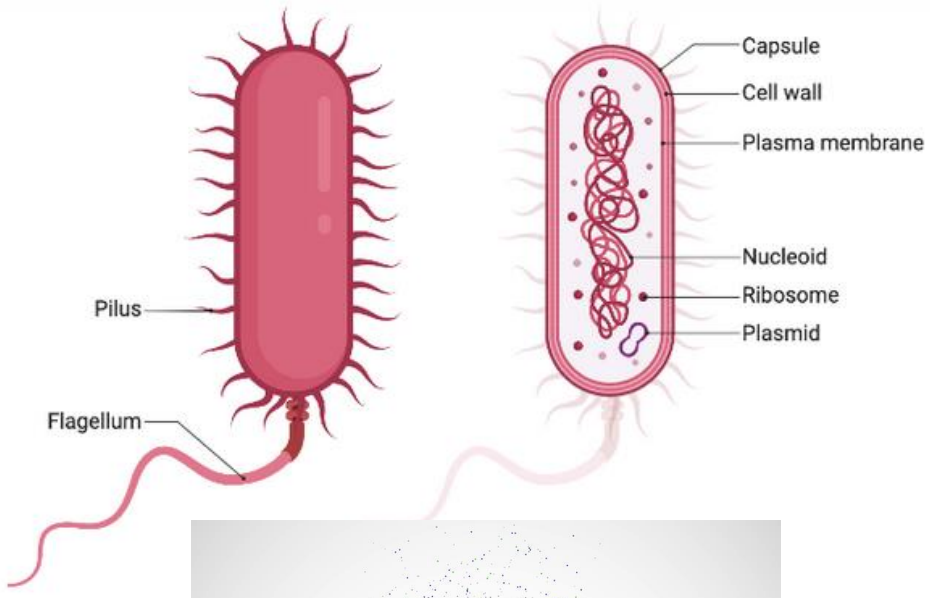
Hví hava føroyingar so ilt í búkinum?

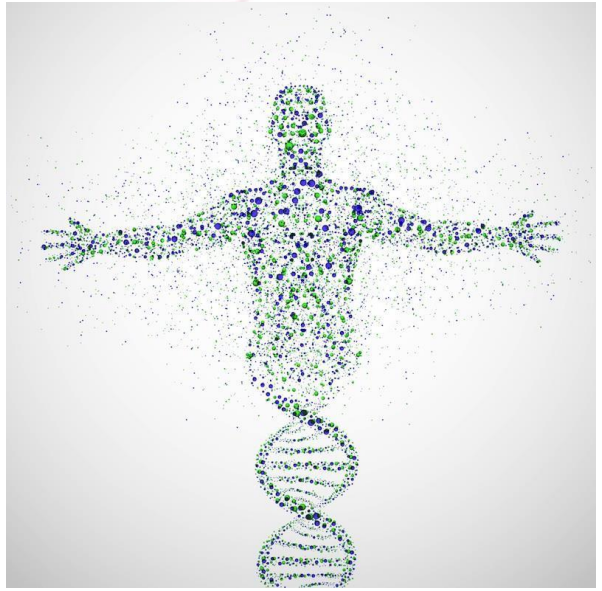
Úrslitini frá fyrstu føroysku IBD granskingini

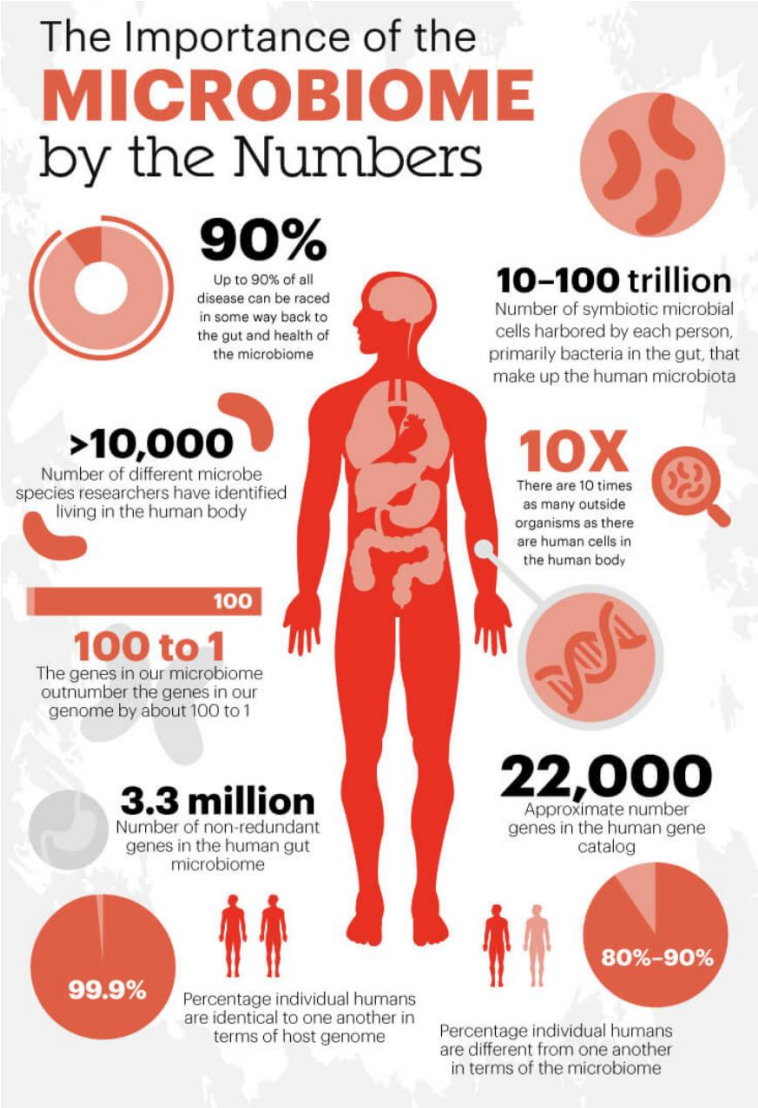
Marjun á Fríðriksmørk Berbisá, Fróðskaparsetur Føroya

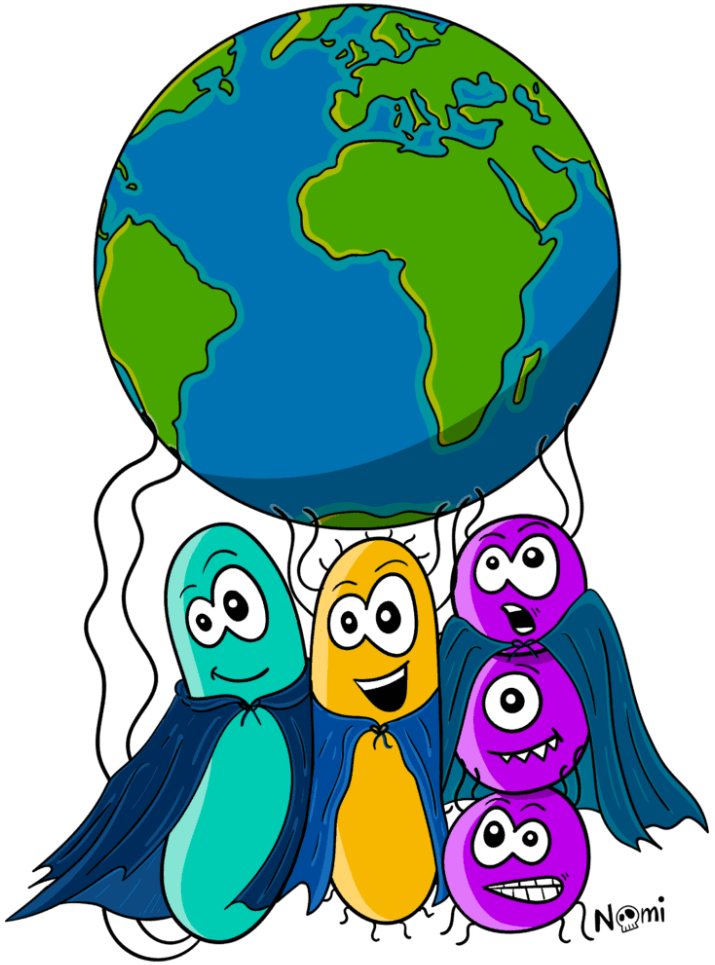
15. september 2022

Hvussu hevur tú tað við bakterium?





