DPC 2026 - Freiburg

Distangling contaminants from true intratumoural microbial signals in pancreatic ductal adenocarcinoma – A benchmarking approach

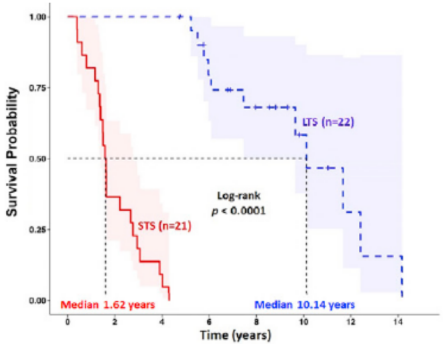
Linh Dang

2026-03-07

Contamination in Microbiome Study

Cell

Tumor Microbiome Diversity and Composition Influence Pancreatic Cancer Outcomes



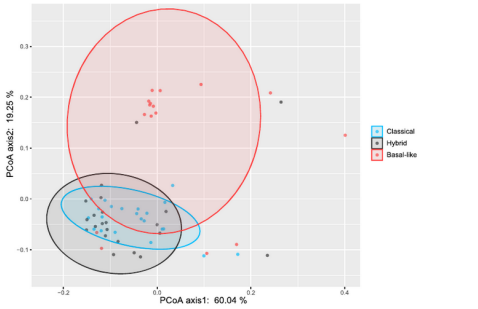
Riquelme et al. Cell 2019

Key taxa: Streptomyces, Pseudoxanthomonas, Saccharopolyspora

Article | Open access | Published: 31 August 2021

Tumor microbiome contributes to an aggressive phenotype in the basal-like subtype of pancreatic cancer

Wei Guo, Yuchao Zhang, Shiwei Guo, Zi Mei, Huiping Liao, Hang Dong, Kai Wu, Haocheng Ye, Yuhang Zhang, Yufei Zhu, Jingyu Lang, Landian Hu, Gang Jin & Xiangyin Kong



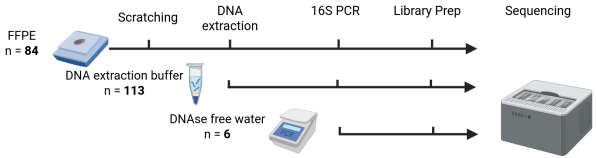
Guo Communication biology 2021

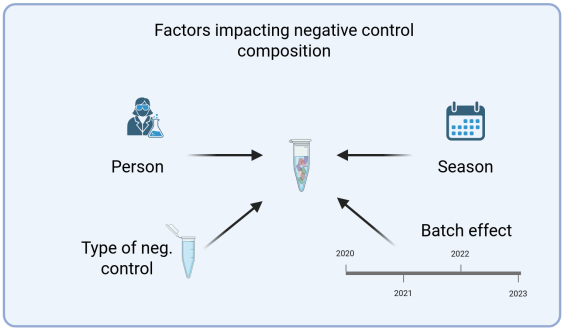
Key taxa: Acinetobacter, Pseudomonas, Sphingopyxis

