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Impact of butyrate-producing gut microbiota on the risk of infectious disease hospitalisation: results from two large population-based cohorts

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09. Experimental microbiology, microbial pathogenesis & biofilms **09b. Host-pathogen interaction (incl basic microbiome studies)**

Oral presentation

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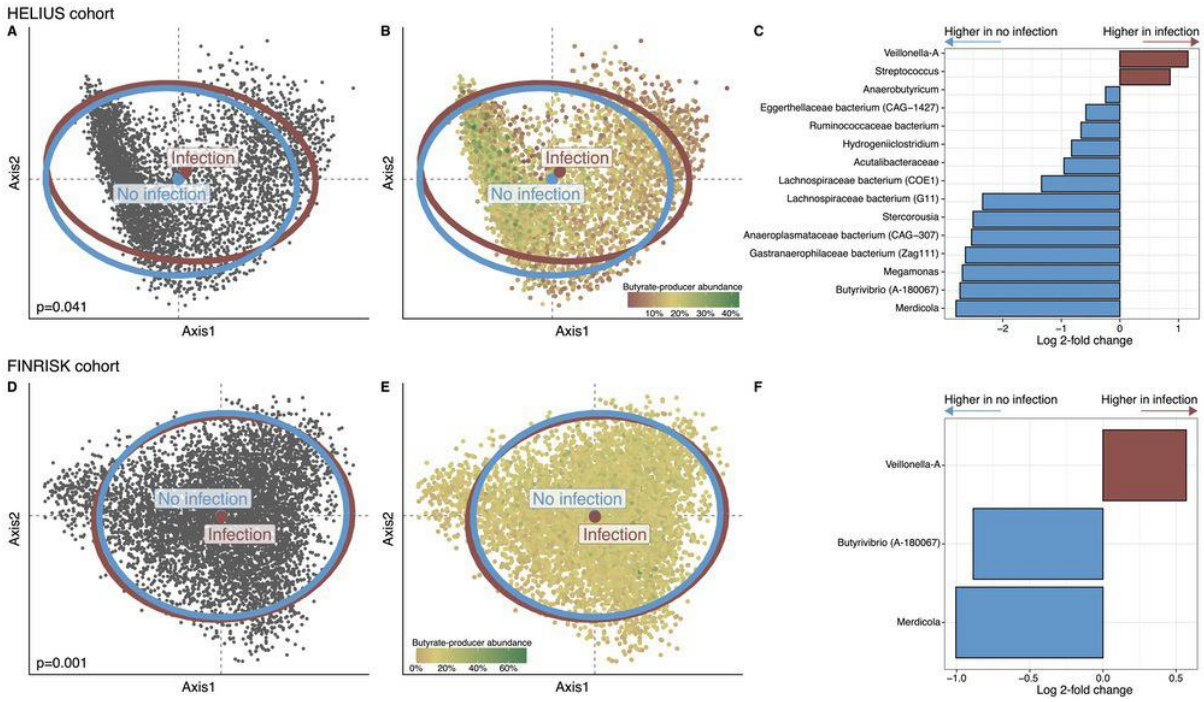
Background
Microbiota alterations are common in patients hospitalised for severe infections and preclinical models have shown that anaerobic butyrate-producing gut bacteria protect against systemic infections. However, the relationship between microbiota disruptions and increased susceptibility to severe infections in humans remains unclear. We investigated the relationship between baseline gut microbiota and the risk of future infection-related hospitalisation in two large population-based cohorts.
Methods
Gut microbiota were characterised using 16S rRNA gene amplicon sequencing and Greengenes2 in independent observational population-based cohorts from the Netherlands (derivation; HELIUS) and Finland (validation; FINRISK 2002). Primary predictor variables were microbiota composition, diversity, and relative abundance of butyrate-producing bacteria. Our primary outcome was hospitalisation or mortality due to any infectious disease during 5–7-year follow-up after faecal sample collection, based on national registry data. We examined associations between microbiota and infection-risk using microbial ecology and Cox proportional-hazards. Multivariable analyses were used to adjust for demographics, lifestyle, antibiotic exposure, and comorbidities.
Results
We profiled gut microbiota from 10699 participants (4248 from the derivation cohort; 6451 from the validation cohort). 602 participants (derivation: n=152; validation: n=450) were hospitalised or died due to infections (mainly community-acquired pneumonia) during followup. Gut microbiota composition of these participants differed from those without hospitalisation for infections (derivation: p=0.041; validation: p=0.001). Specifically, higher abundance of butyrate-producing bacteria was associated with a reduced risk of hospitalisation for infections (derivation cohort: cause-specific hazard ratio [csHR] 0.72, 95% confidence interval [CI] 0.55–0.95 per ten percent increase in butyrate-producers, p=0.021; validation: csHR 0.78, 95% CI 0.67-0.90, p=0.00096). These associations remained unchanged following adjustment for demographics, lifestyle, antibiotic exposure, and comorbidities.
Conclusions
Gut microbiome composition, specifically colonisation with butyrate-producing bacteria, is associated with protection against hospitalisation for infectious diseases in the general population across two independent European cohorts. Further studies should investigate whether modulation of the microbiome can reduce the risk of severe infections.
Gut microbiota composition is associated with the risk of hospitalisation for infectious Diseases



Colonisation with butyrate-producing bacteria is associated with protection against severe infection