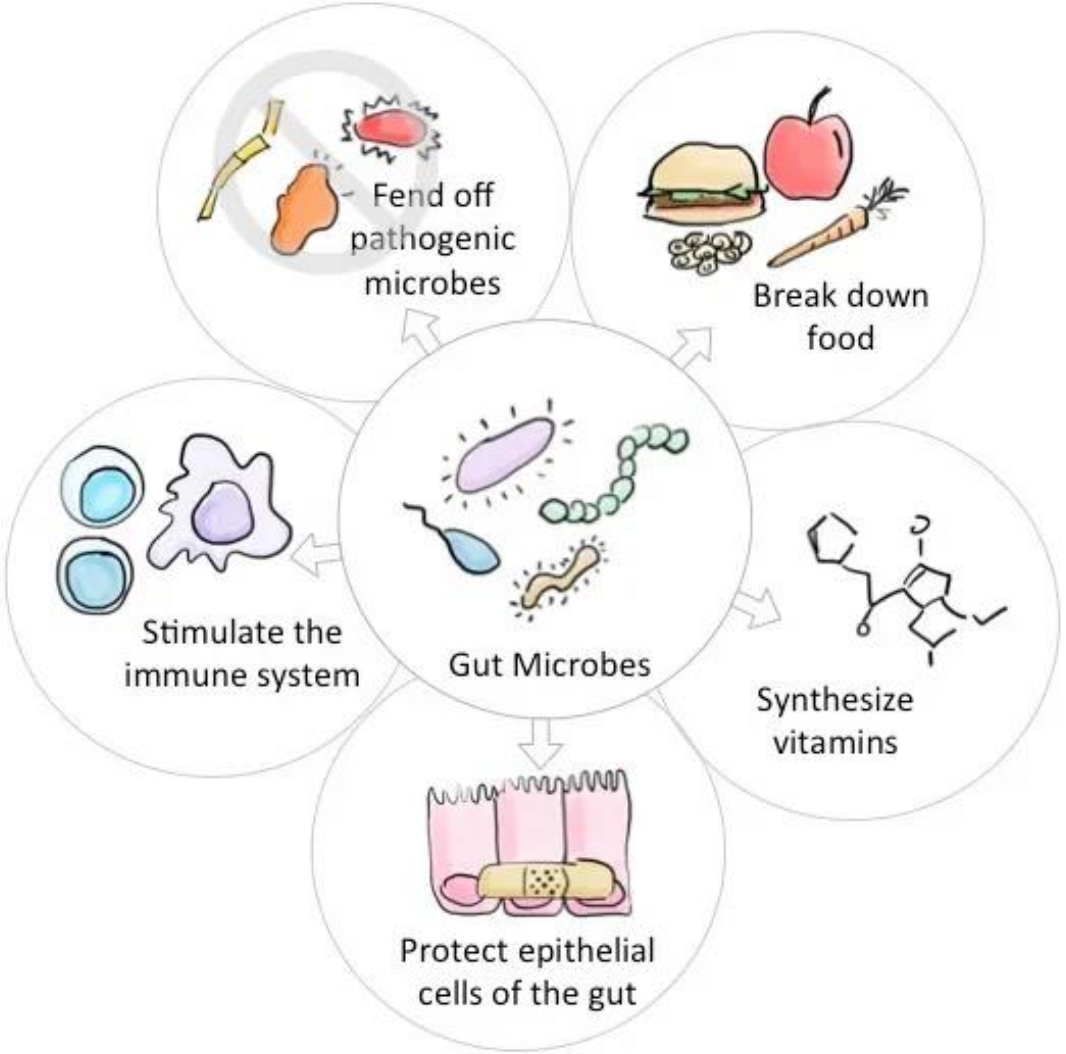




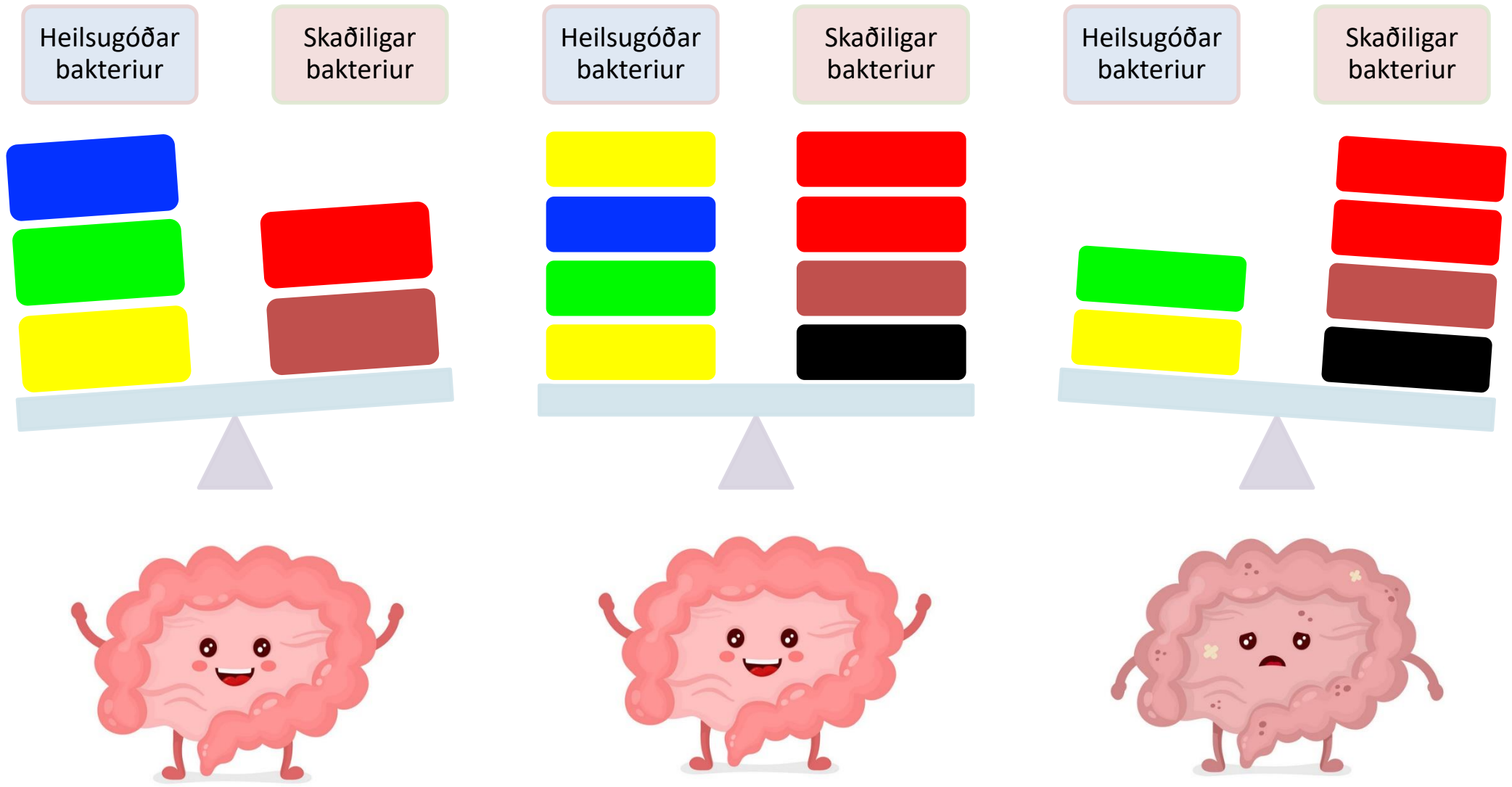
Hvat gera tarmbakteriurnar?

- Bakteriurnar fáa føðslu, orku og eitt fjálgt heim frá okkum – men vit fáa eina rúgvu afturfyri.

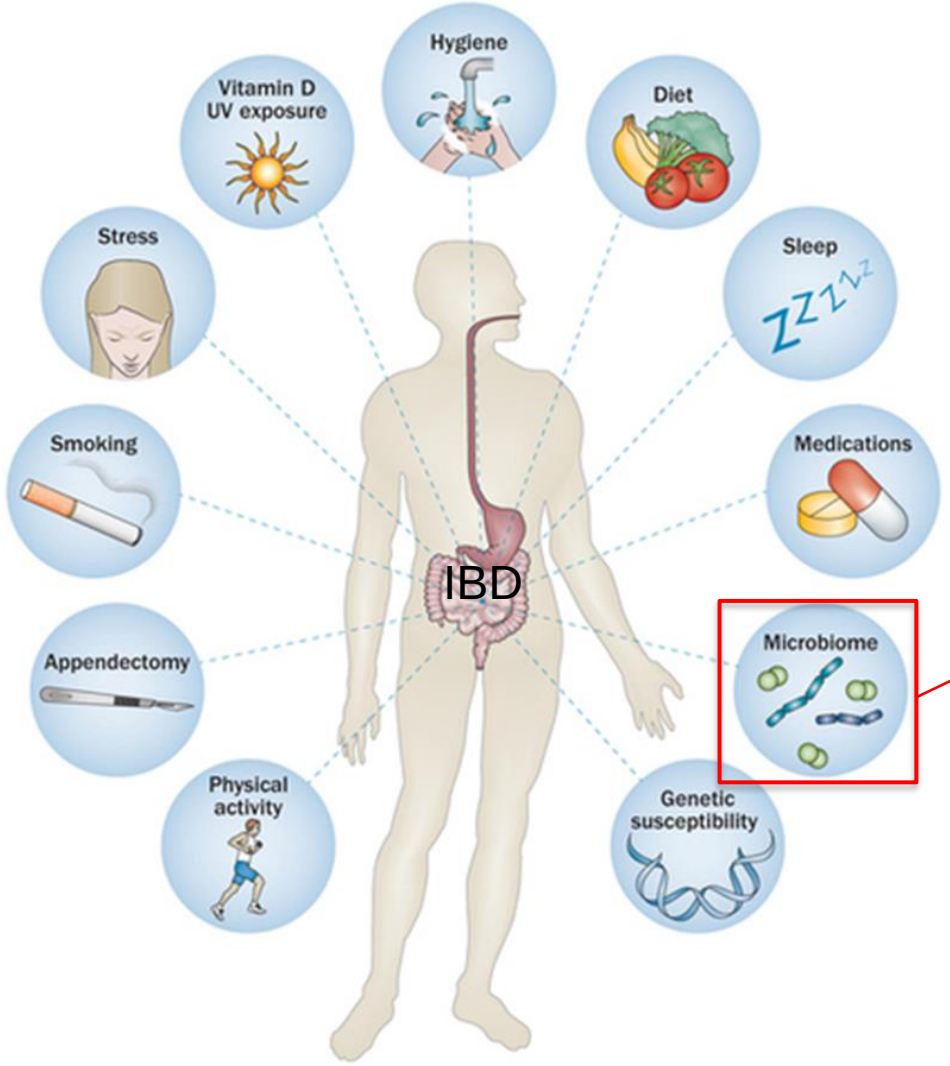
- Tarmbakteriurnar framleiða orku, vitaminir og feittsýrur - yvirskotið fer til okkum
    - 5-10% av dagligu orku-framleiðsluni
    - Framleiða B og K vitaminir
    - Broyta gallsýru til umráðandi hormon
    - Regulera framleiðsluna av neurotransmittarum (t.d. Seratonin)
    - Samstarva við immunverjuna



Mikrobiomið hevur ávirkan á heilsustøðuna



Inflammatory Bowel Diseases (IBD) og mikrobiota



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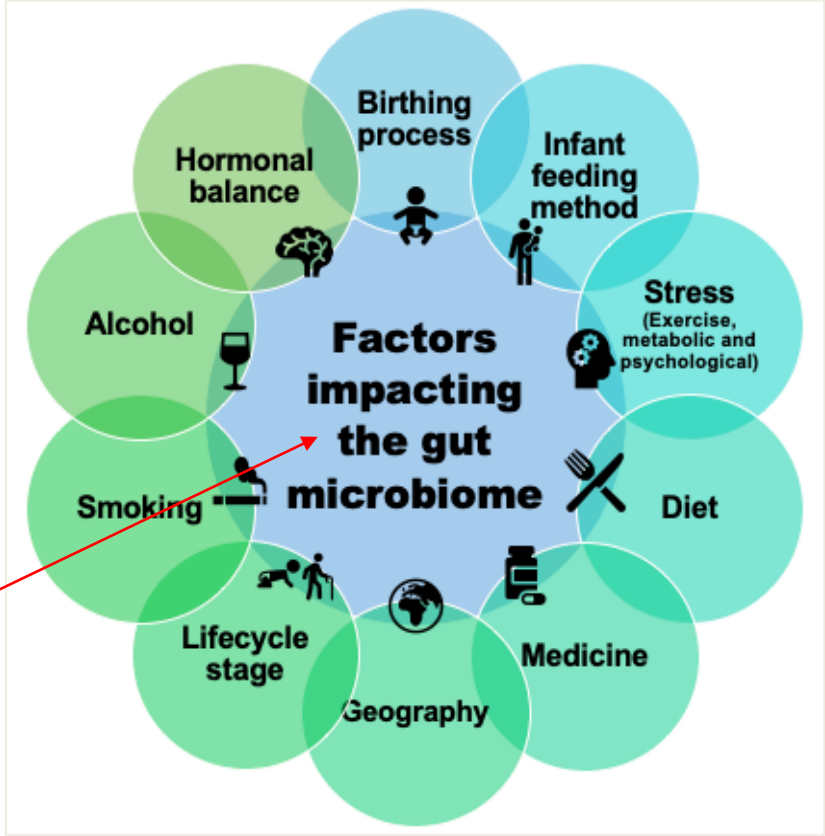


Hvussu er støðan í Føroyum?