Section 1

Negative Control Survey in the Lab

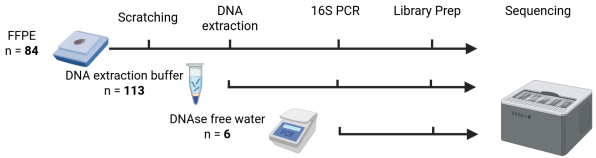
Negative Sample Collection

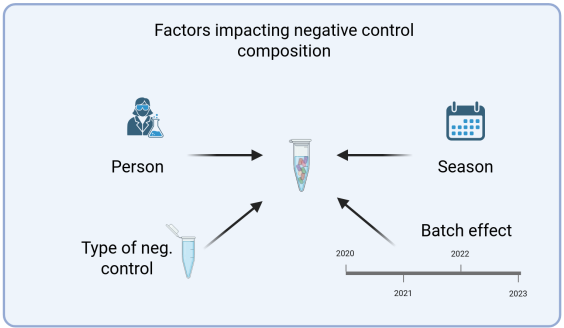




- In total 203 negative control samples over 4 years

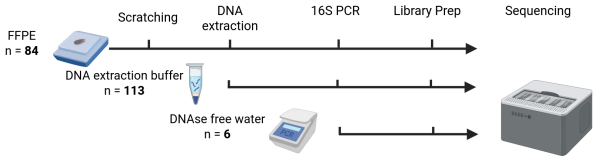
Negative Sample Collection

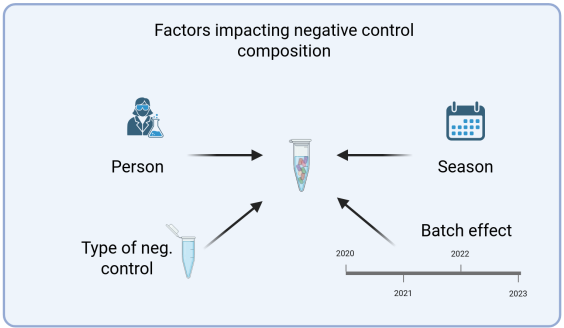




- In total 203 negative control samples over 4 years
  - 113 buffer controls,

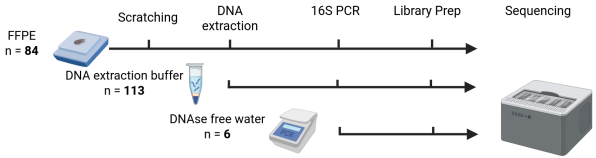
Negative Sample Collection

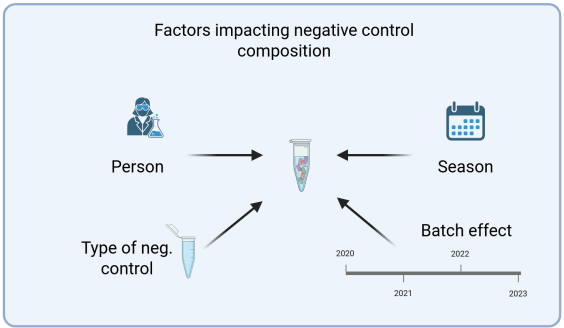




- In total 203 negative control samples over 4 years
  - 113 buffer controls,
  - 84 paraffin controls,

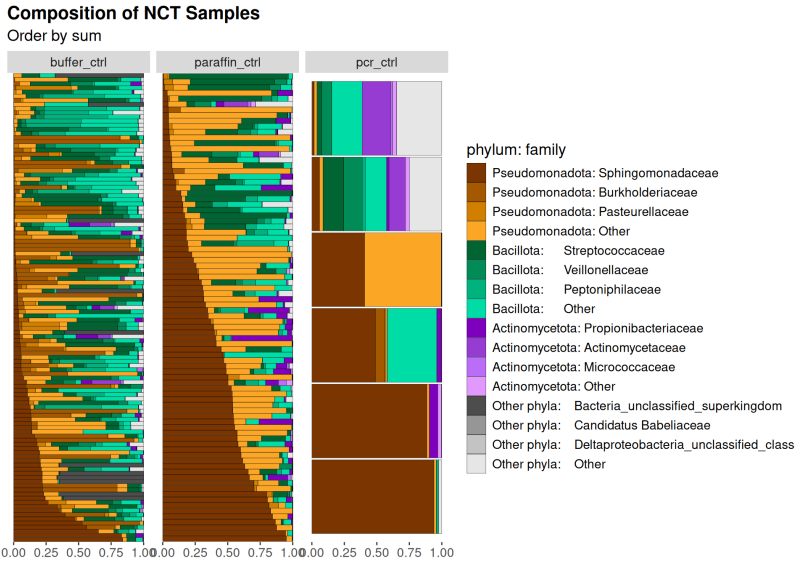
Negative Sample Collection



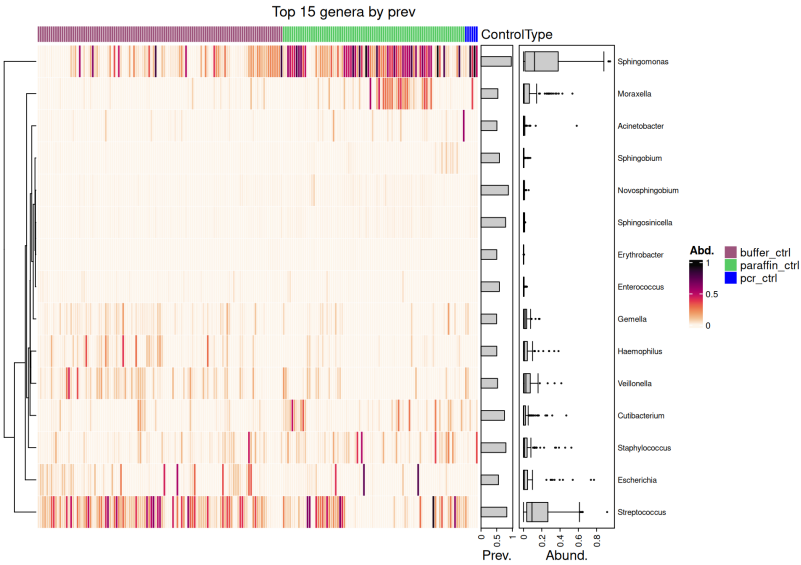


- In total 203 negative control samples over 4 years
  - 113 buffer controls,
  - 84 paraffin controls,
  - 6 PCR control.

