Microbiota Changes in Elderly and Potential Implications in Cancer and Other Chronic Diseases

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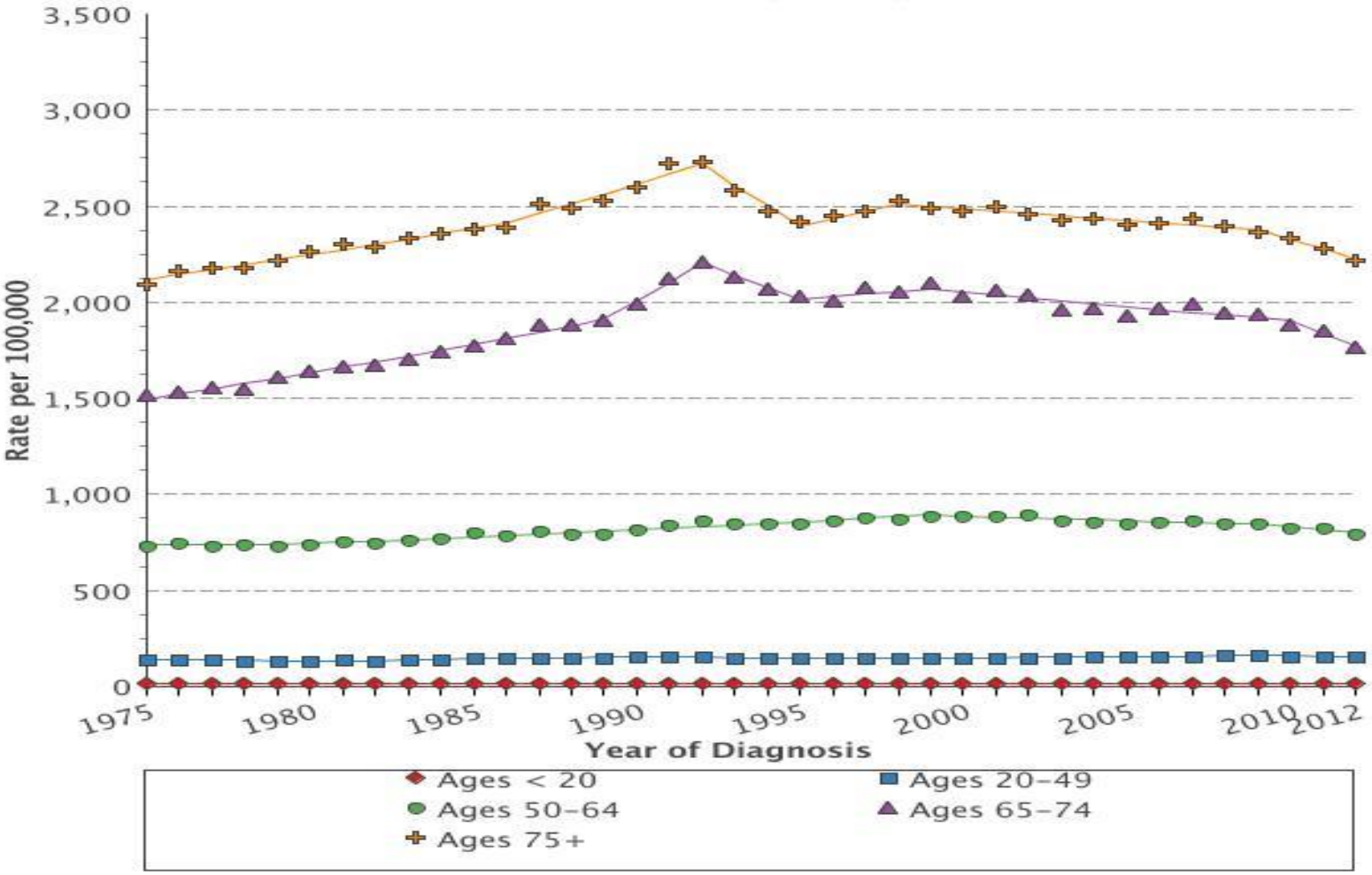
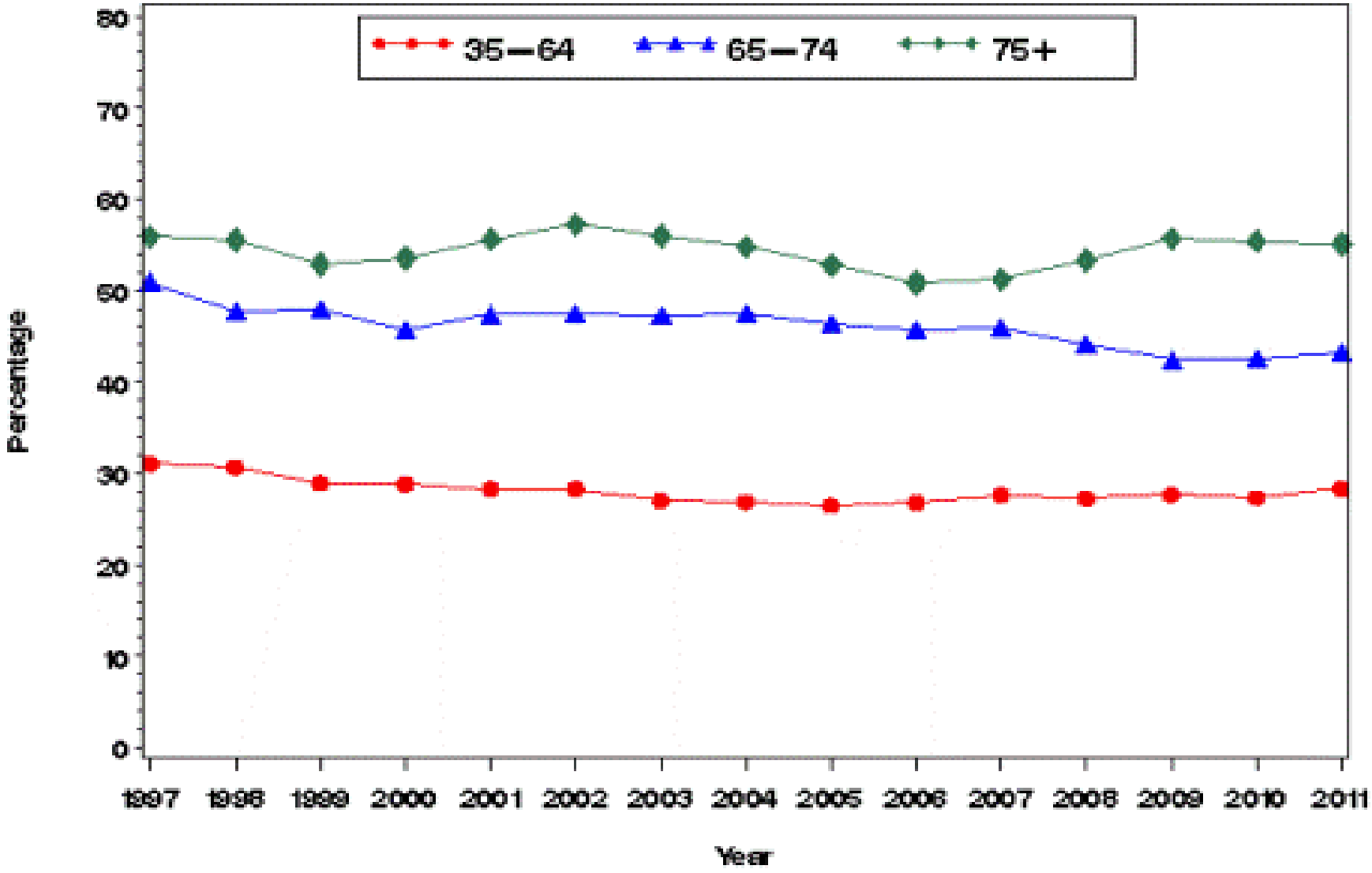
Disclaimer

