

Differences in bacterial community composition between healthy and polyps related gut biopsies

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Introduction-Aim

Human gastrointestinal tract (HGIT) contains a huge number of microorganisms (up to 10^{12} /ml)

Stomach 10^2

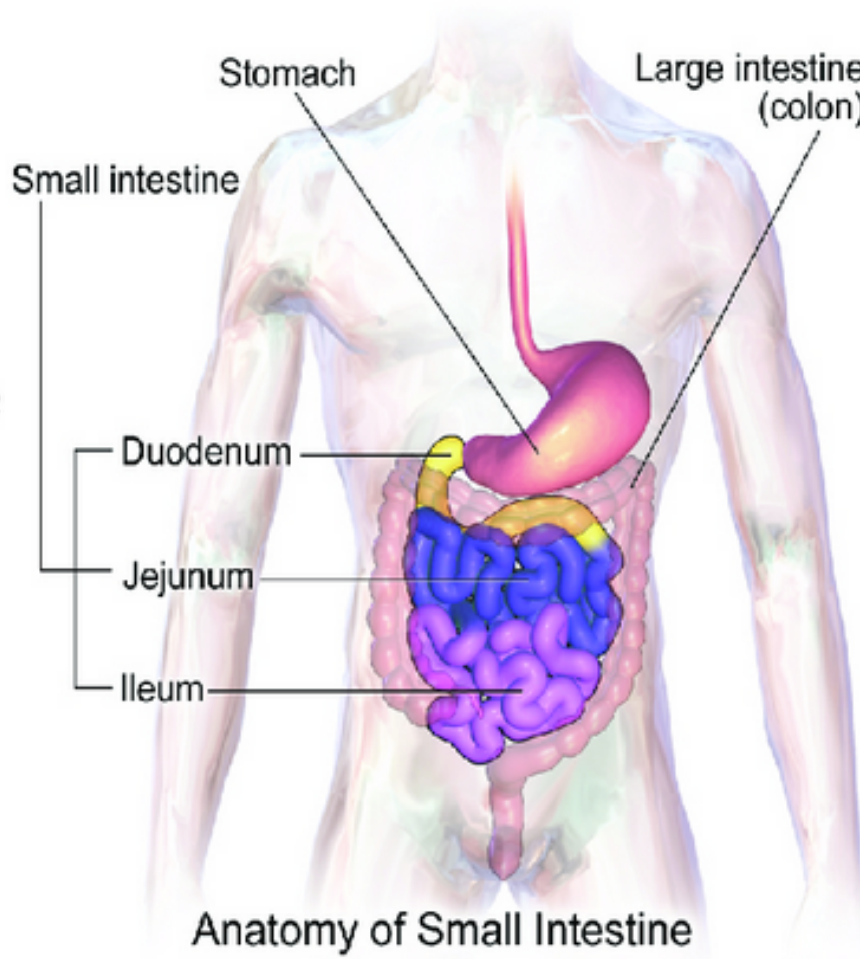
Lactobacillus
Candida
Streptococcus
Helicobacter pylori
Peptostreptococcus