Inflammatory bowel disease

ORIGINAL ARTICLE

East–West gradient in the incidence of inflammatory bowel disease in Europe: the ECCO-EpiCom inception cohort

J Burisch,[1] N Pedersen,[1] S Čuković-Čavka,[2] M Brinar,[2] I Kaimakliotis,[3] D Duricova,[4]

Table 2 Incidence rates per 100 000 for inflammatory bowel disease, Crohn's disease, ulcerative colitis and inflammatory bowel disease unclassified in Europe for patients aged 15 years or older in 2010

	No of patients	IBD crude	IBD adjusted (SE)	CD crude	CD adjusted (SE)	UC crude	UC adjusted (SE)	IBDU crude	IBDU adjusted (SE)
Western European centres									
Cyprus, Nicosia	27	11.2	11.4 (2.2)	6.2	6.3 (1.6)	2.9	3.0 (1.1)	2.1	2.2 (1.0)
Denmark, Aarhus	55	21.2	20.7 (2.8)	8.5	8.2 (1.8)	10.8	10.6 (2.0)	1.9	1.8 (0.8)
Denmark, Amager	23	17.2	16.3 (3.4)	5.2	4.8 (1.8)	7.5	7.4 (2.4)	4.5	4.1 (1.7)
Denmark, Funen	123	30.7	33.4 (3.1)	10.7	11.4 (1.8)	18.7	20.1 (2.4)	1.2	1.4 (0.7)
Denmark, Herlev	48	22.4	24.4 (3.6)	6.5	7.0 (1.9)	7.5	8.3 (2.1)	8.4	9.2 (2.2)
Denmark, Herning	49	21.2	22.5 (3.3)	6.5	7.1 (1.9)	12.6	13.0 (2.5)	2.2	2.3 (1.1)
Denmark, Viborg	37	24.6	26.7 (4.5)	8.6	9.6 (2.7)	14.6	15.7 (3.4)	1.3	1.4 (1.0)
Faroe Islands	31	81.5	83.1 (15.0)	10.5	11.1 (5.6)	31.5	31.8 (9.3)	39.4	40.2 (10.5)

AP&T Alimentary Pharmacology and Therapeutics

Inflammatory bowel diseases in Faroese-born Danish residents and their offspring: further evidence of the dominant role of environmental factors in IBD development

T. Hammer*,†, S. N. Lophaven*, K. R. Nielsen‡,§, M. von Euler-Chelpin*, P. Weihe†, P. Munkholm¶, J. Burisch¶ & E. Lynge*

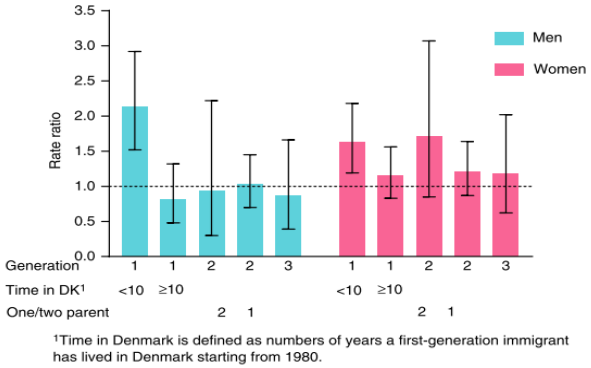


Figure 1 | Standardised incidence ratio (SIR) of ulcerative colitis in Faroese immigrants to Denmark. Notes: DK, Denmark; One/two parent, one or two parent(s) of Faroese origin.

Original Article

The Faroese IBD Study: Incidence of Inflammatory Bowel Diseases Across 54 Years of Population-based Data

Turid Hammer,[a,†] Kári R. Nielsen,[b,c,†] Pia Munkholm,[d] Johan Burisch,[d] Elsebeth Lynge[a]

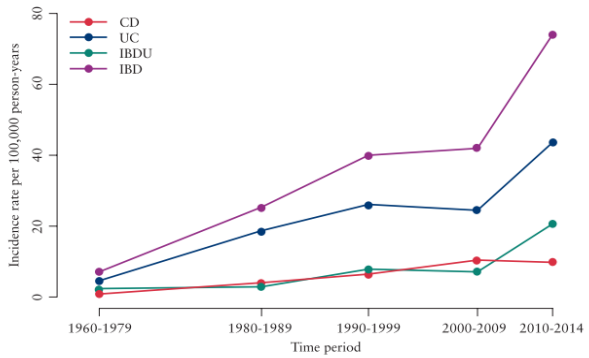
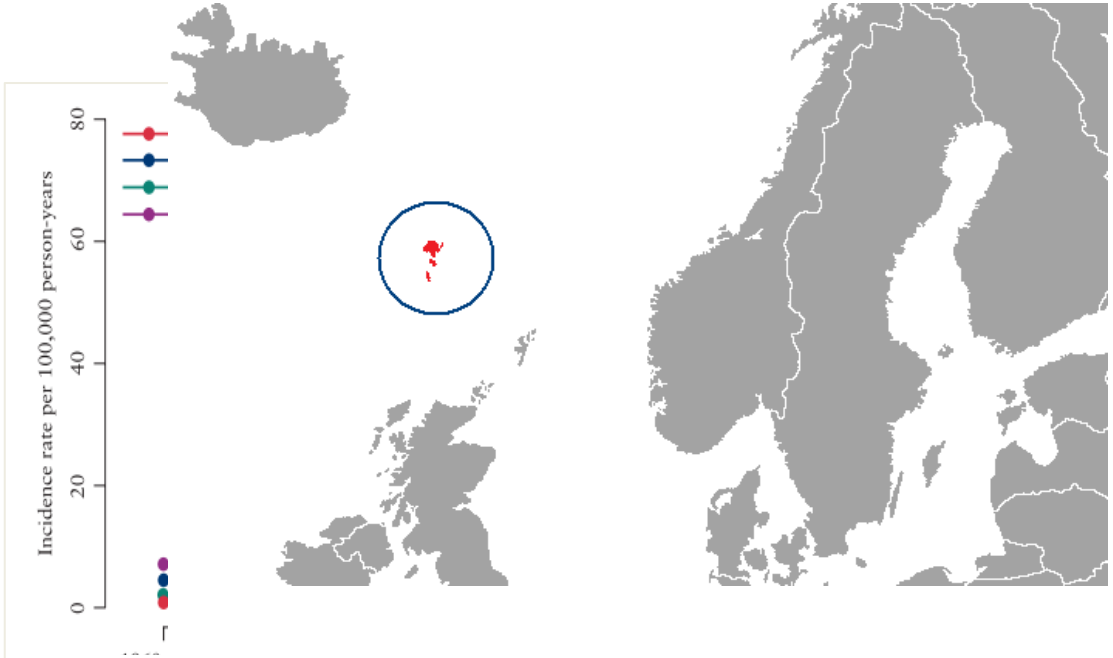
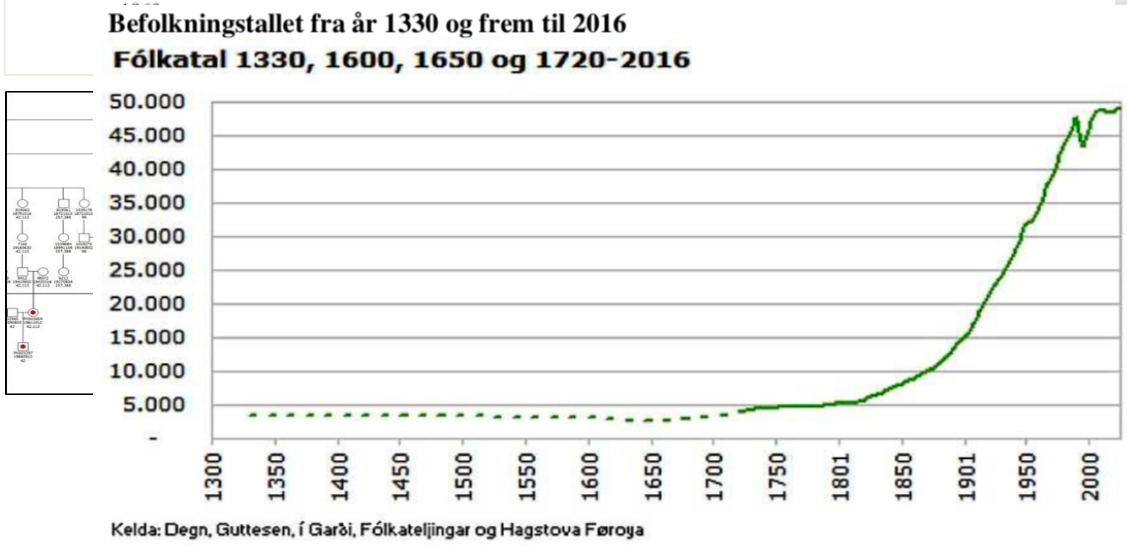


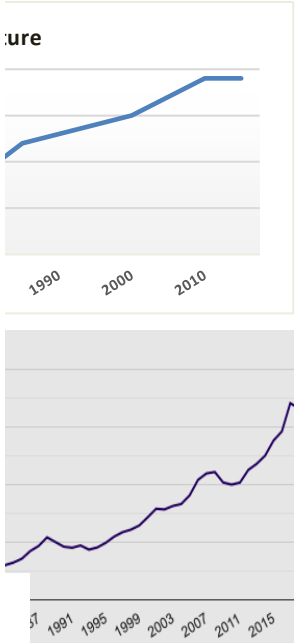
Figure 3. Inflammatory bowel disease [IBD] age-standardised European Standard Population [ESP] incidence rates per 100 000 person-years [py].

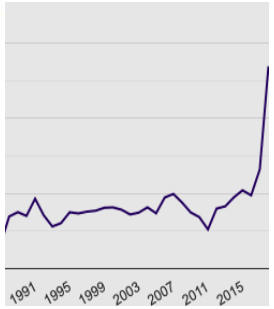
Hvussu er støðan í Føroyum?

- Lítið samfelag, sum í øldir hevur verið avbyrgt frá umheiminum.
  - *Einsháttað fólk*
  - *Søguliga hava føroyingar livað av einum sera skerdum tilfeingi*
- Ómetaliga stórar samfelagsligar og mentanarligar broytingar
  - *Farin frá 'skerdum flytiføri, skerdum matvøru-úrvali, sera avmarkaðum sambandi við umheimin og tungum fysiskum arbeiði' til tað øvuta.*
- Sjúkutíttleikin av IBD er tvífaldaður seinastu 20 árini.