- This presentation reflects my personal view of the subject and do not represent in any way the official position of the National Cancer Institute and/or of the National Institutes of Health

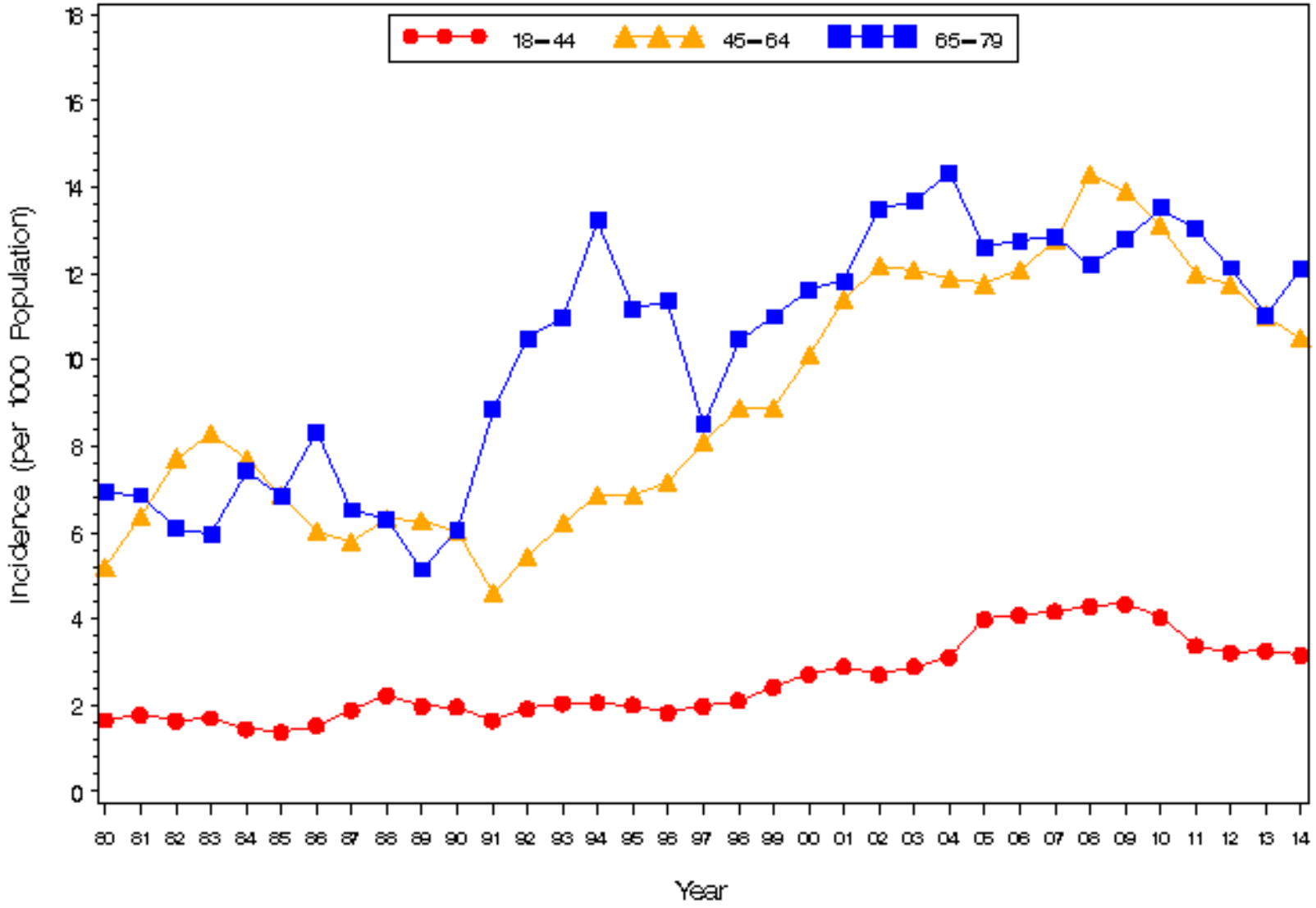


Cancer sites include invasive cases only unless otherwise noted.
Rates are per 100,000 and are age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130). Regression lines are calculated using the Joinpoint Regression Program Version 4.2.0, April 2015, National Cancer Institute.
Incidence source: SEER 9 areas (San Francisco, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, and Atlanta).