Bacterial Composition



Heatmap from Negative Controls

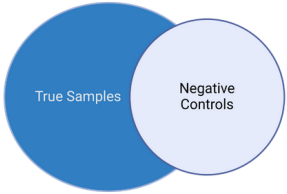


Section 2

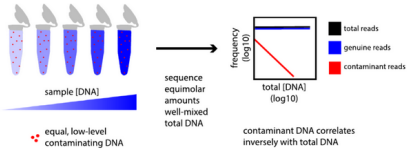
Intratumor Microbiome in PDAC and Assessment of

Decontamination Strategies

Restrictive

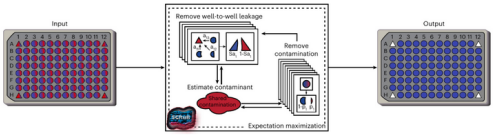


Decontam

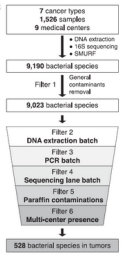


Davis et al. 2018 Microbiome

SCRuB



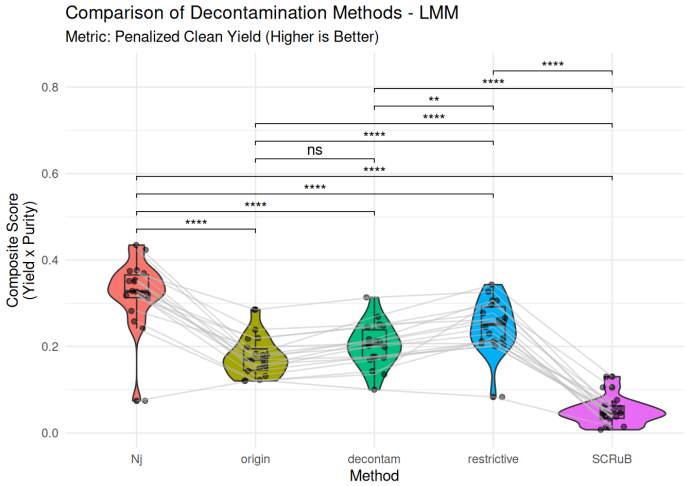
Austin et al. 2023 Nature Biotechnology



Nejman et al. 2020 Science

Assessment of Decontamination Approach

- **Yield**:
$$\frac{\#\ putative\ true\ taxa \notin NCT}{\#observed\ species}$$



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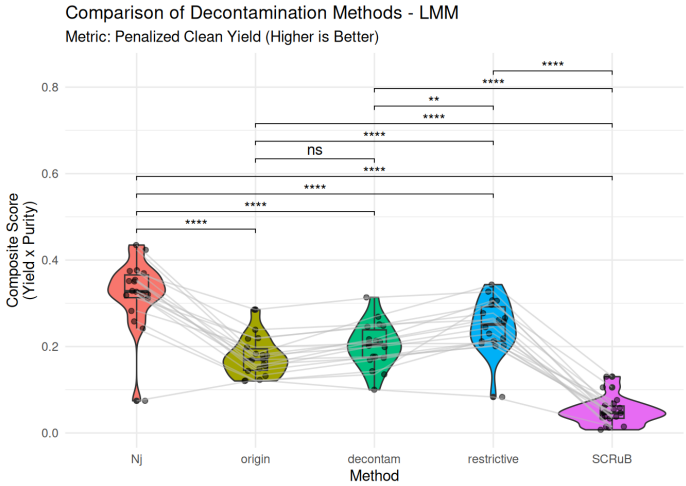