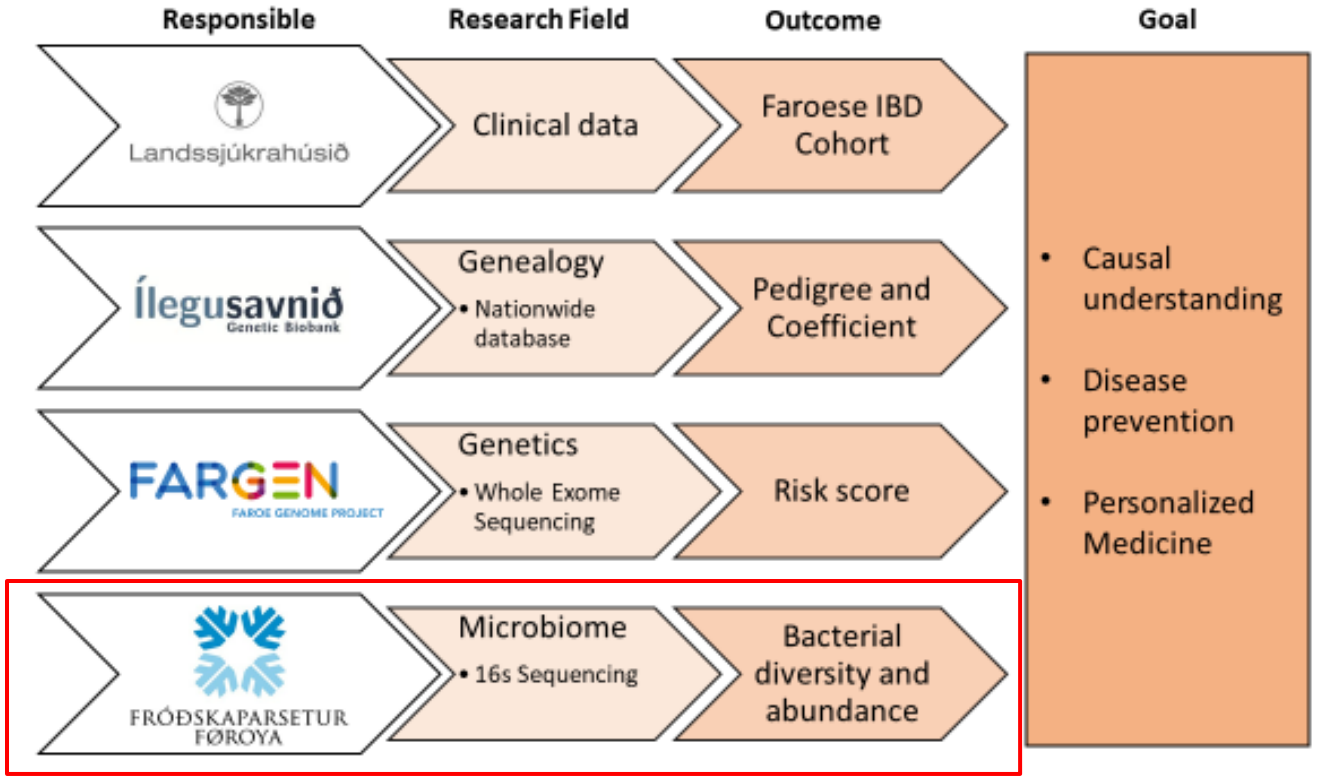






Granskingarsamstarvið

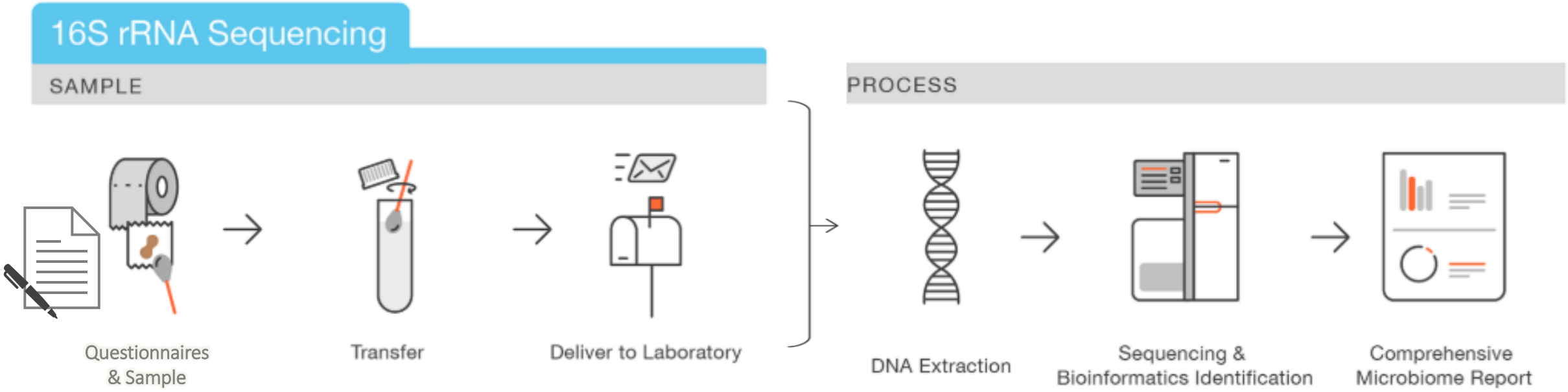
Why does the Faroe Islands have the highest incidence of IBD patients in the world?



novo nordisk fonden

granskingarráðið
RESEARCH COUNCIL FAROE ISLANDS

Verkætlanin: Hvat hava vit gjørt?