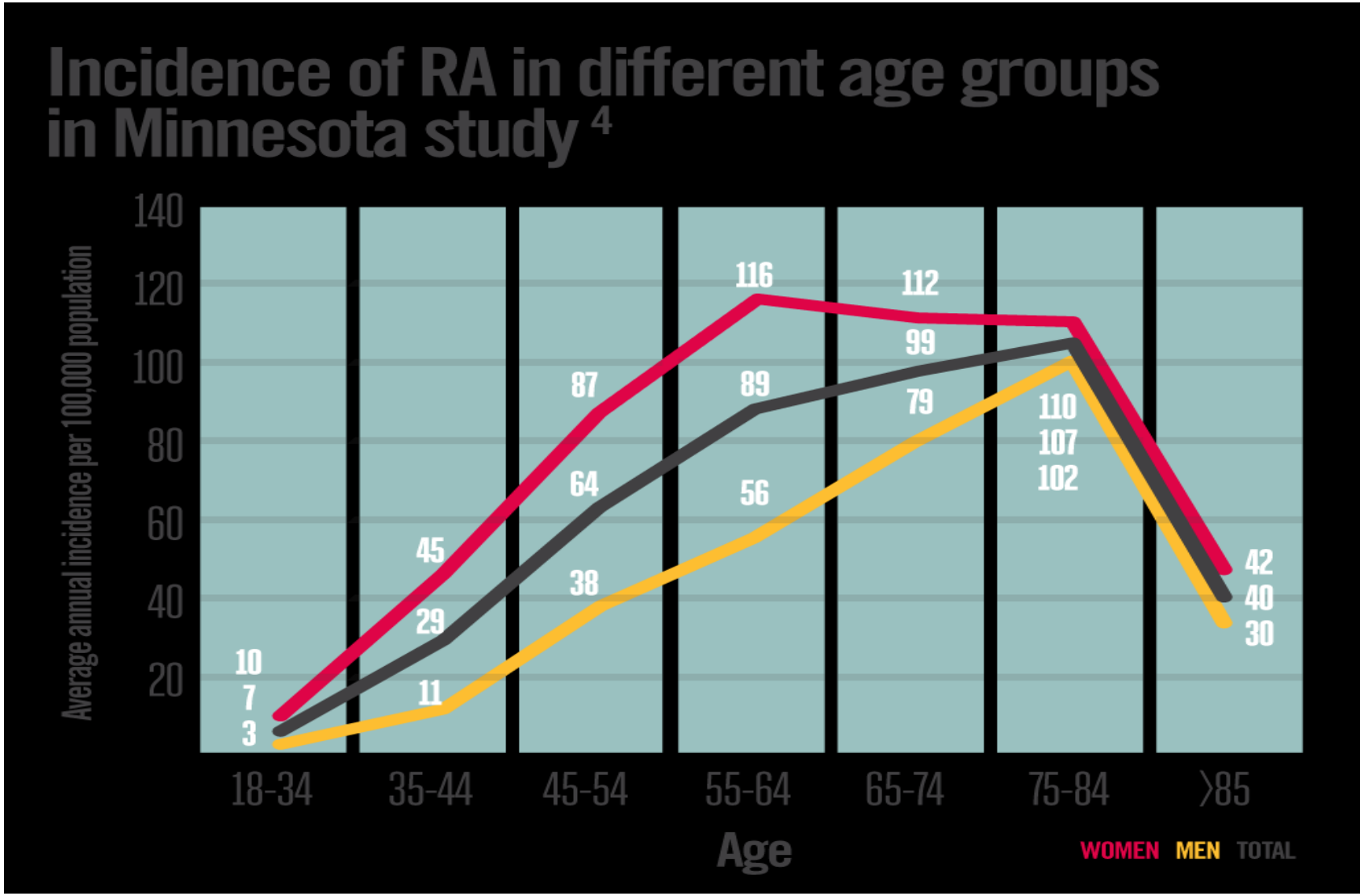
Percentage of People with Diabetes Aged 35 Years or Older Reporting Heart Disease or Stroke, by Age, United States, 1997–2011



Incidence of Diagnosed Diabetes per 1,000 Population Aged 18-79 Years, by Age, United States, 1980-2014



Incidence of Rheumatoid Arthritis



https://rheumatoidarthritis.net/what-is-ra/ra-statistics/

Office of Disease Prevention and Health Promotion

"As Americans live longer, growth in the number of older adults is unprecedented. In 2014, 14.5% (46.3 million) of the US population was aged 65 or older and is projected to reach 23.5% (98 million) by 2060."

