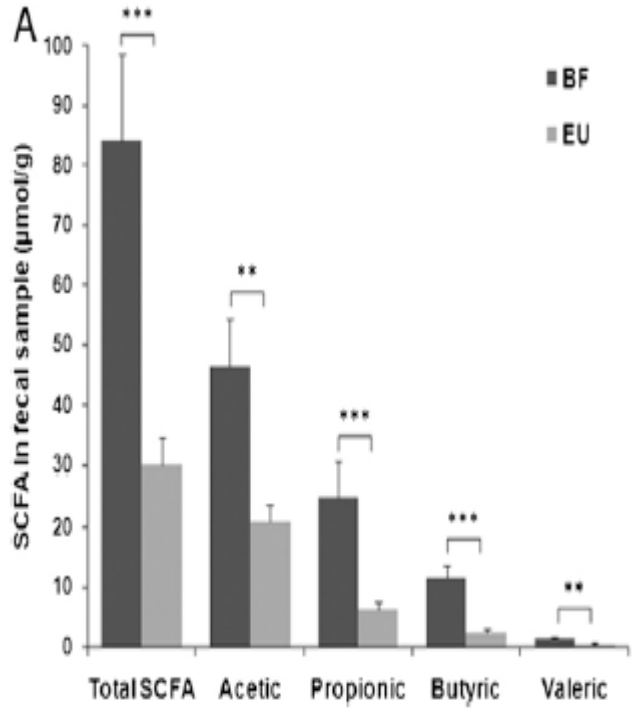
DIET INFLUENCES MICROBIOME COMPOSITION

- Long-term diet is associated with development of specific enterotypes – Diets high in animal protein and fat with high levels of Bacteroides and low levels of Prevotella – Diets high in carbohydrates but low in animal protein and fat with higher levels of Prevotella but lower levels of Bacteroides
- Japanese harbor organisms that produce enzyme that aids in seaweed digestion
- Microbiota of Breast-fed African children enriched in Bacteroidetes and depleted in Firmicutes to maximize energy uptake from fiber-rich diet

Impact of diet in shaping gut microbiota revealed by a comparative study in children from Europe and rural Africa

Carlotta De Filippo[a], Duccio Cavalieri[a], Monica Di Paola[b], Matteo Ramazzotti[c], Jean Baptiste Poullet[d], Sebastien Massart[d], Silvia Collini[b], Giuseppe Pieraccini[e], and Paolo Lionetti[b,1]

PNAS | August 17, 2010 | vol. 107 | no. 33 | 14691–14696



Diet–induced extinctions in the gut microbiota compound over generations

Erica D. Sonnenburg[1]*, Samuel A. Smits[1]*, Mikhail Tikhonov[2,3], Steven K. Higginbottom[1], Ned S. Wingreen[4,5] & Justin L. Sonnenburg[1]

‘MICROBIAL ACCESSIBLE CARBOHYDRATES” (MACS) DERIVED FROM PLANT FIBER ARE REDUCED IN DIET.

OVER SEVERAL GENERATIONS, LOW-MACS DIET IN MICE RESULTED IN PROGRESSIVE LOSS OF DIVERSITY, **WHICH WAS NOT RECOVERABLE BY REINTRODUCTION OF MACS**

यत् पिण्डे, तत् ब्रह्माण्डे ।

YAT PIṆḌE, TAT BRAHMĀṆḌE

WHATEVER THERE IS IN THE ENVIRONMENT IS ALSO THERE IS THE HUMAN BODY

AHARA VIDHI VISESHAAYATANA

The preventive and curative aspects of Ayurveda revolve around the central theme of *pathya ahara* and *vihara .*