Úrslit

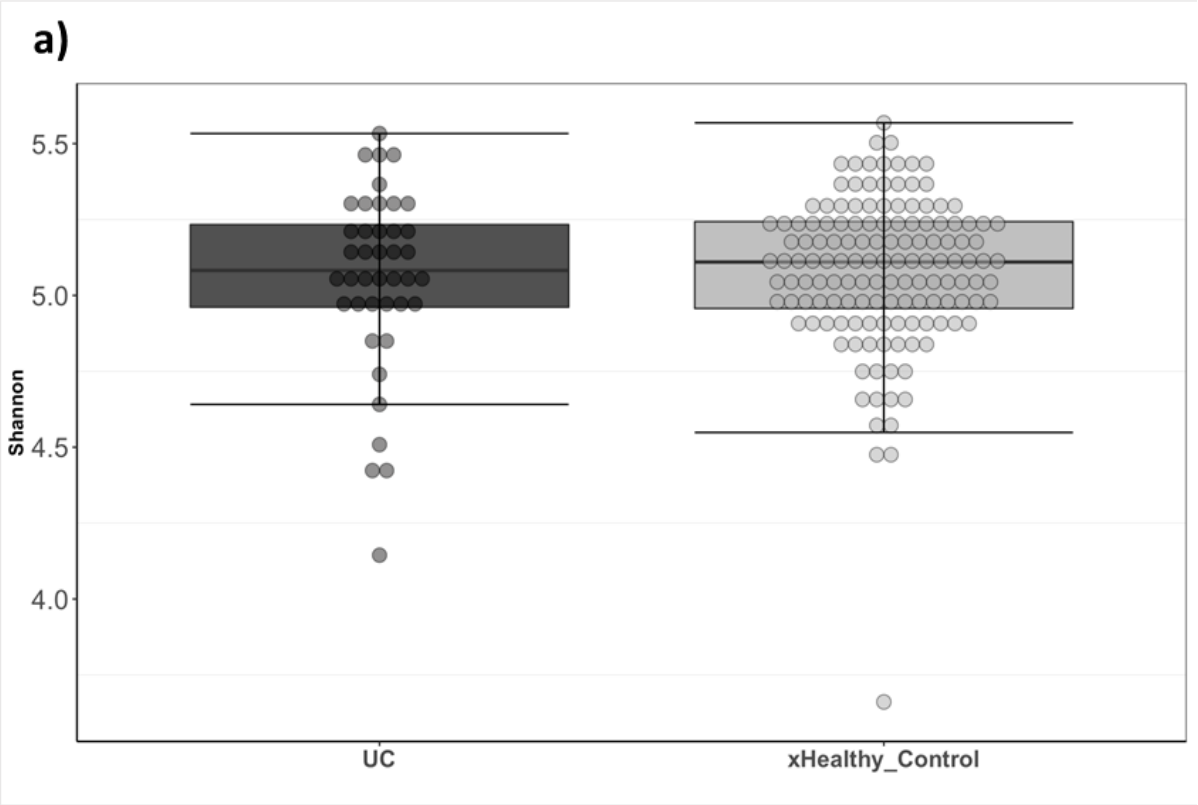
- Luttakarar og matvanar

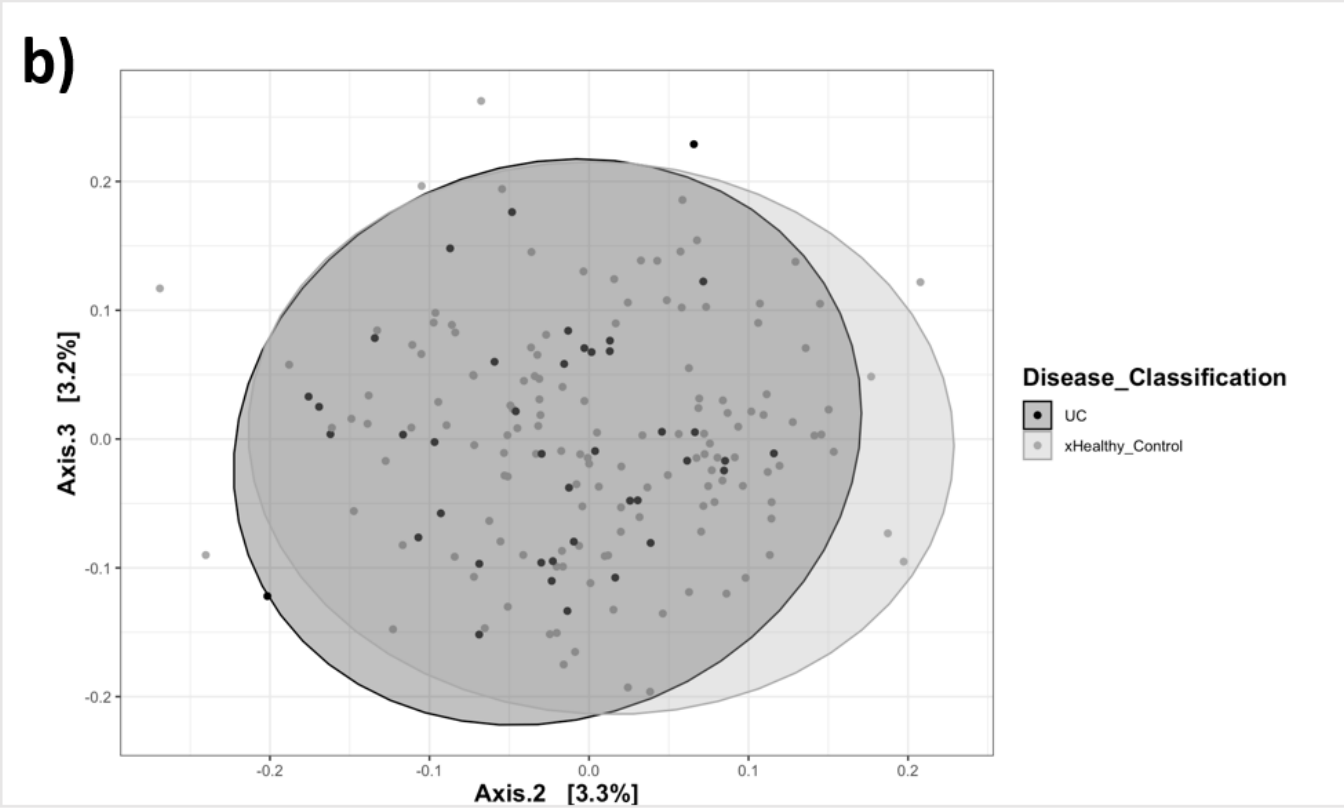
	UC	Healthy	Total
General			
Total	41 [22]	144 [78]	185 [100]
Sex			
Male	18 [44]	57 [39.6]	75 [41]
Female	23 [56]	87 [60.4]	110 [59.5]
Age			
Mean age at inclusion (SD; years)	48	55	53
Mean body mass index (SD; kg/m^2)	26.4	25.4	25.7
Smoking			
Current	7 [17.1]	23 [16]	30 [16.2]
Former	10 [24.4]	42 [29.2]	52 [28.1]
Never	24 [58.5]	79 [54.9]	103 [55.7]
Health			
Participant reported co-morbidities			
None	25 [61.0]	121 [84]	146 [78.9]
Asthma	0 [0]	0 [0]	0 [0]
Heart disease	4 [9.8]	0 [0]	4 [2.2]
Peripheral joint pain/arthritis	2 [4.9]	3 [2.1]	5 [2.7]
Axial joint pian/arthritis	3 [7.3]	0 [0]	3 [1.6]
Psoriasis	5 [12.2]	4 [2.8]	9 [4.9]
Diabetes	2 [4.9]	0 [0]	2 [1.1]
IBD related diseases in family members			
Asthma	4 [9.8]	20 [13.9]	24 [13]
Heart disease	16 [39.0]	38 [26.4]	54 [29.2]
Peripheral joint pain/arthritis	11 [26.8]	27 [18.8]	38 [20.5]
Axial joint pian/arthritis	3 [7.3]	5 [3.5]	8 [4.3]
Psoriasis	10 [24.4]	22 [15.3]	32 [17.3]
Diabetes	11 [26,8[	34 [23.6]	45 [24.3]
Mean age at diagnosis (SD; years)	27	-	-
Disease duration (IQR; years)	17	-	-
UC extent		-	-
(Rectum) E1, proctitis	22 [53.7]		
(Distal to splenic flexure) E2, left-sided	9 [22]		
(Proximal to splenic flexure) E3, extensive	10 [24.4]		
Disease activity		-	-
Active	17 [41.5]		
Remission	24 [58.5]		
Previous abdominal surgery	0	-	-
Medical treatment		-	-
None	3 [7.3]		
5-ASA	38 [90.2]		
Immunosuppressants	22 [53.7]		
Biological	9 [22]		
Combination therapy	22 [53.7]		

Questionnaires	HC	UC	TOTAL
Food groups	Median	Median	Median
Water	4	4	4
Tea or coffee (without sugar)	4	4	4
Dairy products	3	3	3
Sweets	4	3	3
Starch	3	3	3
Fruits and berries	3	3	3
Whole grains	3	3	3
Other vegetables	3	3	3
Sausages and meat products	3	3	3
Beef, pork, or lamb	2	2	2
Eggs	2	2	2
Onions, spring onions or leek	2	2	2
Fish	2	2	2
Leafy greens	2	1	2
Homemade Faroese ryebread	1	1	1
Chicken or turkey	1	1	1
Yoghurts or active cultures	1	1	1
Soda or juice	0	0	0
Alcohol	1	0	1
Fruit juice	0	0	0
Fermented lamb	0	0	0
Coffee or tea (with sugar)	0	0	0
Soda or juice (sugar free)	0	0	0
Beans	0	0	0
Dried fish	0	0	0
Shellfish	0	0	0
Pilot whale blubber	0	0	0
Pilot whale meat	0	0	0
Fermented fish	0	0	0
Wild birds	0	0	0