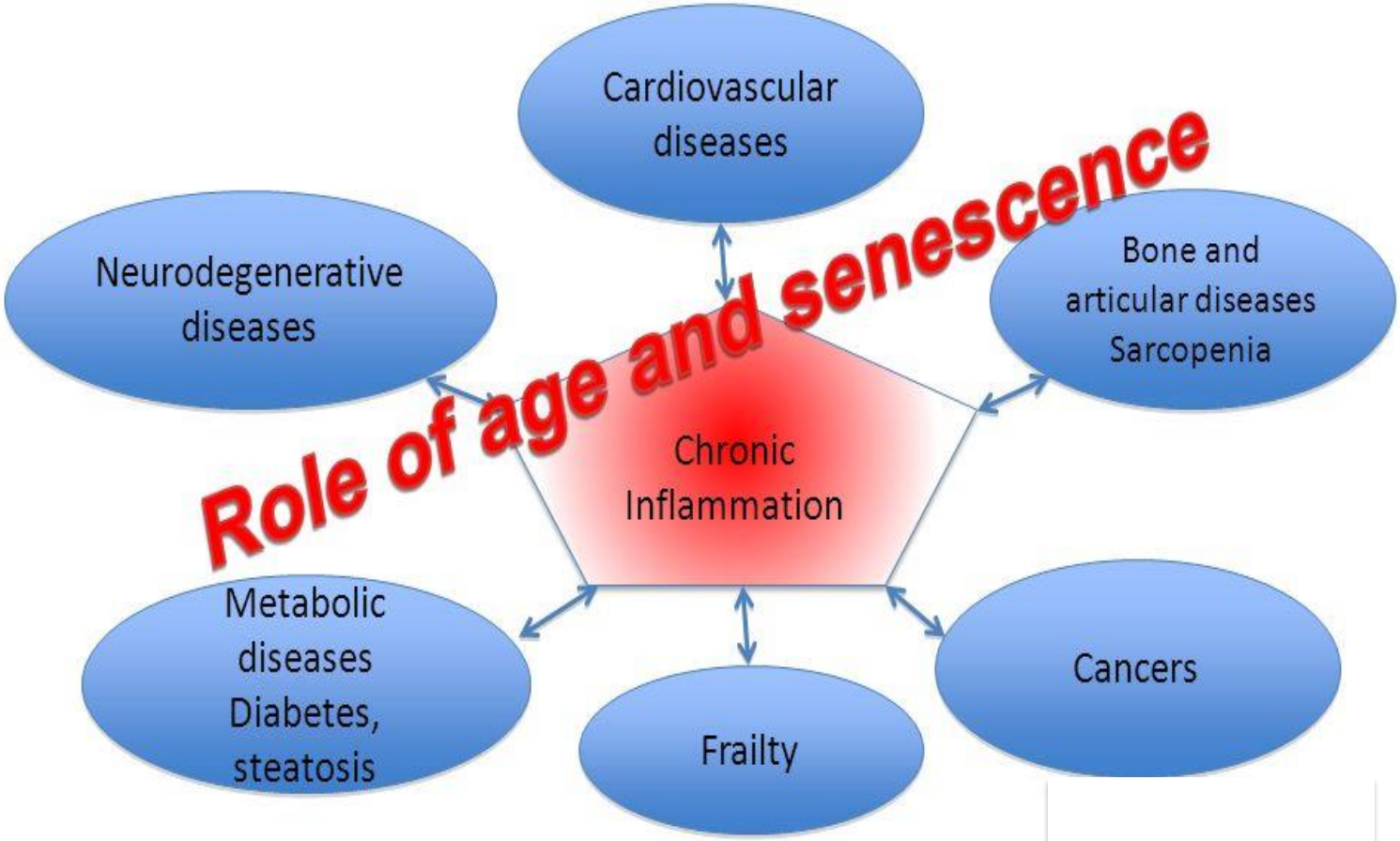
(https://www.healthypeople.gov/2020/topics-objectives/topic/older-adults

Center for Disease Control and Prevention

"Over the next decade, we expect the number of new cancer cases to go up, mostly because of an aging white population and a growing black population."

https://www.cdc.gov/cancer/dcpc/research/articles/cancer_2020.htm

Most age-related comorbidities are associated with a chronic low-grade inflammation



From A Freund Trends Molecular Med 2010

Chronic Inflammation (Inflammaging) and Its Potential Contribution to Age-Associated Diseases

- Human aging is characterized by a chronic, low-grade inflammation, and this phenomenon has been termed as “inflammaging.”

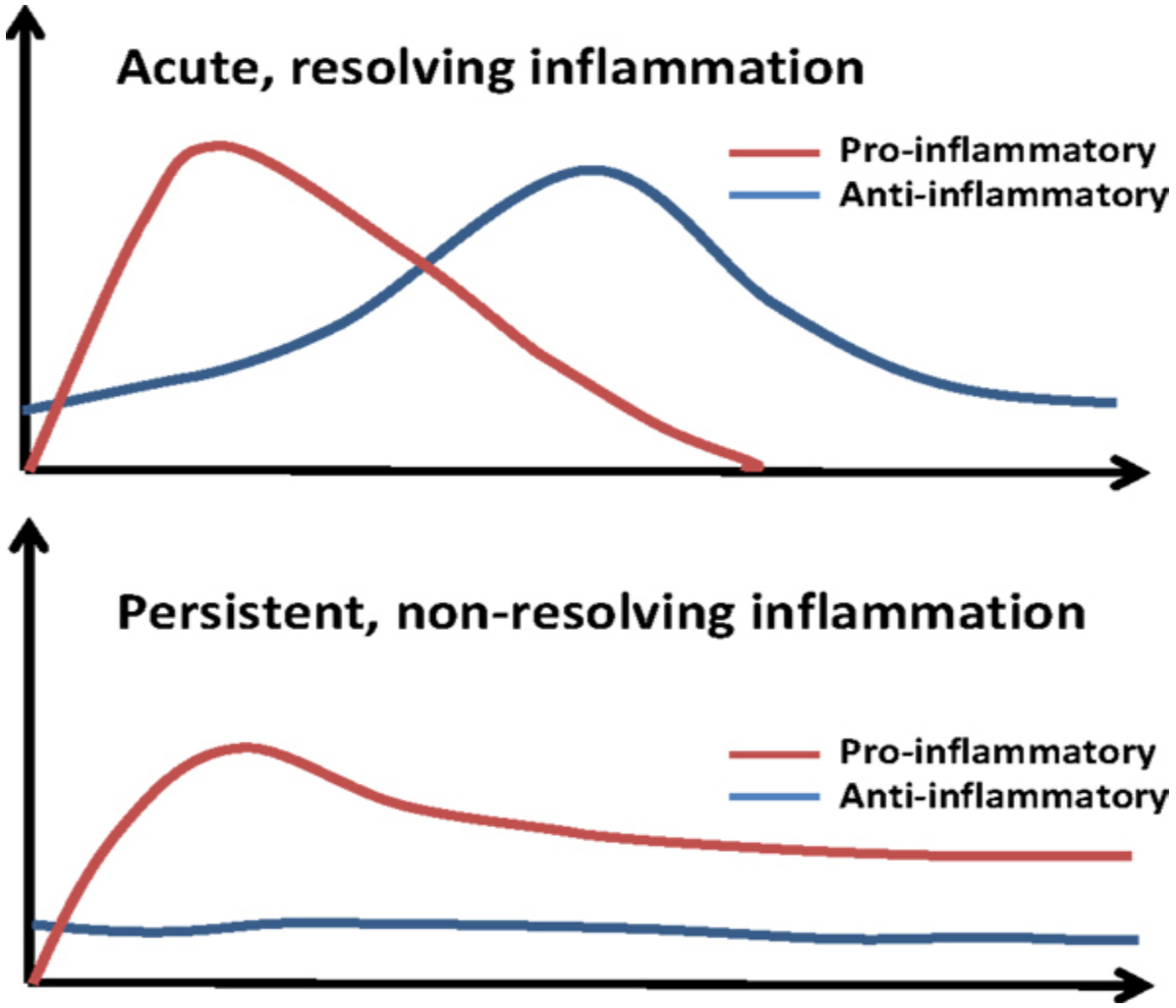
- The precise etiology of inflammaging and its potential causal role in contributing to adverse health outcomes remain largely unknown.