Duodenum 10^2

Streptococcus
Lactobacillus

Jejunum 10^2

Streptococcus
Lactobacillus



Proximal ileum 10^2

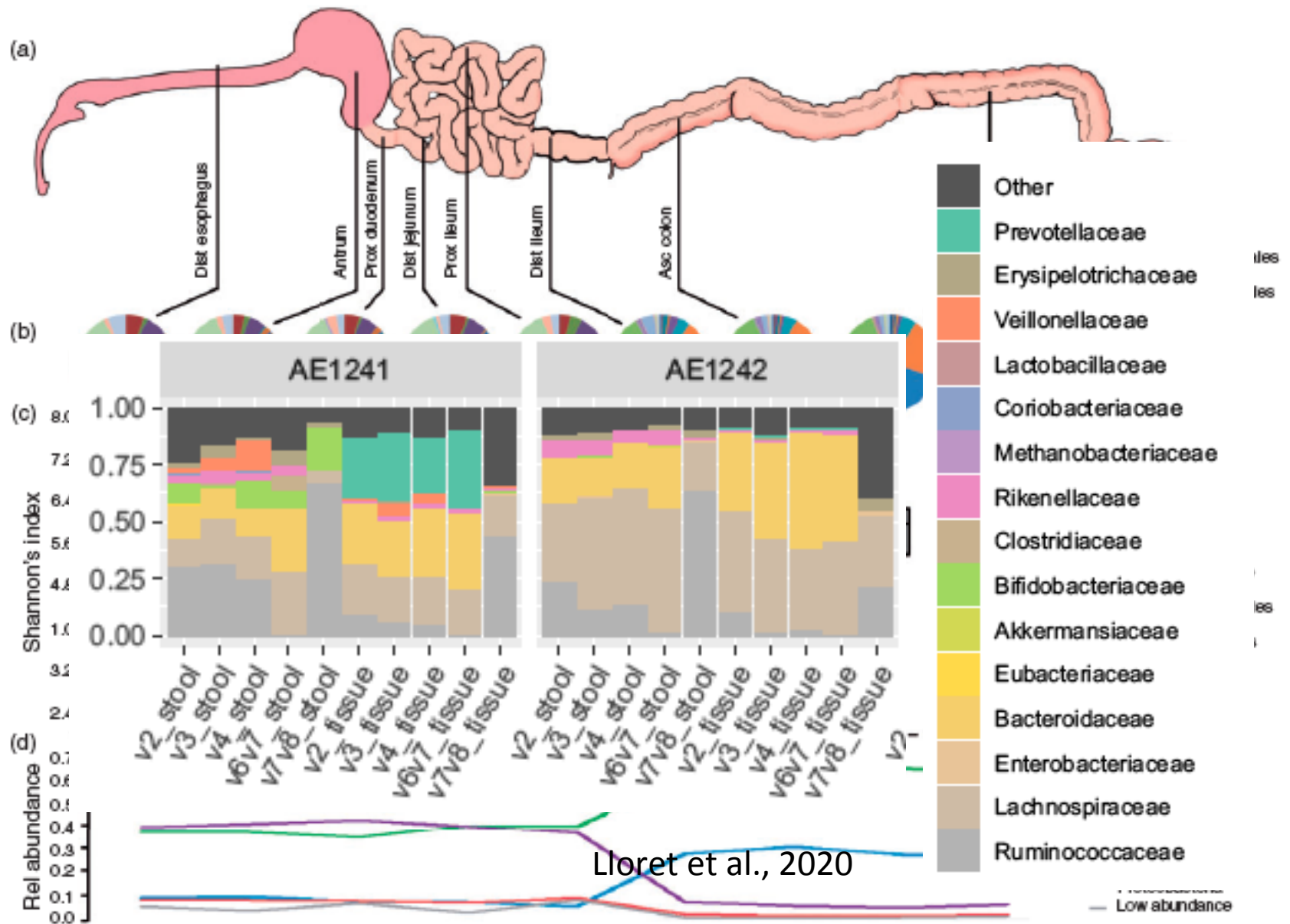
Streptococcus
Lactobacillus

Distal ileum 10^8

Clostridium
Streptococcus
Bacteroides
Actinomycinae
Corneybacteria

Colon 10^{12}

Bacteroides
Clostridium
Bifidobacterium
Enterobacteriaceae



Introduction-Aim

The human intestine retains a complex microbial ecosystem, which performs crucial functions that impact on host health.

The dysbiosis of human gut microbiota, amongst others, is strongly associated with the development of colorectal cancer (CRC).

**Polyps (abnormal tissue growth) → benign
→ high risk for colorectal cancer (CRC)???**

Do we have differences regarding bacterial community composition between normal and abnormal tissues ???