Úrslit

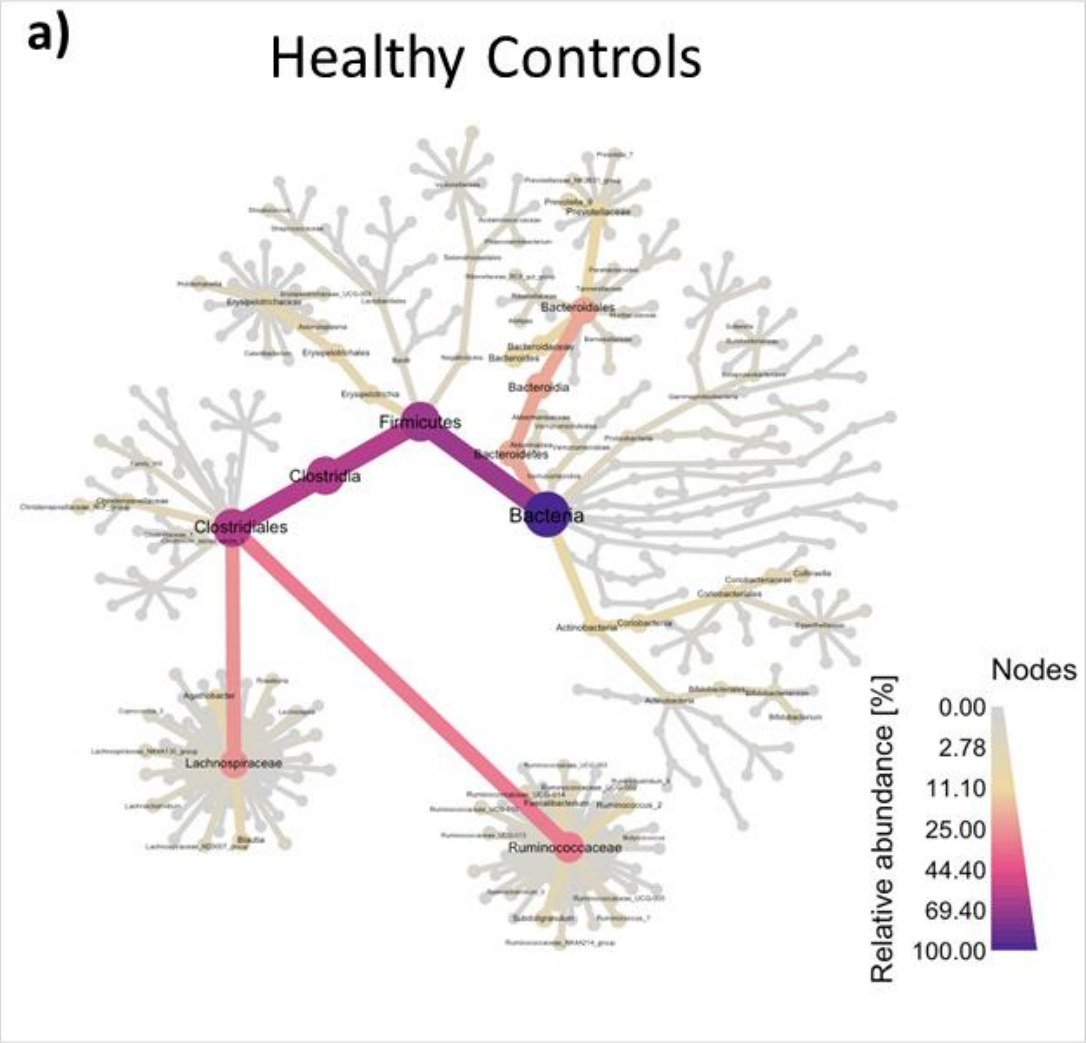
- Tarmbakteriu-profilurin

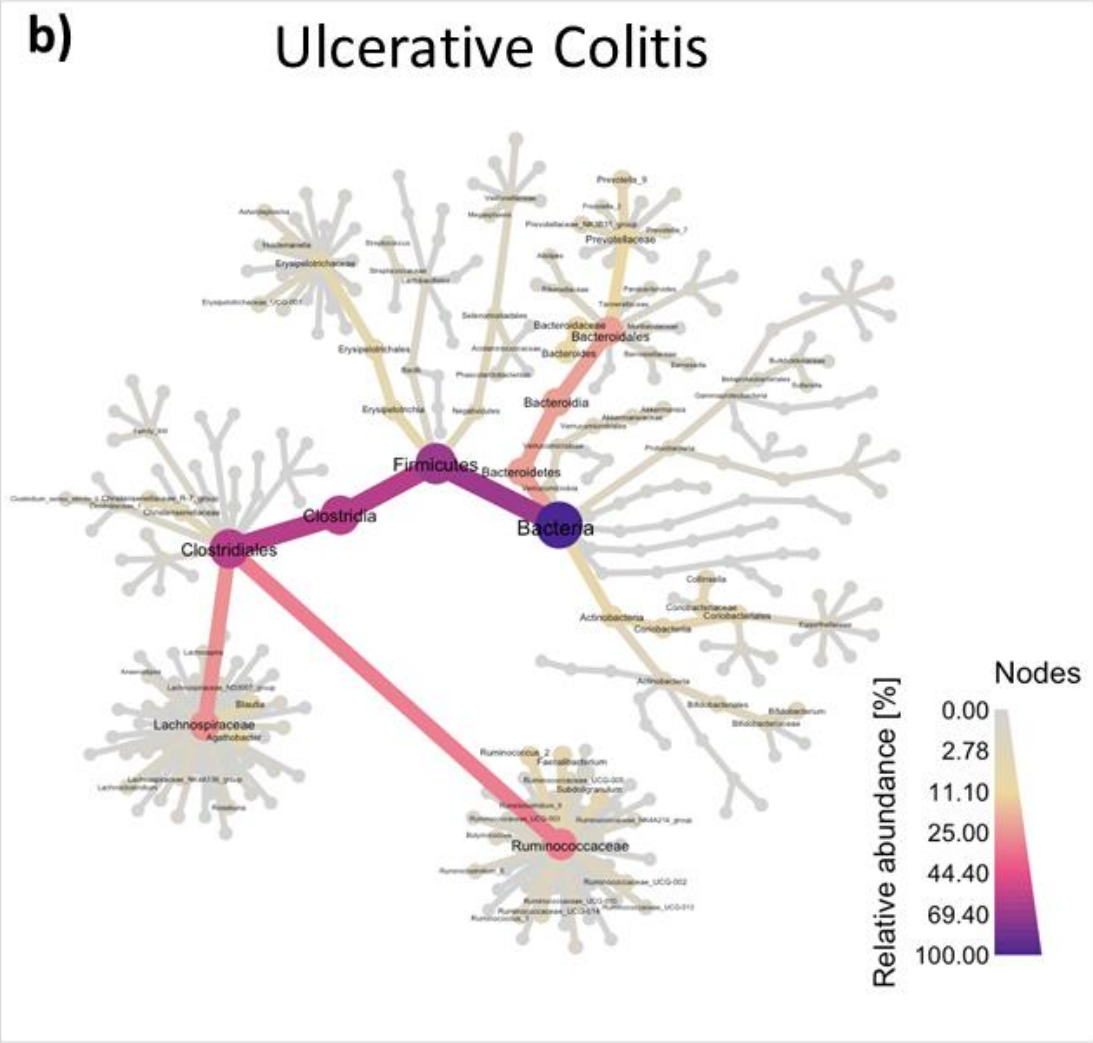




Úrslit

- Tarmbakteriu-profilurin





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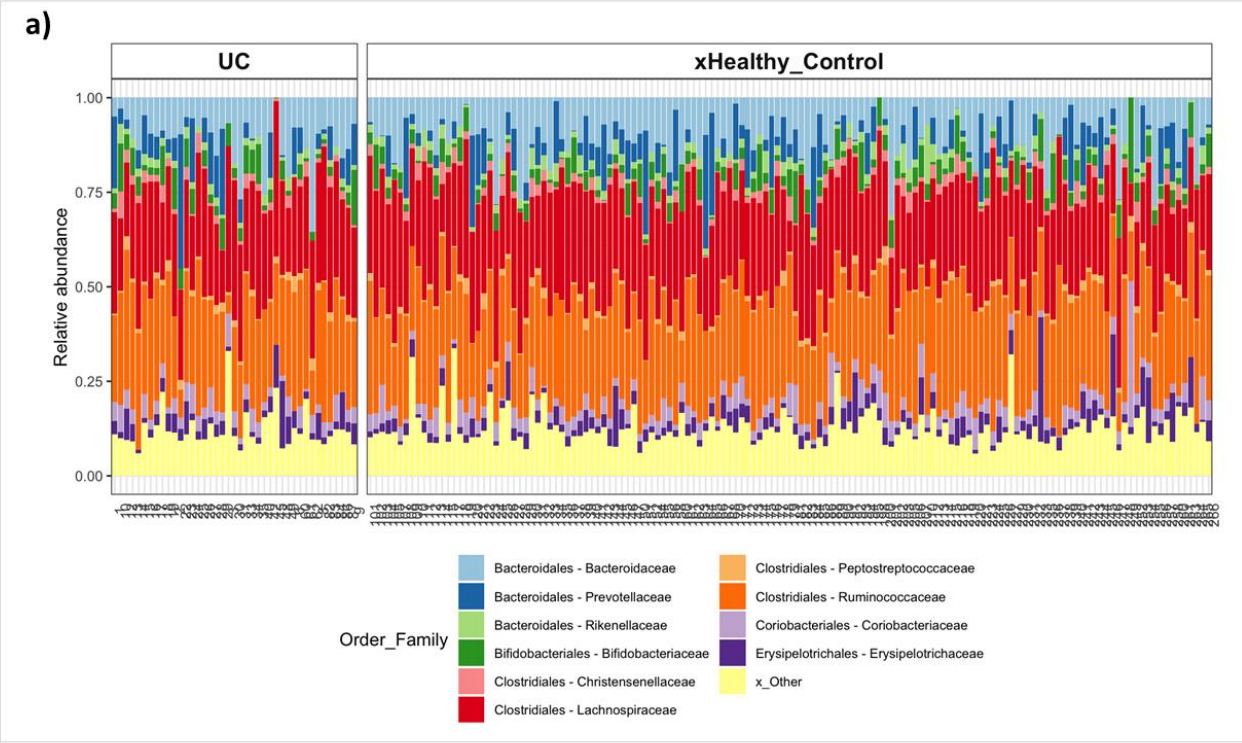
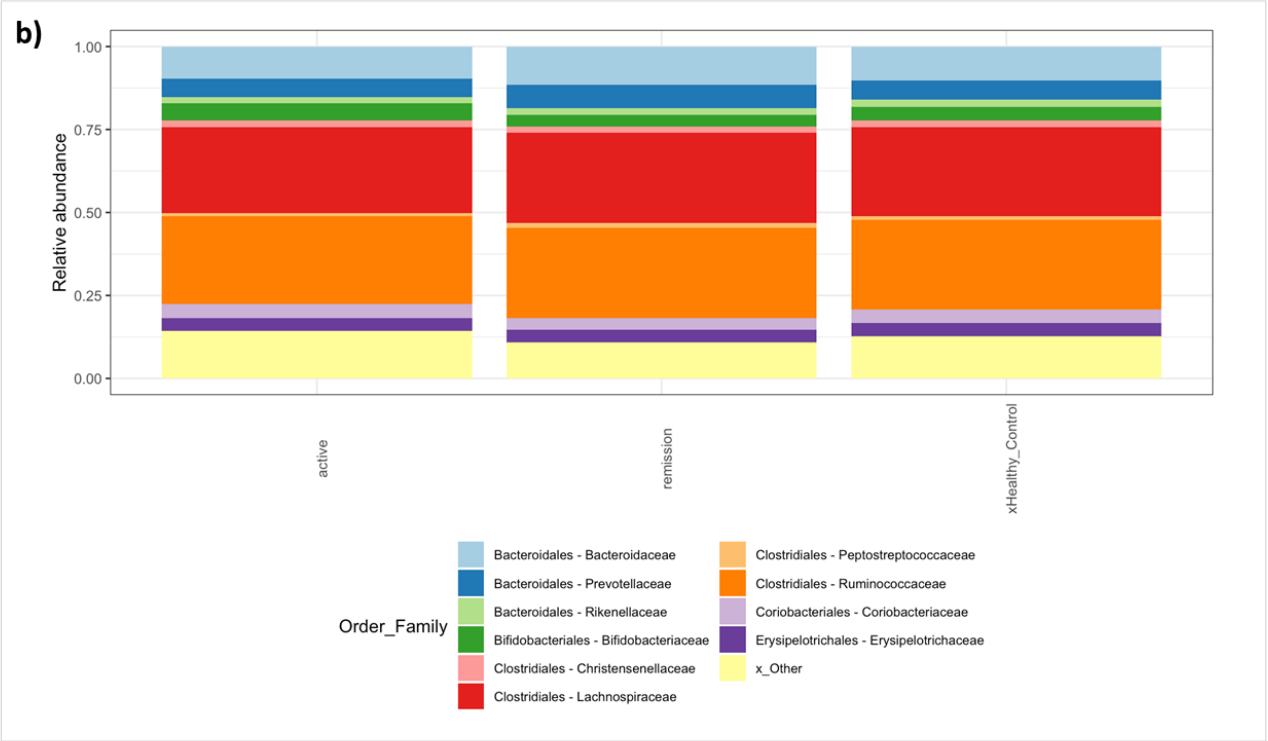
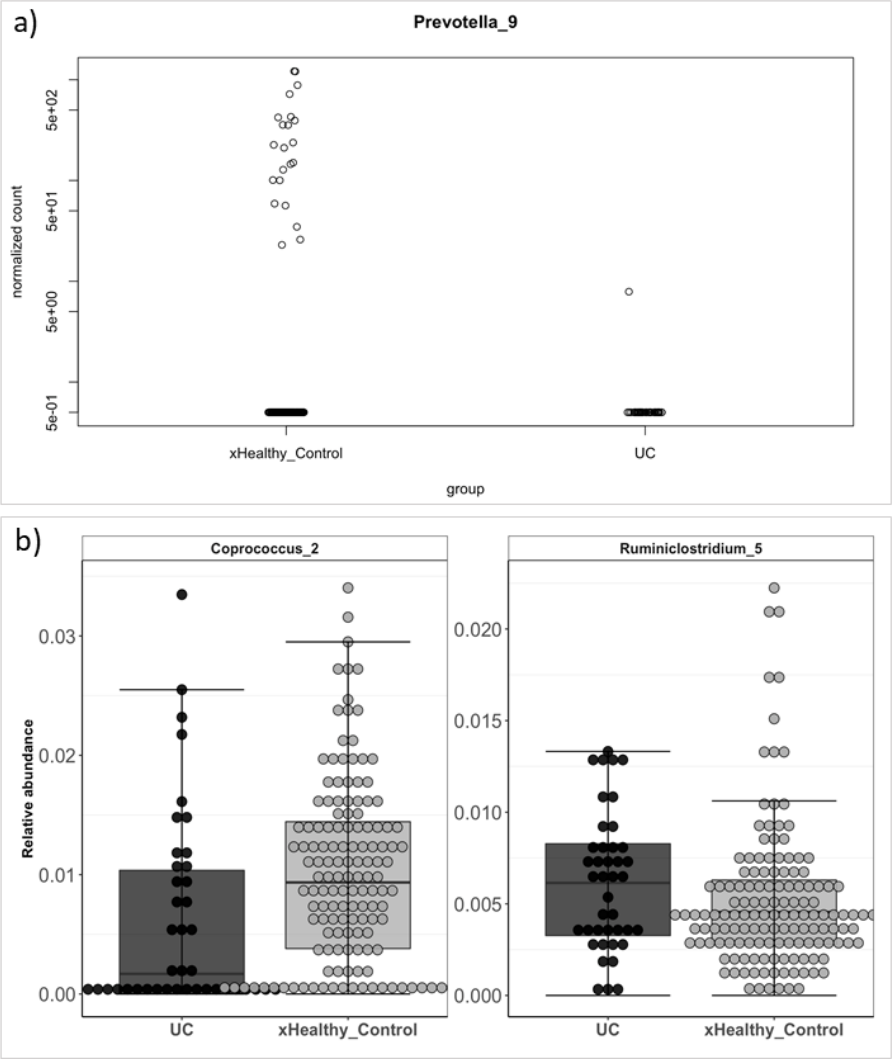
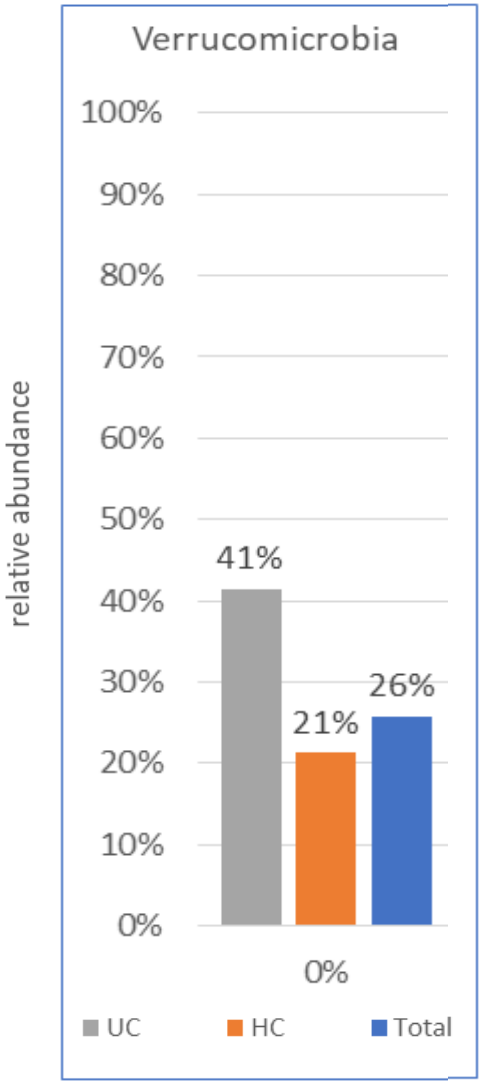