- The identification of pathways that control age-related inflammation across multiple systems is therefore important in order to understand whether treatments that modulate inflammaging may be beneficial in old people.

Claudio Franceschi, and Judith Campisi

Gerontol A Biol Sci Med Sci. 2014 Jun;69 Suppl 1:S4-9. doi: 10.1093/gerona/glu057.

The course of acute and persistent inflammatory responses



Matthew C et. Al Front Immunol. 2014; 5: 680..

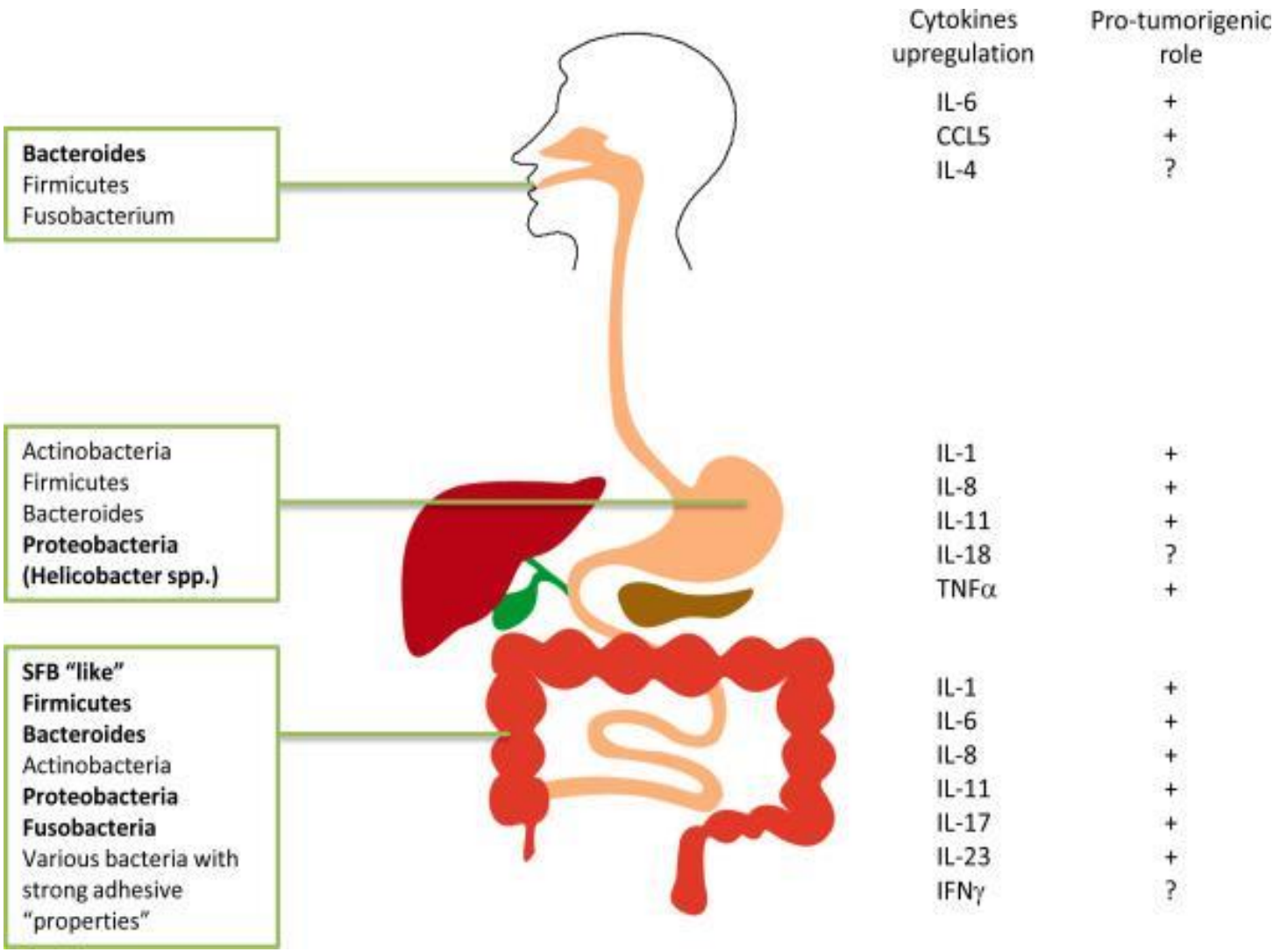
Evidence-based nutritional and pharmacological interventions targeting chronic low-grade inflammation in middle-age and older adults

A systematic review and meta-analysis

- Probiotic supplementation significantly reduced both inflammatory biomarkers. […] IL-6 and CRP.
- Moreover, meta-regression analysis showed a significant reduction of IL-6 levels as the duration of probiotic treatment increased […], but there were not significant dosage effects for IL-6.
- There were not a sufficient number of studies to evaluate the dosage or treatment duration effects of probiotics on CRP.
- Heterogeneity was high for IL-6 studies,as well as CRP studies