Can we detect potential biomarkers for CRC?

Flexible sigmoidoscopy or Colonoscopy biopsies

	A	B	anatomy	code	age	weight	height	BMI	sex	medical record
HP7	small polyps 0.8 cm	healthy	blind	Blind- ascending	63	68	1.77	21.7	M	stomach ulcer/ lower intestine polyps
HP21	polyps 1.7 cm	healthy	desc-sigmoid	descending	70	78	1.62	29.7	F	benign
HP28	small polyps	healthy	blind	Blind- ascending	78	75	1.75	24.4	M	Ankylosing spondylitis/ anemia
HP25	polyps 1.5 cm	healthy	blind	Blind- ascending	68				F	diverticula
HP22	small polyps 0.6 cm	healthy	blind-asc	Blind- ascending	59	62	1.53	26.4	M	diverticula/HP+
HP27	polyps 1.5 cm	healthy	sigmoid	sigm	60	95	1.88	26.8	M	
HP24	polyps 0.4-0.7 cm	healthy	rectum	rect	72	53	1.63	19.9	F	hypeplastic polyps
HP1	small polyps 0.5 cm	healthy	sigmoid	sigm	73	80	1.7	27.6	M	onekidney
HP15	inflammation	healthy	rectum	rect	76				F	hemorrhoids
HP4	lesion	healthy	ascend- transverse	Blind- ascending	65	45	1.6	17.5	F	anemia/CT
HP19	big polyps	healthy	Transverse-desc	descending	74	70	1.63	26.3	F	polyps
HP26	polyps lesion	healthy	descending	descending	68	93	1.93	24.9	M	probable liver metastasis
HP23	mass	healthy	descending- sigmoid	descending	58	93	1.87	26.5	M	sigmoid CT lesion/liver?
HP2	healthy	neoplasm 0.25 cm	sigmoid	sigm	65				M	
HP14	polyps 4 cm	healthy	rectum	rect	75	85	1.7	29.4	M	adenoma (high dysplasia)
HP20	mass 4.8 cm	healthy	rectum	rect	68	47	1.54	19.8	F	lower intestine CT
HP29	brittle lesion	healthy	rectum	rect	74	68	1.65	24.9	F	probable liver metastasis/ anemia

Methods

Biopsies from abnormal and healthy gut tissues

Age: 69.4 ± 5.2

BMI: 24.2 ± 4.3

M/F: 9/8

DNA extraction

Illumina sequencing (V3-V4 region)