Úrslit

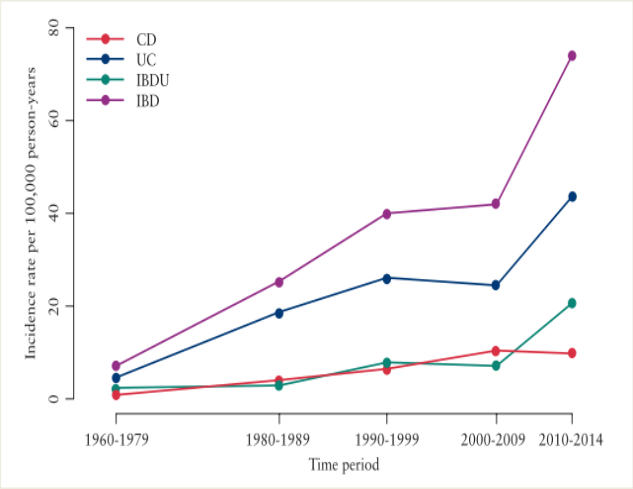
- Er munur á sjúkum og frískum?

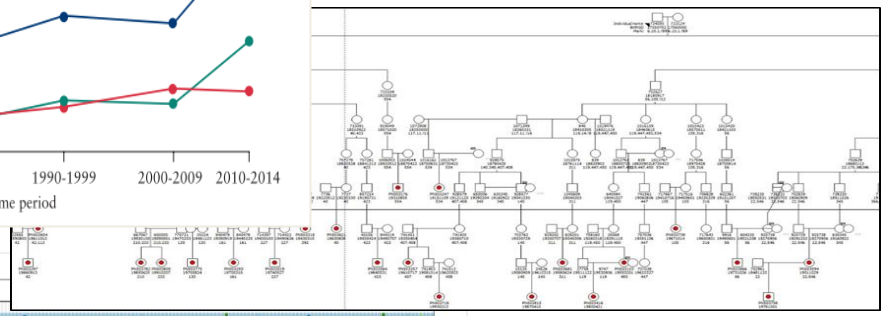


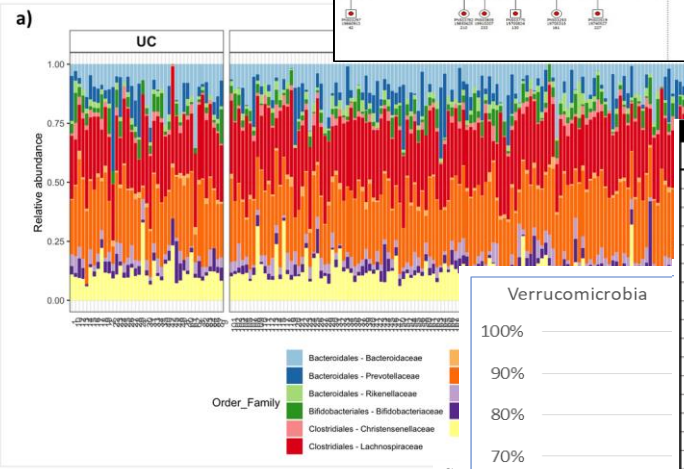


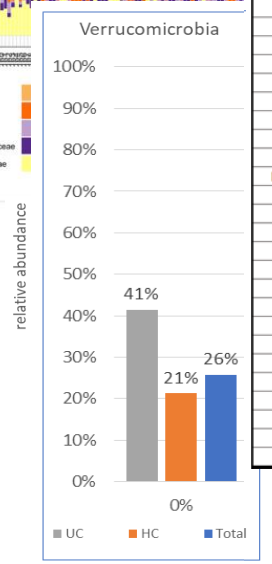
Hvat vita vit nú?

- Heimsins hægsti títtleiki sæst í føroyum, serliga nógv í ávísum familjum
- Fyrstu ferð at tarm-mikrobiom hjá føroyingum verður greinað
  - Gjørt eina mannagongd, sum gevur úrslit á høgum støði
- Vit síggja ongan mun á mikrobiota hjá frískum føroyingum samanborið við IBD sjúklingar
- Tá vit zooma inn, hava vit funnið onkrar statistiskt signifikantar munir
- Lívsstílur og matvanar líkjast vesturheiminum









Questionnaires	HC	UC	TOTAL
Food groups	Median	Mediar	Median
Water	4	4	4
Tea or coffee (without sugar)	4	4	4
Dairy products	3	3	3
Sweets	4	3	3
Starch	3	3	3
Fruits and berries	3	3	3
Whole grains	3	3	3
Other vegetables	3	3	3
Sausages and meat products	3	3	3
Beef, pork, or lamb	2	2	2
Eggs	2	2	2
Onions, spring onions or leek	2	2	2
Fish	2	2	2
Leafy greens	2	1	2
Homemade Faroese ryebread	1	1	1
Chicken or turkey	1	1	1
Yoghurts or active cultures	1	1	1
Soda or juice	0	0	0
Alcohol	1	0	1
Fruit juice	0	0	0
Fermented lamb	0	0	0
Coffee or tea (with sugar)	0	0	0
Soda or juice (sugar free)	0	0	0
Beans	0	0	0
Dried fish	0	0	0
Shellfish	0	0	0
Pilot whale blubber	0	0	0
Pilot whale meat	0	0	0
Fermented fish	0	0	0
Wild birds	0	0	0

Hvat gera vit so?

- Hypotesur, sum kunnu kannast nærri
  - Føroyingar eru serliga viðkvæmir fyri broytingum
  - Føroyingar eru genetiskt útsettir fyri at útvikla IBD (FarGen)
    - IBD sæst týðiliga aftur í familjum
- Hyggja eftir autoinflamatoriskum sjúkunum í eini heild og viðgera tær saman:
  - Gikt
  - Psoreasis
  - IBD/IBS
- Ein langtíðarverkætlan er prøvað av og klár at verða skotin í gongd.

Tíðarlinja fyri innsavnan av skarnroyndum og spurnarbløðum.

Hetta hevði ikki borið til uttan:

- Granskingarráðið og Novo Nordisk Fonden
- IBD INCEPTION Project samstarvið

FRÓÐSKAPARSETUR FØROYA

SJÚKRAHÚS VERKIÐ

Ílegusavnið Genetic Biobank

FARGEN FAROE GENOME PROJECT

novo nordisk fonden

granskingarráðið RESEARCH COUNCIL FAROE ISLANDS

Vísinda vøka

Bakteriuflokkar

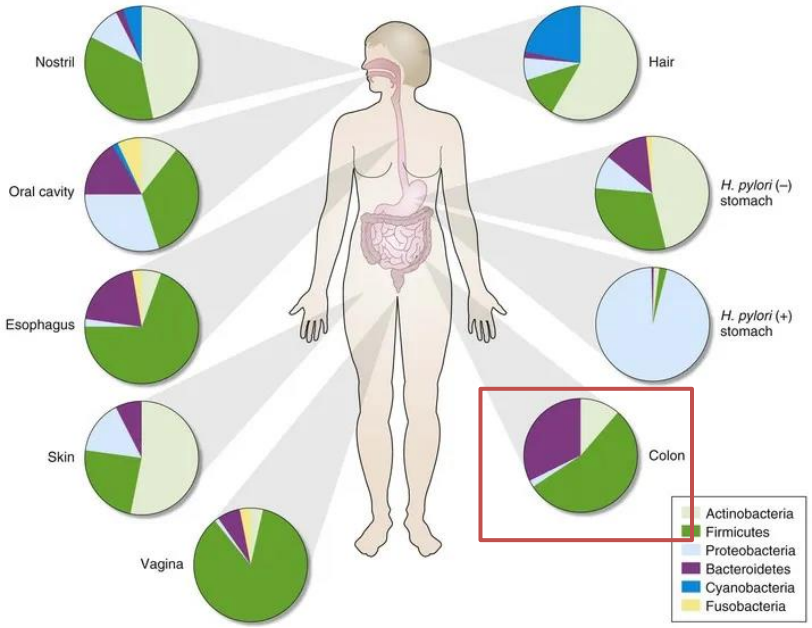
- **Firmicutes**
  (SCFAs producing, anti-inflammatory)