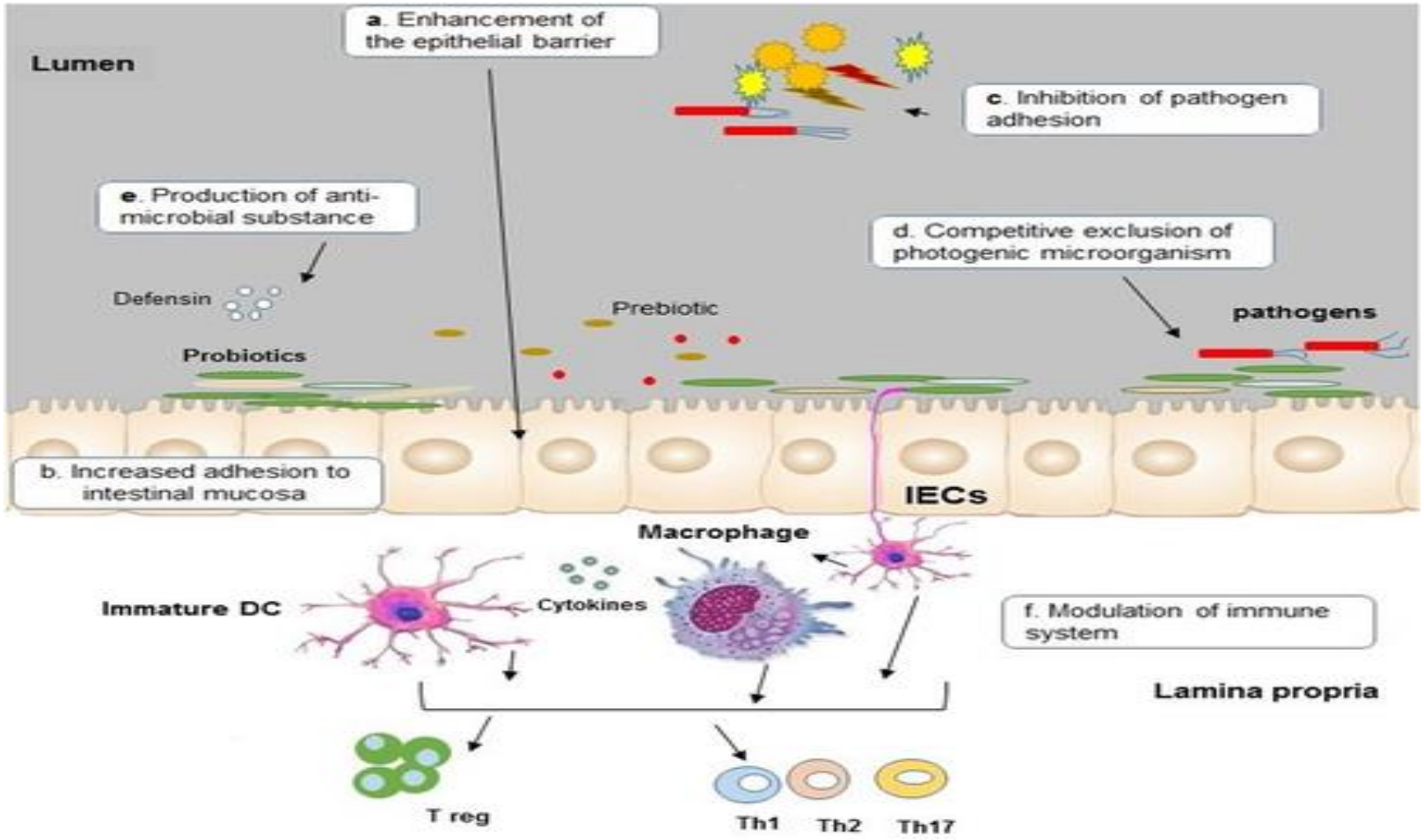
- C.Custodero et Al. https://doi.org/10.1016/j.arr.2018.05.004