ASHTA AHARA VIDHI VISESHAAYATANA

TO RECEIVE THE TOTAL BENEFITS OF *AHARA* IT IS NECESSARY TO HAVE THE KNOWLEDGE ABOUT

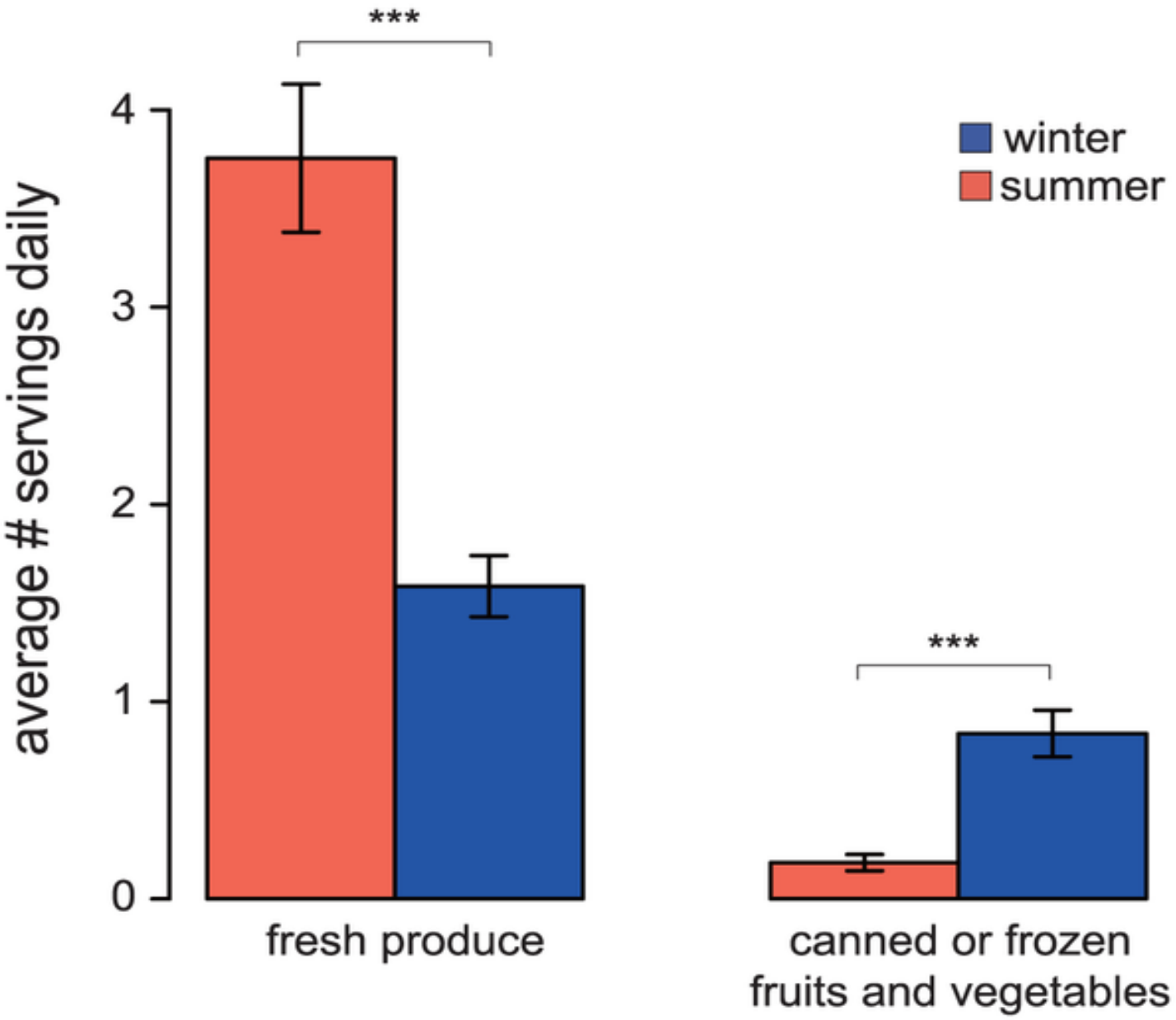
" ASHTA AHARA VIDHIVISHESHAAYATANA

KAALA (SEASON)"- THIS REPRESENTS TIME IN TERMS OF CLIMATE, PHASE OF DIGESTION, TIMING OF THE DAY, STAGE (AVASTHA) OF DISEASE ETC.

WHAT IS SEASONAL DIET?

RITUCHARYA (SEASONAL REGIMEN)

In Ayurvedic classics, there has been a thorough consideration for seasons, besides the dietetic regimens for days and nights. Whole year is divided into six seasons and detailed dietetic regimen for these seasons is prescribed.