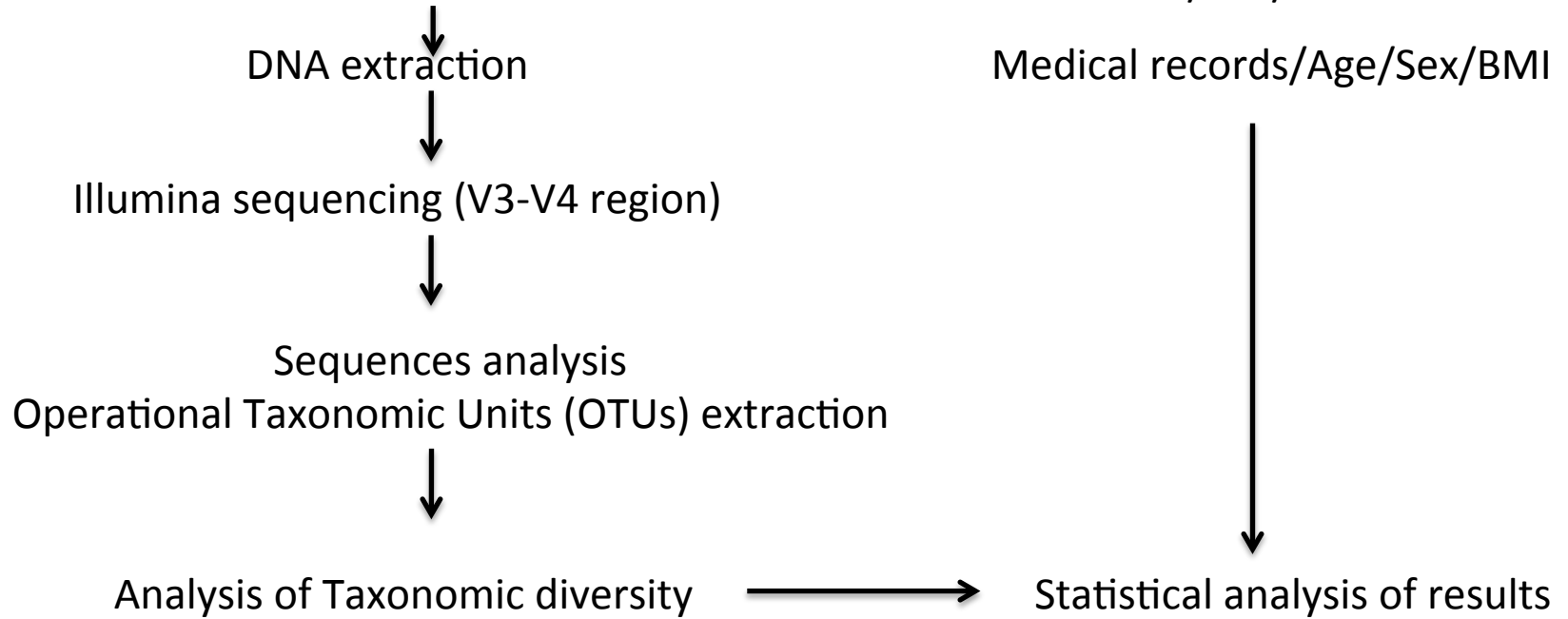
Sequences analysis

Operational Taxonomic Units (OTUs) extraction

Medical records/Age/Sex/BMI

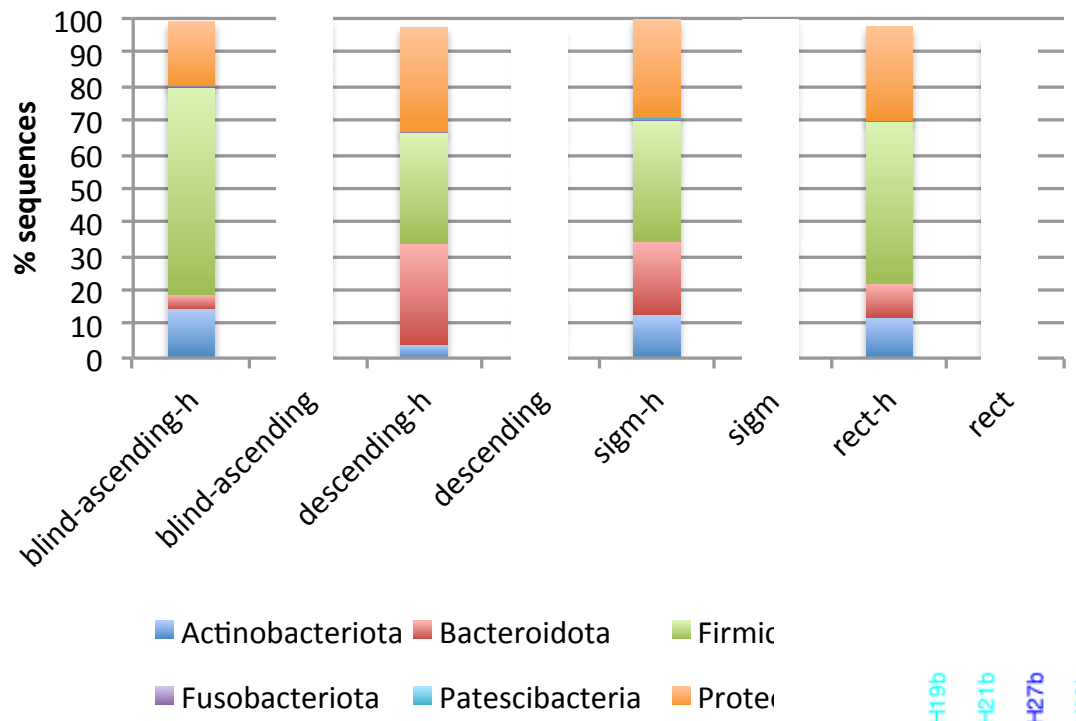
Analysis of Taxonomic diversity