Microbiome Influence on Inflammation and Cancer



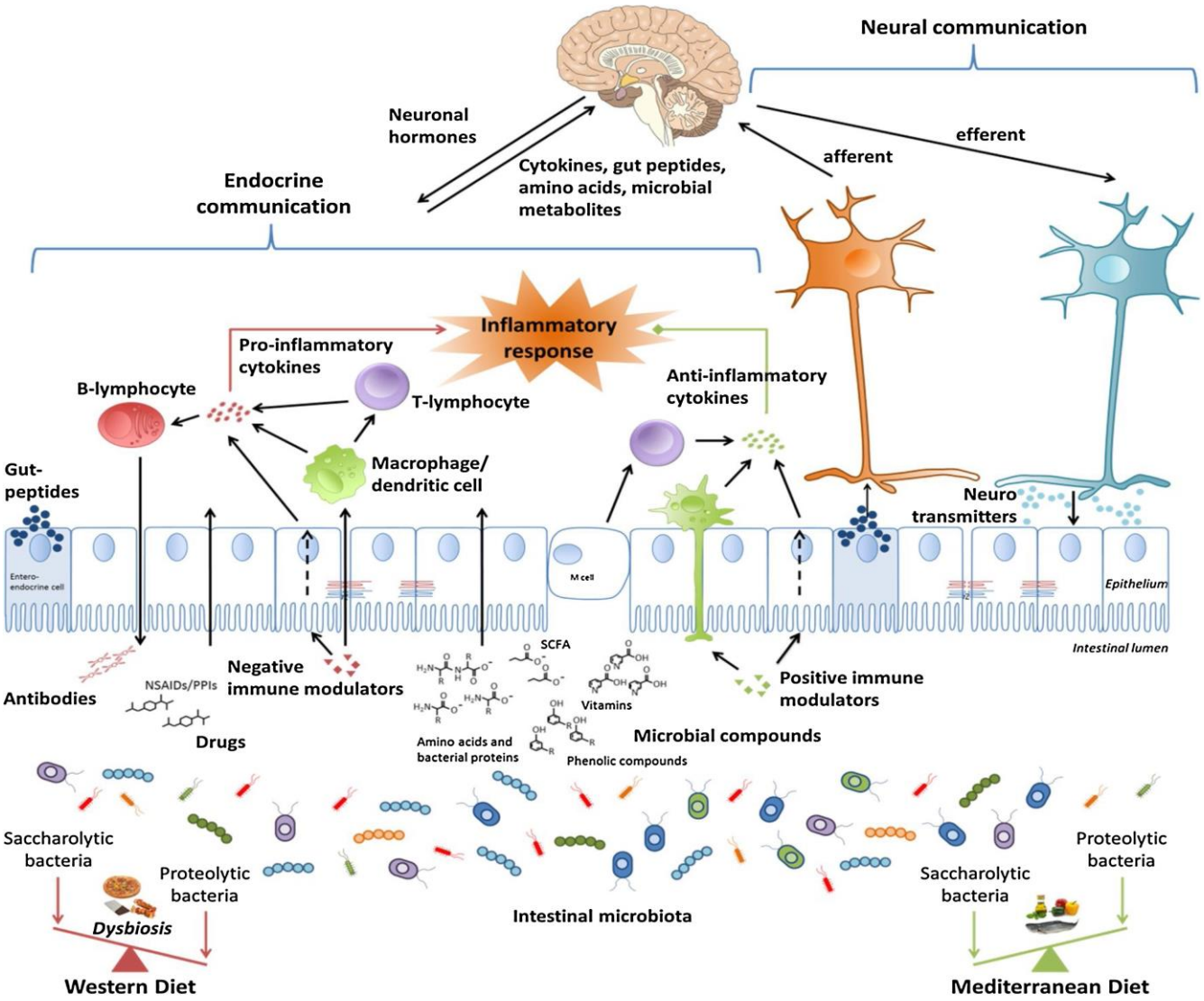
Cancer J. 2014 May-Jun; 20(3): 181–189

Probiotics Importance and their Immunomodulatory Properties



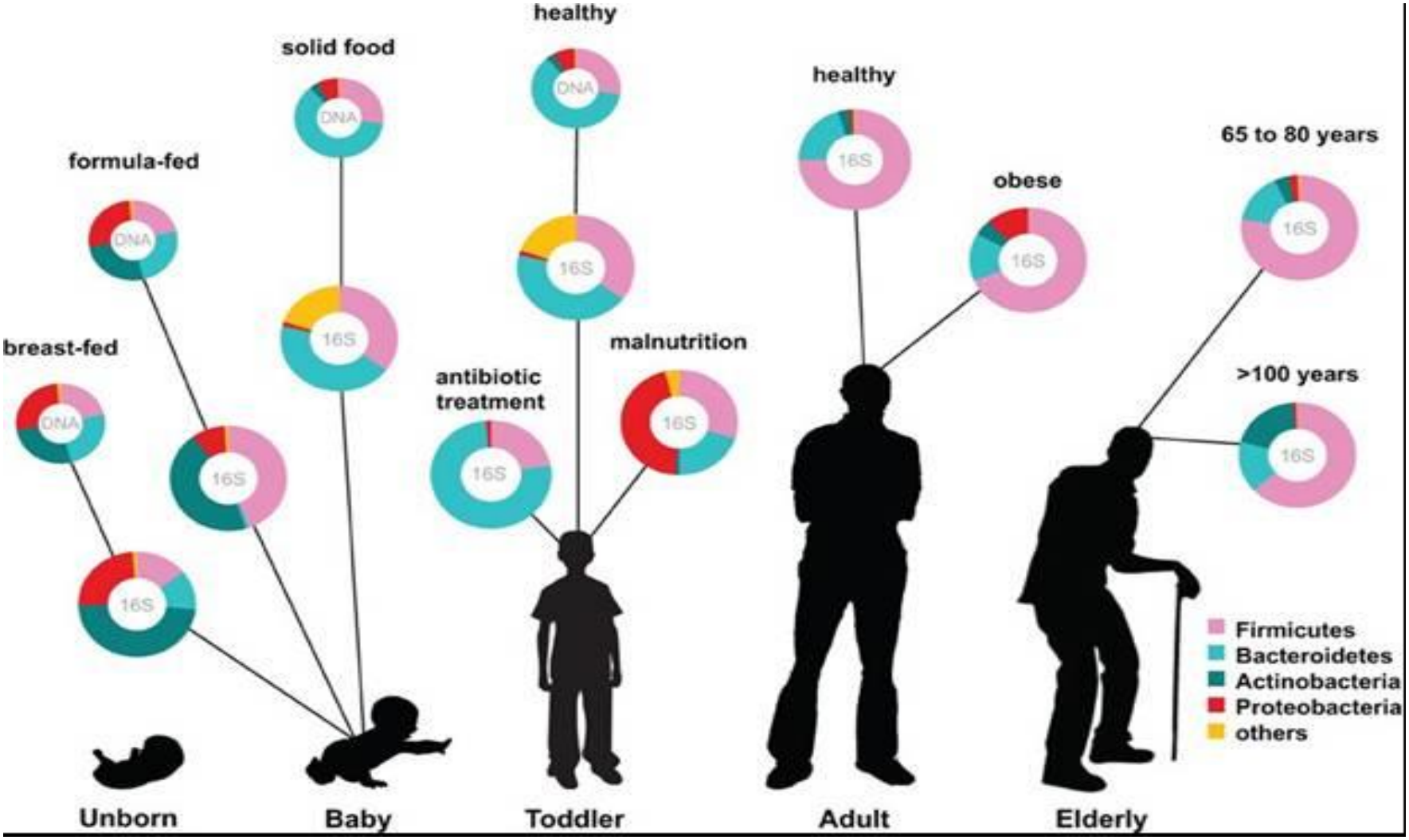
Probiotics importance and their immunomodulatory properties, First published: 14 October 2018, DOI: (10.1002/jcp.27559)