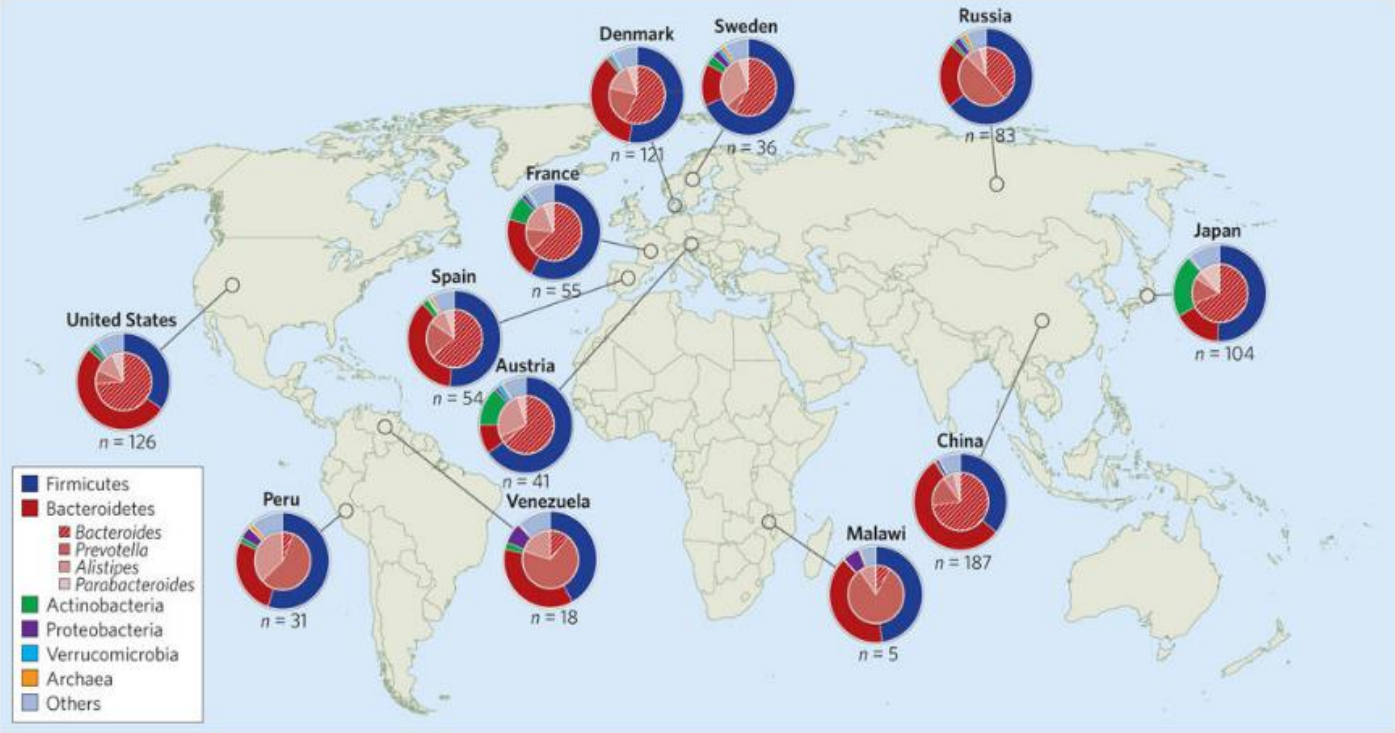
- **Bacteroidetes**
  (SCFAs and PSA producing, anti-inflammatory)

- **Actinobacteria**
  (Sulfate reducing bacteria)

- **Proteobacteria**
  (Sulfate reducing bacteria)

- **Verrucomicrobia**
  (SCFAs producing, mucus degradation)

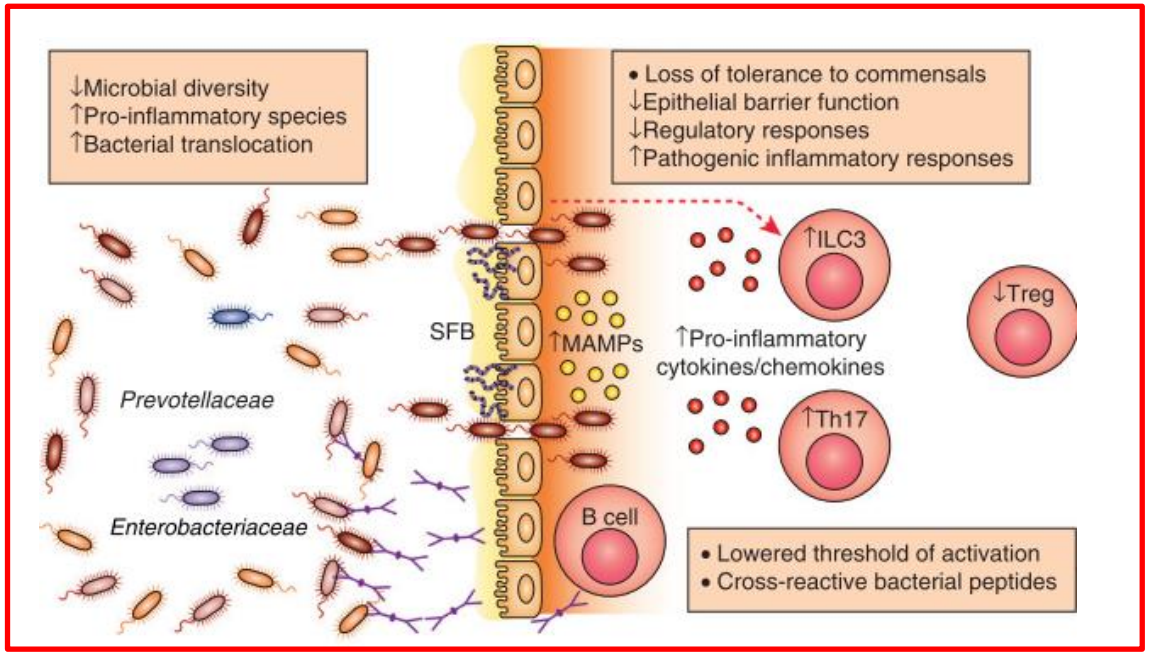


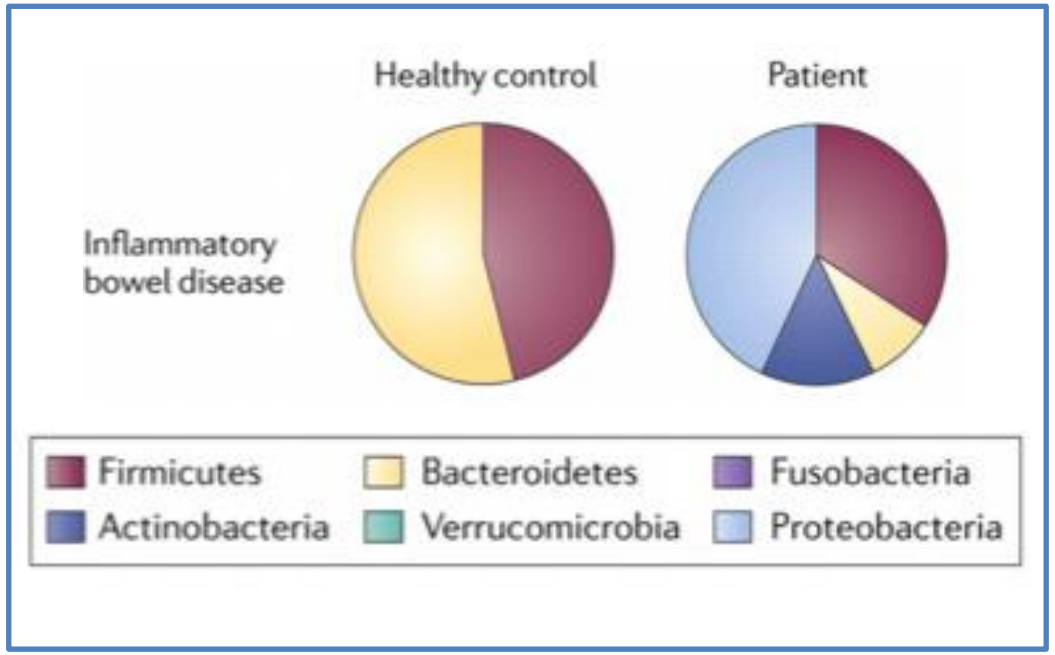


Hvør kom fyrst? Hønan ella eggið?

Etiology of IBD is unknown, however, it is hypothesized to be a result of dysregulated mucosal immune response to commensal gut microbiota in genetically susceptible individuals

Year	Population	MZ Twins (No. Concordant: No. Discordant)	Pair Concordance	DZ Twins (No. Concordant: No. Discordant)	Pair Concordance
1988–2010	All Combined Non-overlapping cohorts	CD 34 : 78 UC 22 : 121	30.3% 15.4%	CD 7 : 189 UC 8 : 198	3.6% 3.9%





Oluf Borbye Pedersen

Hvat seta fólk í samband við bakteriur?
- farligt
- Skitið
- - ólekkurt

- Hetta passar í nøkrum førum...

MEN:
Um vit eru bangin fyri bakteriurm so búgva vit á skeivari planet...
Bakteriernes planet

Bakteriur eru allastani
Tilsamans viga bakteriurnar meir enn allar plantur og øll djór í heiminum.

Patogenar bakteriur = farligar
Kommensellar bakteriur = vigtigar fyri okkara yvirlivilsi

Fleiri bakteriur í tínum munni enn tað eru menniskjur í heiminum.

Menniskja, saman við baktierunum, er ein superorganisma.
50 billiónir av bakterium liva í okkara tarmum
Tilsamans viga tær ímillum 1-2 kg.
Mikrobiota: samling av bakterium
Mikrobiom: DNAið hja bakteriusamlingini

Eingin hevur sama tarm-mikrobiota

Hvat gera bakteriurnar?
- Tær eru umráandi fyri okkara stoffskifti
- Framleiga orku, vitaminir og orku til okkum (og eisini til tær)
    - B og K vitaminir og eisini gallsýru
    - Regulera framleiðsluna av tarmhormonum
    - Regulera framleiðsluna av neurotransmittarum, sum eru stoff ið ávirka heila funktiónina (t.d. Seratonin)
    - Samstarva við imunverjuna (og “lærir imunverjuna upp”)

Hvat ávirkar tarmmikrobiota?
- Føðingin (og viðurskiftini hjá mammuni undir graviditetinum)
- Ílegurnar
- Umhvørvi
- Lívsstílur (rørsla)
- Matur (fylg almennu kostráðunum)
    - Fibur og kjarnur = gott
    - Frukt og grøntsakir = gott
    - Reytt kjøtt = ikki gott
    - Søtmiddel = ikki gott
    - Gluten = ikki gott
    - Konsistensmiddel = IKKI GOTT (frá dressing og mayones)

Hypotesa:
- Antibiotikaforbrúkið í vesturheiminum hevur gjørt at vit fáa eit fátakari mikrobiom
    - 18 kurar 20 tey fyrstu árini

Sunt tarm mikrobiota kann fyribyrjga útviklingina av kroniskum sjúkum

Gransking av tarmbakterium er eitt nýtt fyribrygdi, tí at tær flestu tarmbakteriurnar eru anaerobar (tvs tær yvirliva bara í umhvørvi uttan ilt). Seinastu 12 árini er granskingin av tarmmikrobioma vorið gjørligt við brúka av nýggjum laboratorie teknikkum, sekvensering og bioinformatik
1100 nýggjar bakteriuartir identifiserað
10 milliónir tarmbakteriugen identifiserað

10 fer so nógvar virus-artir í tarminum (ikki identifisera)
Soppur
Arkea
Etc