

10<sup>th</sup> International Conference on

# VASCULAR DEMENTIA

February 22-23, 2018 | Paris, France

## Exploring links between the microbiome and dementia

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Our microbiome composition likely influences health and how well we age. Here we provide a background describing the links between oral bacteria and sporadic Alzheimer's disease. We present our data from Next Generation Sequencing (NGS) comparing bacterial reads from AD and cognitively normal temporal cortex. Immunosenescence results in waning targeted immune responses and increased reliance on innate immunity. As a result, bacterial and inflammatory cytokine load, particularly in conjunction with e.g. poor oral hygiene, rise with age and many neurodegenerative diseases are associated with inflammation. Gum disease increases periodontal pocket depth and shifts the balance of the oral microbiome towards a more anaerobic population, capable of eliciting greater TNF-alpha release from buccal cells lining the mouth. High levels of pro-inflammatory cytokines e.g. TNF-alpha, compromise the integrity of the normally protective blood brain barrier. Bacteria escaping the mouth and gut are more likely to evade targeted immune responses, so low levels in the circulation fail to elicit classic signs of systemic infection, but instead contribute to local or generalized inflammation. Sensitive techniques such as NGS, now suggest biofilm can form on many surfaces, including blood vessels. Under some circumstances this may provide an environment that allows harmful or anaerobic bacteria, otherwise unable to adhere or survive in isolation, to thrive. Some oral bacteria are also known to subvert otherwise benign biofilm to an aggressively inflammatory form. A better understanding of the host/microbiome interplay in neurological disease may reveal opportunities for new therapeutic and preventive strategies.