General mechanisms by which the gut microbiota affects host intestinal epithelium and immune-inflammatory response



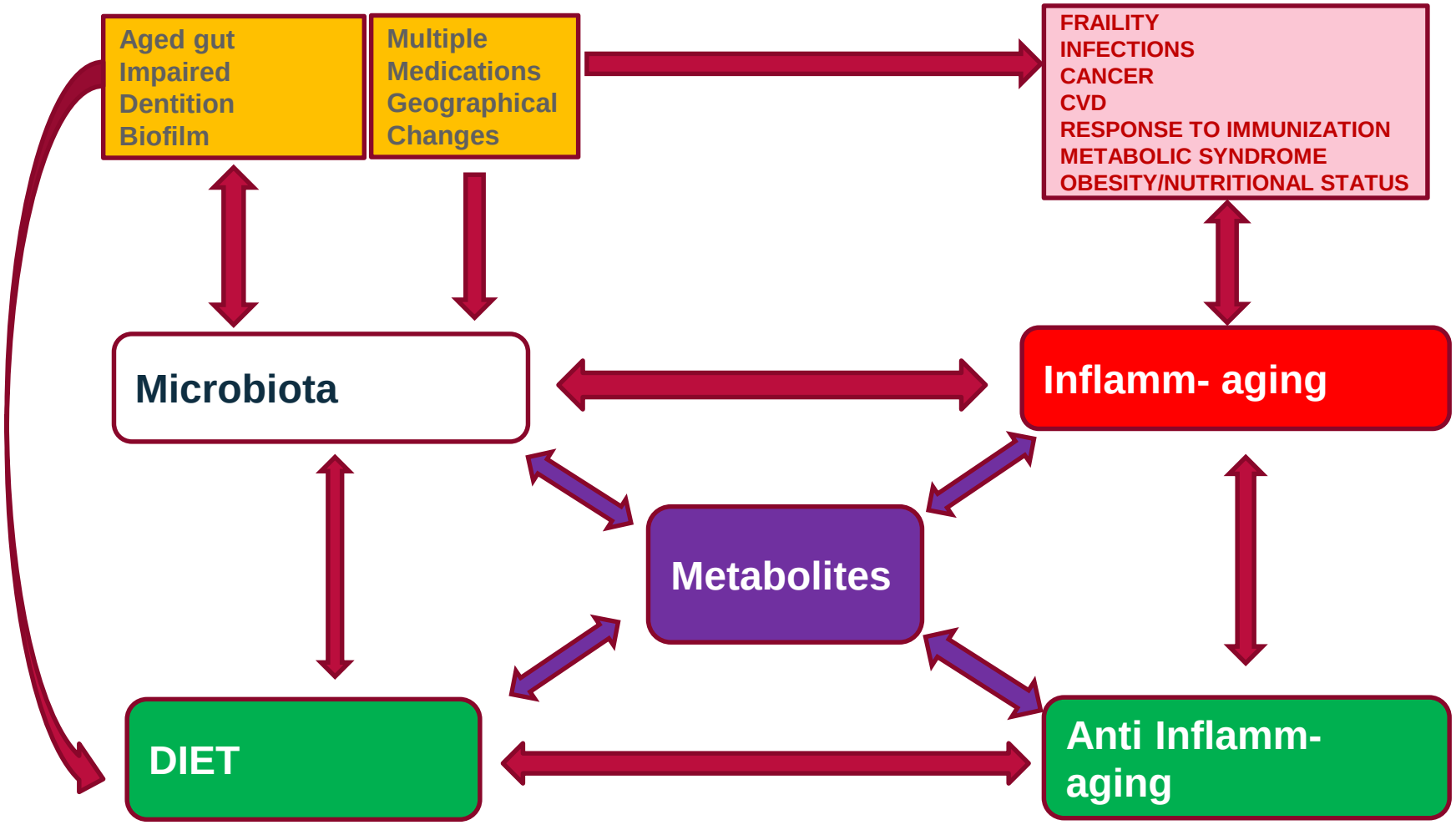
Calder PC et. al Health relevance of the modification of low grade inflammation in ageing (inflammageing) and the role of nutrition. Ageing Res Rev.2017 Sep 9;40:95-119. doi: 10.1016/j.arr.2017.09.001.

Changes in the microbiota composition with the age



The function of our microbiota: who is out there and what do they do?
Ottman N[1], Smidt H, de Vos WM, Belzer C.

Age-related Microbiome Changes and their implications in Disease Prevention, Progression, and Treatment (AMDPPT)



Inflammaging and anti-inflammaging: A systemic perspective on aging and longevity emerged from studies in humans Claudio Franceschi[a, b, c, e], , 2015

The Microbiota and Microbiome in Aging: Potential Implications in Health and Age-Related Diseases; Heidi J. Zapata MD, PhD* and Vincent J. Quagliarello MD 2015

FOA Purpose:

- 1. to evaluate changes in the microbiota during lifetime and its influence in health and disease status in the elderly, including those from racial/ethnic minority and underserved populations;
- 2. to understand the underlying mechanisms of microbiota interactions in aged subjects, in the context of multiple medications and chronic diseases;
- 3. to investigate how interventions designed to change the microbiota can reduce the risk and progression of age-associated diseases, or modify the effect of treatment in elderly and among populations that suffer the disproportionate burden of the disease.

Funding Mechanisms

Age-related Microbiota Changes and their Implications in Chronic Disease Prevention, Treatment and Progression (R21 Clinical Trial Optional)

https://grants.nih.gov/grants/guide/pa-files/PA-18-739.html

Age-related Microbiota Changes and their Implications in Chronic Disease Prevention, Treatment and Progression (RO1 Clinical Trial Optional)

https://grants.nih.gov/grants/guide/pa-files/PA-18-738.html

Advancing Translational and Clinical Probiotic/Prebiotic and Human Microbiome Research (R01 Clinical Trial Optional)

https://grants.nih.gov/grants/guide/pa-files/PA-18-902.html

Thank you for your attention

- QUESTIONS?