



UiT The Arctic University of Norway

# *Inflammatory* BIOMARKERS

WITH EVERYTHING!

Rafael Nozal Cañadas

HDL Seminar 2022.04.21



# What is a biomarker?

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**What are Biomarkers?**

Kyle Strimbu and Jorge A. Tavel, M.D.

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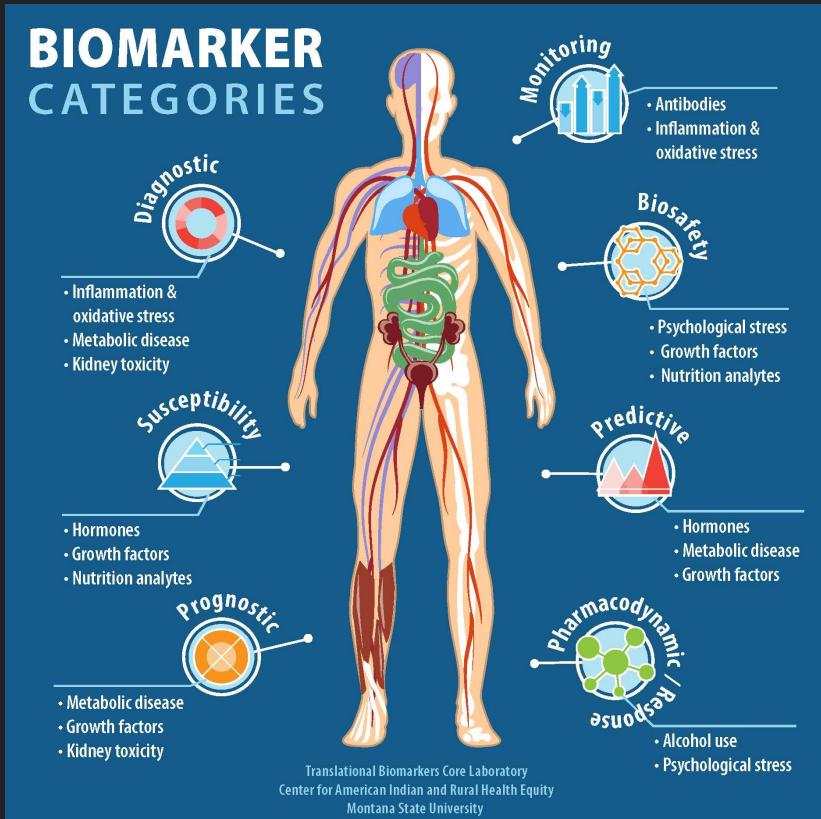