SEASONAL VARIATION IN HUMAN GUT MICROBIOME COMPOSITION

Davenport ER, Mizrahi-Man O, Michelini K, Barreiro LB, Ober C, et al. (2014) Seasonal Variation in Human Gut Microbiome Composition. PLOS ONE 9(3): e90731. https://doi.org/10.1371/journal.pone.0090731
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0090731

SEASONAL CHANGES IN IMMUNE FUNCTION

- A study on animals with seasonal changes revealed the effects of photoperiod on immune function and hormone synthesis which influence the development of opportunistic disease
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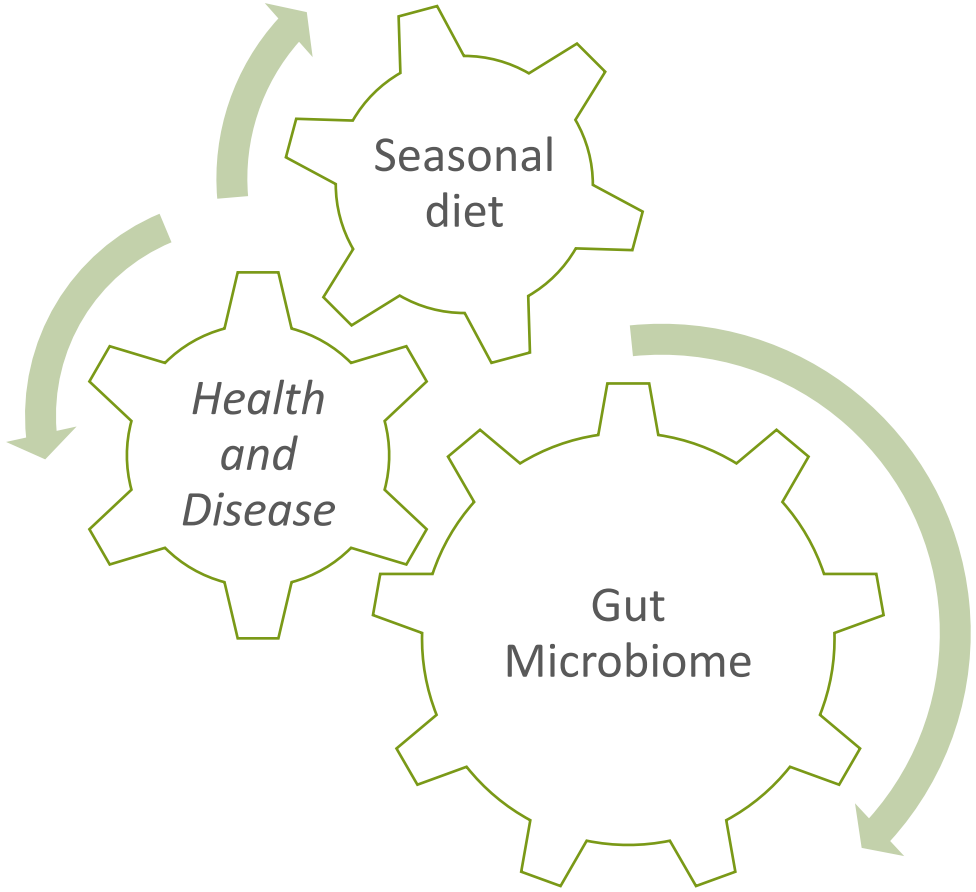
SEASONAL DIET, GUT MICROBIOME, AND EPIGENETICS



CONCLUSION

- Diet Plays an important role in Gut health . Seasonal Diet effects the composition and function of gut microbiome .
- Disruption of the brain gut axis and the intimate involvement of the GI microbiota may initiate a feedback loop that potentiates a neuro inflammatory cascade and leads to neurological conditions
- Seasonal Diet , other factors related to diet are important factors in Disruption of Gut flora which leads Health and health related issues .
- More Studies needs to be done . Seasonal Diet and overall diet can influence epigenetic changes associated with disease and may modify gene expression patterns through epigenetic mechanisms

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