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- **Yield**:
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- **Purity**:
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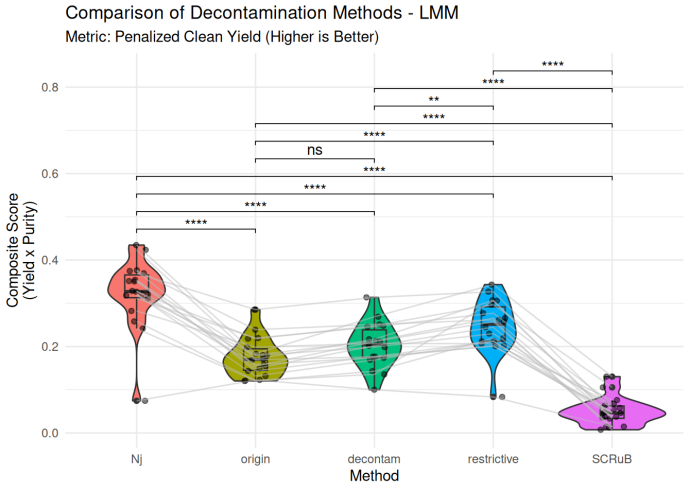
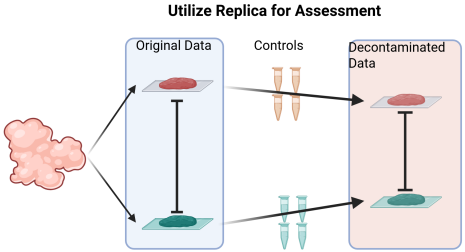
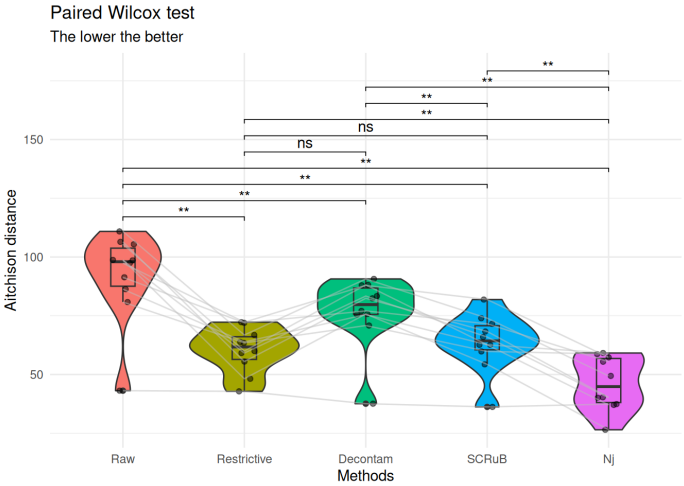
- $Composite\ Score = Yield \times Purity$



Integrate Replica



- 10 PDAC sample, each with 2 replica



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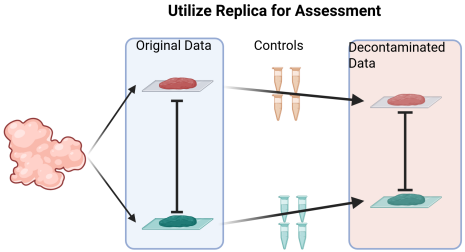
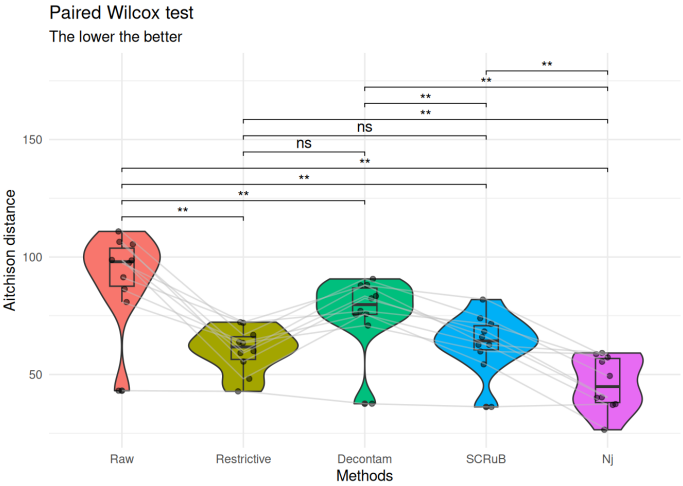
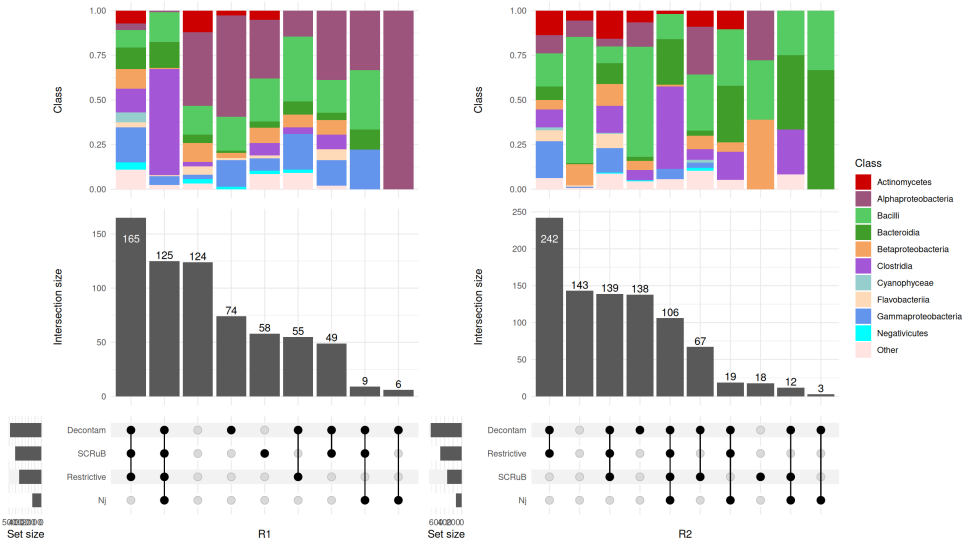