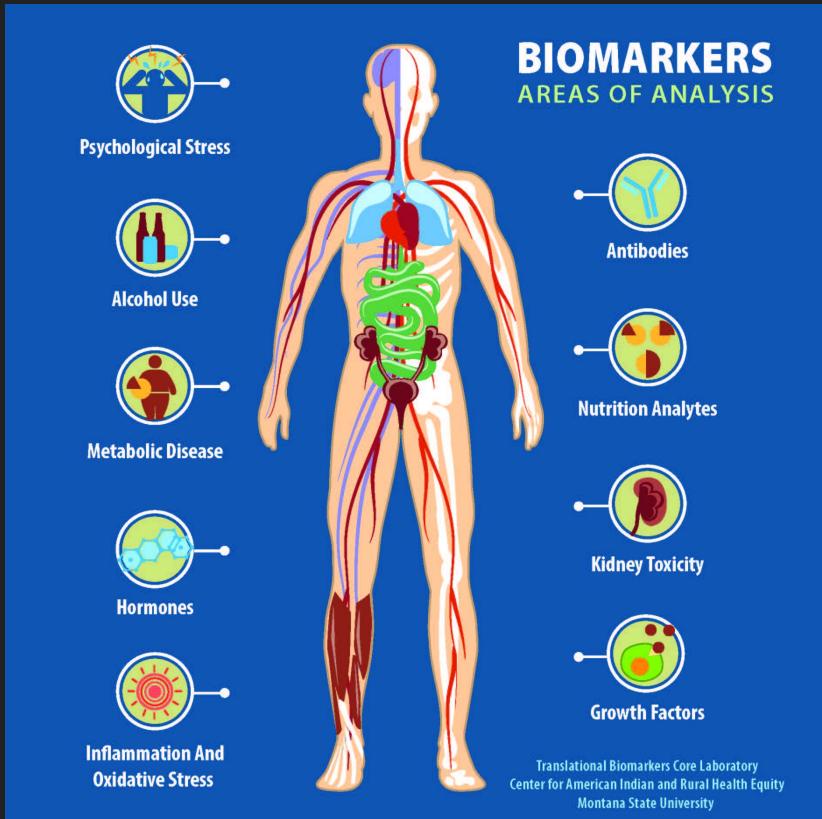
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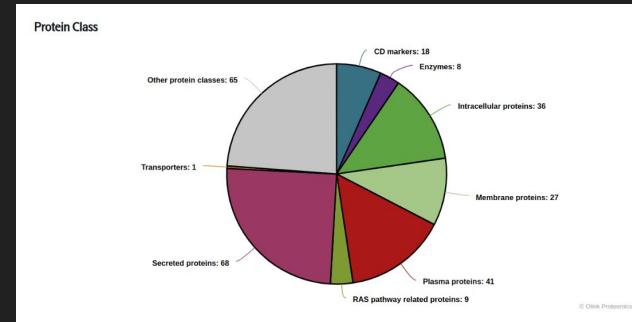
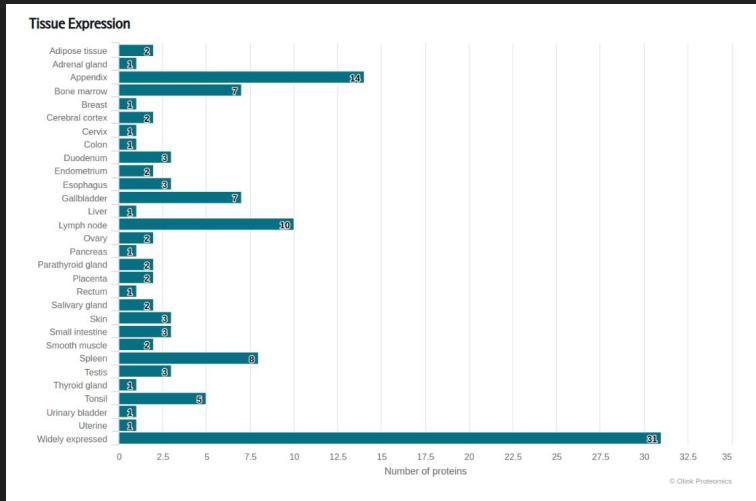
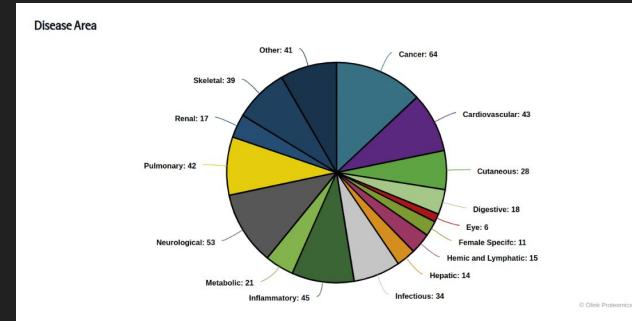
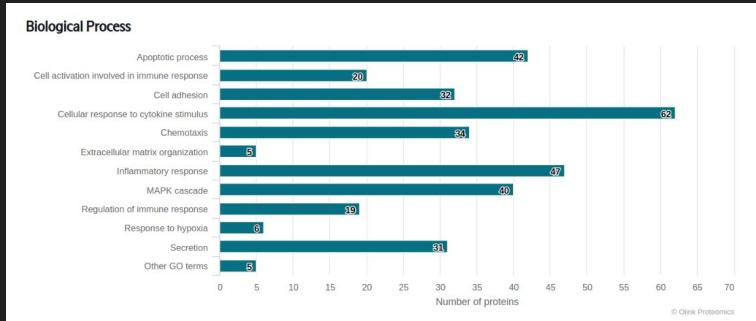
Kyle Strimbu and Jorge A. Tavel, M.D.