Statistical analysis of results

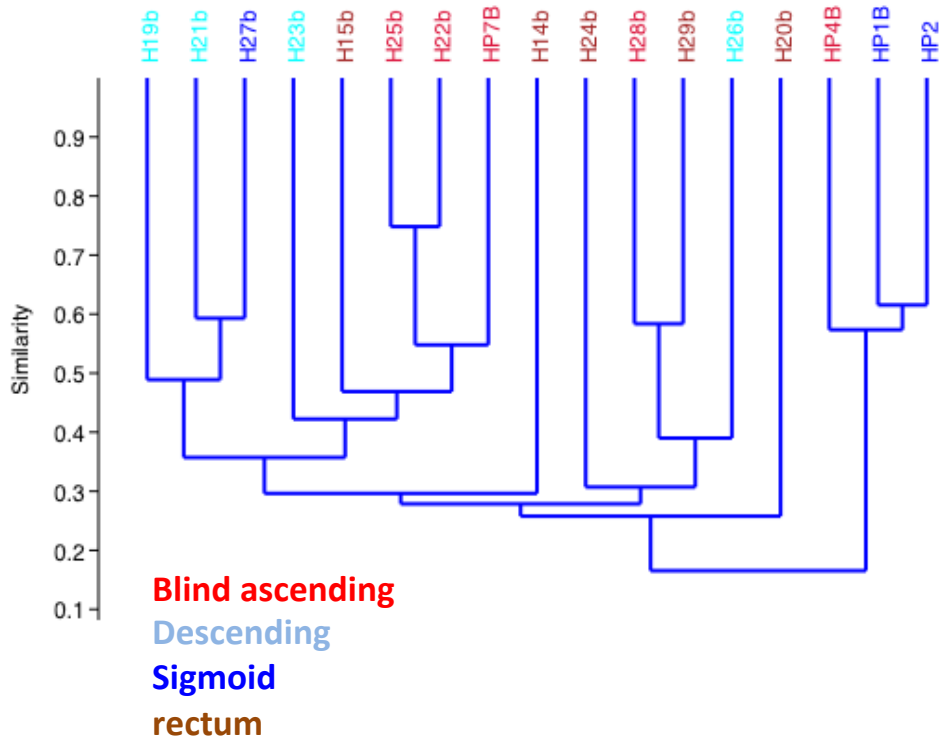


Results

Compared to the usual series of
Firmicutes > *Bacteroidetes* >
Proteobacteria → Dysbiosis?