- 10 PDAC sample, each with 2 replica
- Aichison distance with paired Wilcox test.



Overlap - Microbiome profile of PDAC in mice



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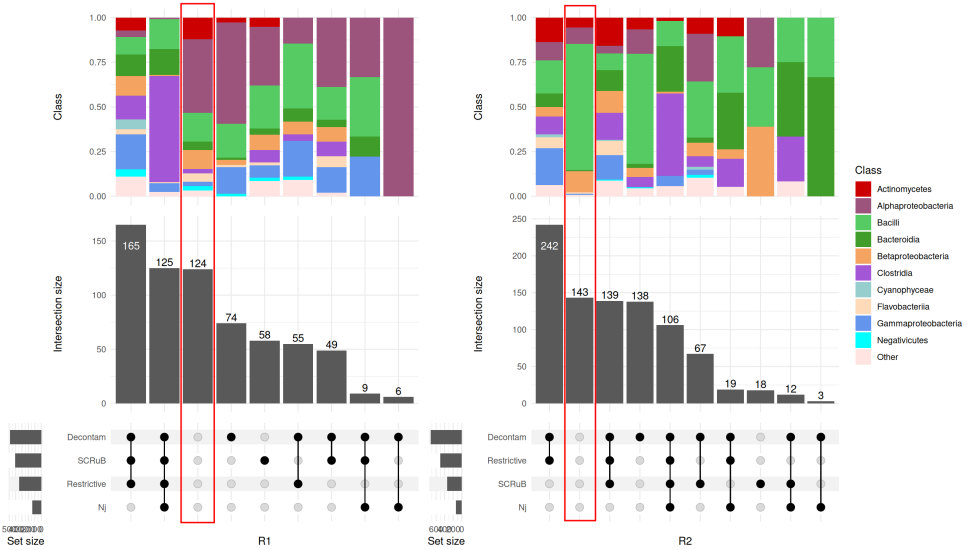