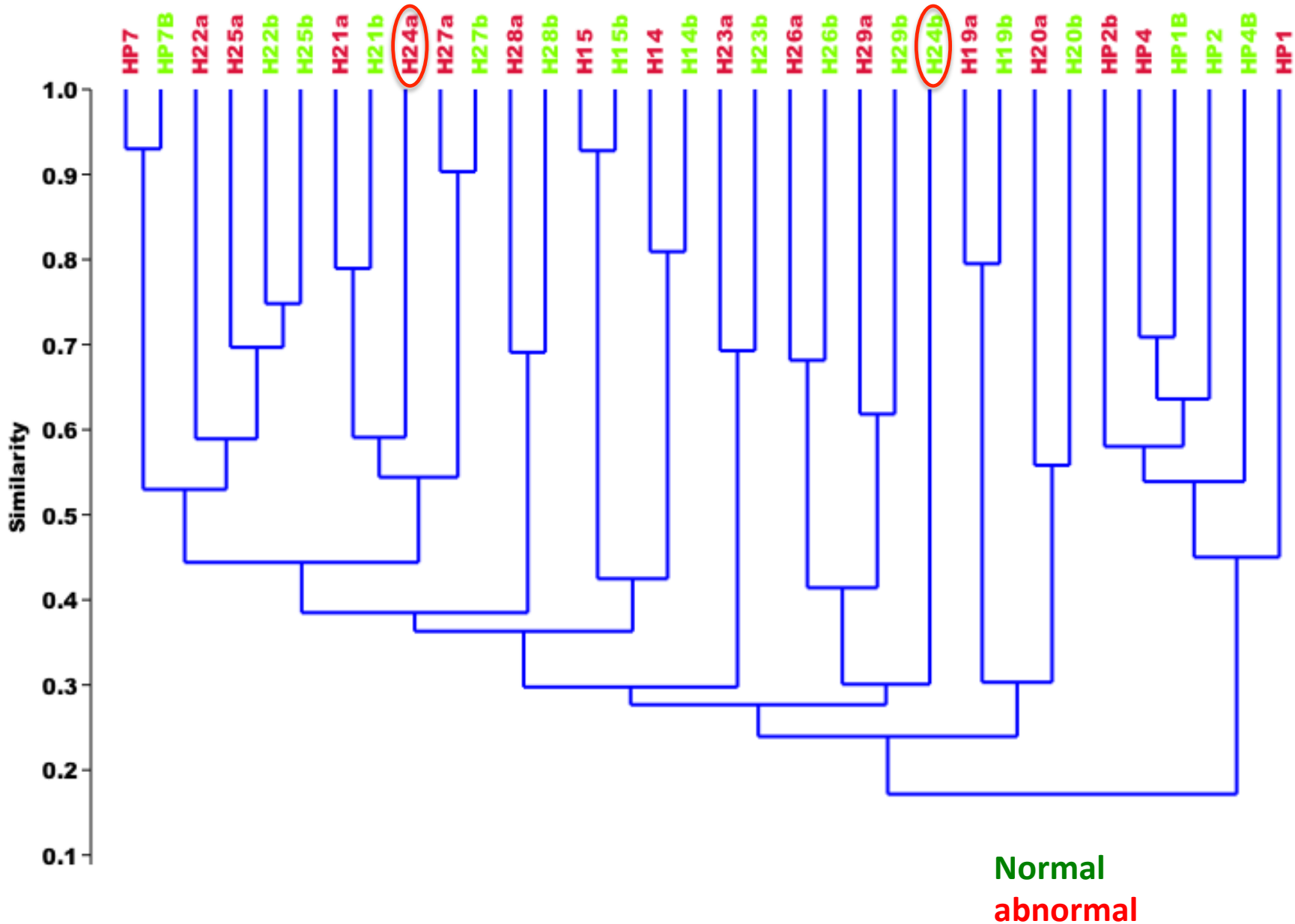
No specific pattern regarding location

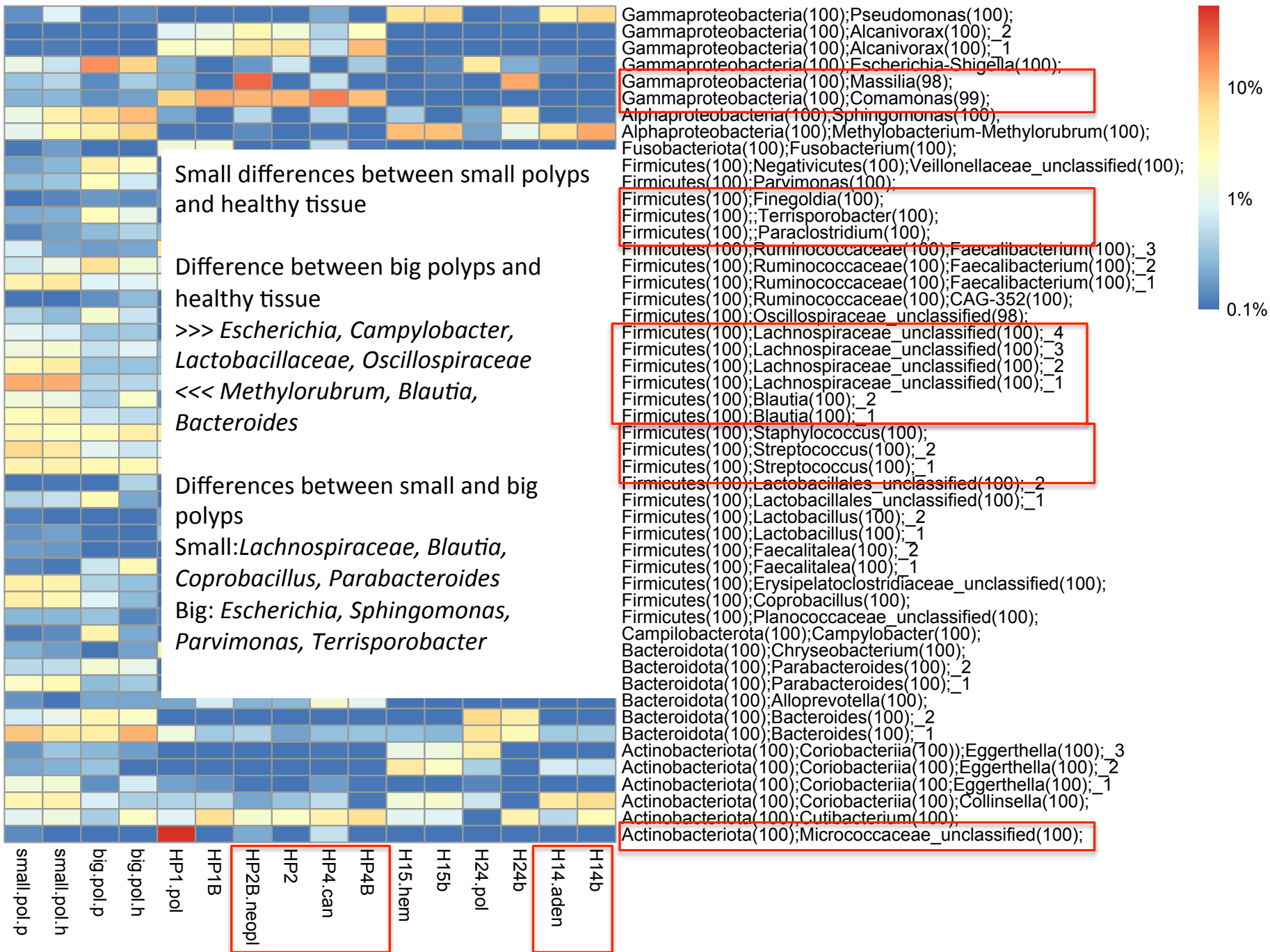


small polyps

big polyps-lesion-mass

Lesion-neoplasm





Conclusions

- Complex results → each individual is different!!! → detailed medical records along with other data (blood test, food preferences) are required.
- Decrease of *Lachnospiraceae* (producing SCFAs) seems as a good bioindicator for precancerous stage
 - Food or result?
- *Streptococcus* has been blamed for being an indicator from precancerous stages but it seems that different strains that cannot be easily distinguished have different outputs.
- Could changes in diet change the profile and thus the fate of precancerous polyps?
- Need for the development of specific protocols followed by all scientists involved

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