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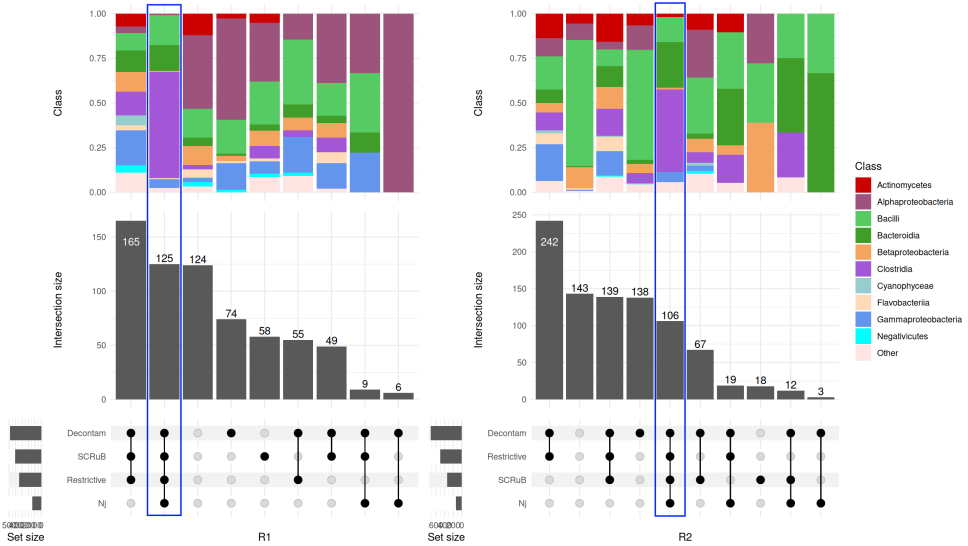
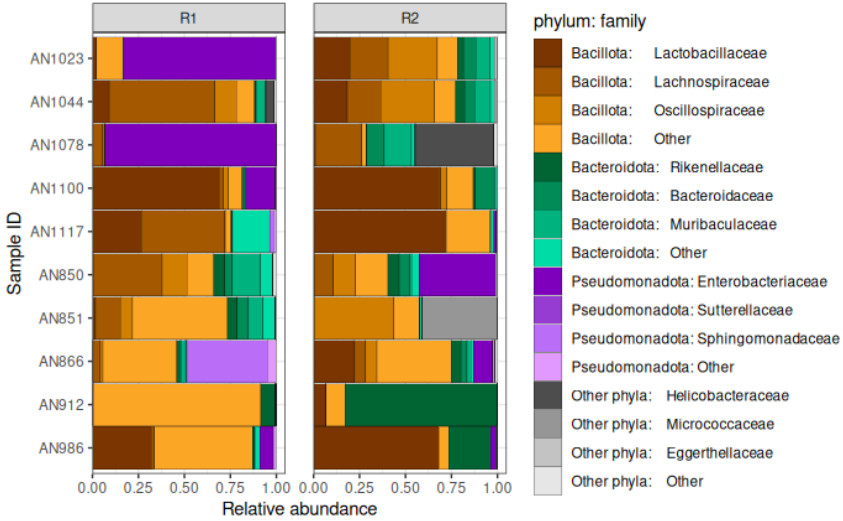
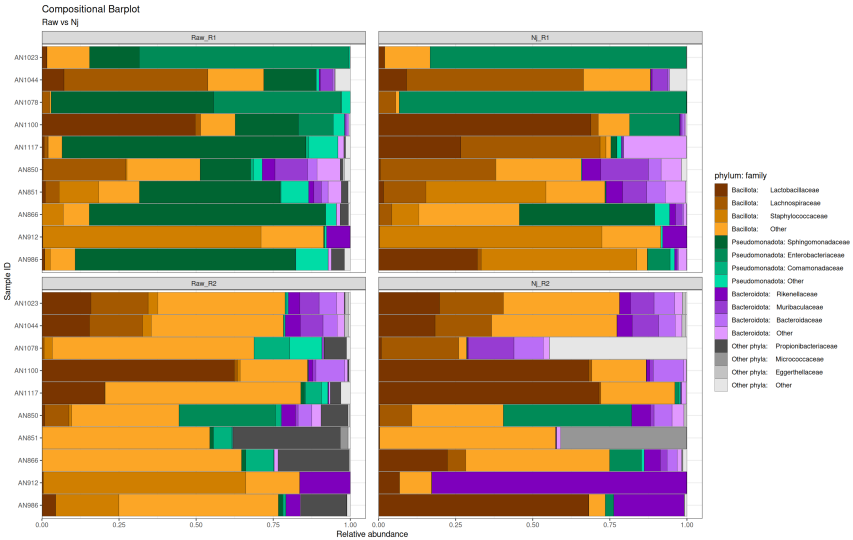


Core microbiome after Nj approach



Core microbiome after Nj approach



Conclusions

Decontamination Methods

- Negative control samples are essential to avoid spurious taxa.

Intratumor microbiome in PDAC

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Intratumor microbiome in PDAC

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- In our study, thoroughly remove contaminant such as Nejman et al. procedure outperforms others.

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Intratumor microbiome in PDAC

- Re-sequencing and various decontamination methods with proper negative controls could yield a reliable set of intratunmor microbiota.

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Intratumor microbiome in PDAC

- Re-sequencing and various decontamination methods with proper negative controls could yield a reliable set of intratunmor microbiota.
- Almost identified taxa are well-known gut microbiota.

Acknowledgements

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Section 3

Backup Slides

Core microbiome - All decontamination method - phylum: family