# What type of biomarkers?



# What biomarkers do we have?



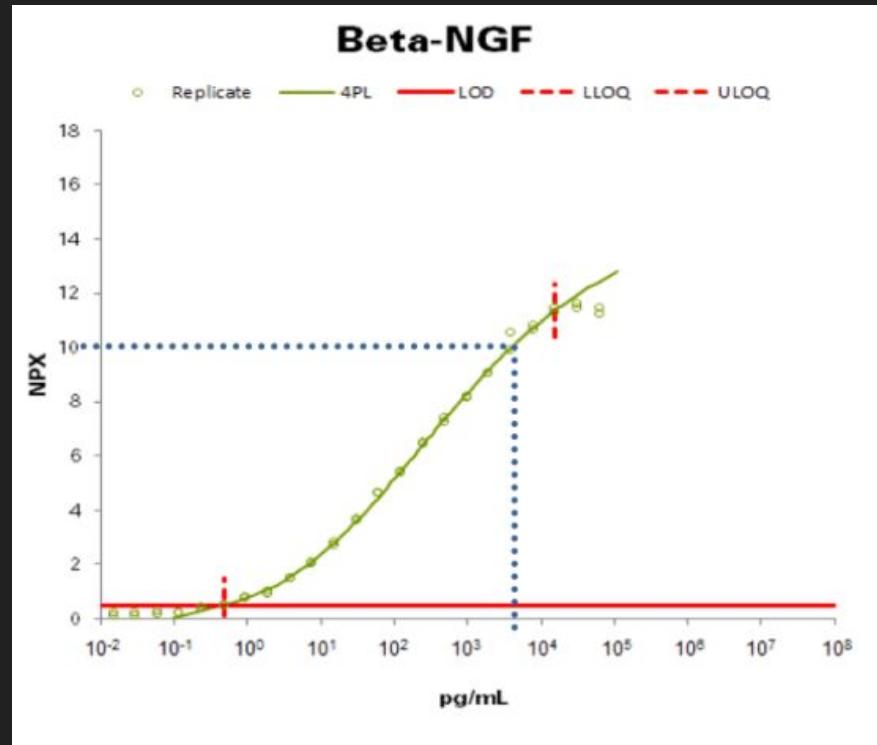
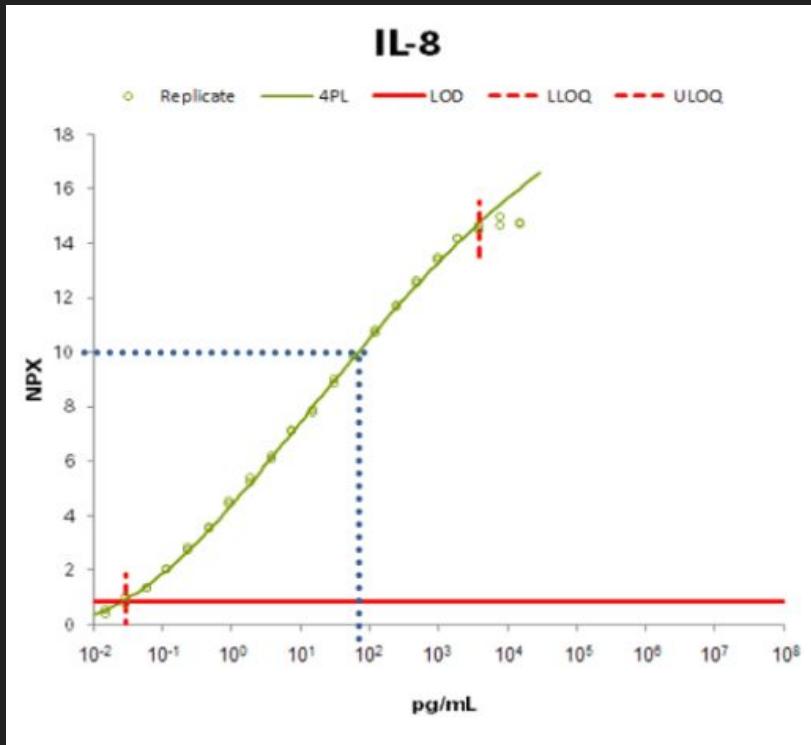
*Olink® Target 96 Inflammation*

# What biomarkers do we have?

Adenosine Deaminase	Fibroblast growth factor 19	Interleukin-4	Tumor necrosis factor
Artemin	Fibroblast growth factor 21	Interleukin-5	Urokinase-type plasminogen activator
Axin-1	Fibroblast growth factor 23	Interleukin-6	Vascular endothelial growth factor A
Brain-derived neurotrophic factor	Fibroblast growth factor 5	Interleukin-7	
Beta-nerve growth factor	Fms-related tyrosine kinase 3 ligand	Interleukin-8	
Caspase-8	Glial cell line-derived neurotrophic factor	Leukemia inhibitory factor	
Eotaxin	Hepatocyte growth factor	Leukemia inhibitory factor receptor	
C-C motif chemokine 19	Interferon gamma	Monocyte chemotactic protein 1	
C-C motif chemokine 20	Interleukin-10	Monocyte chemotactic protein 2	
C-C motif chemokine 23	Interleukin-10 receptor subunit alpha	Monocyte chemotactic protein 3	
C-C motif chemokine 25	Interleukin-10 receptor subunit beta	Monocyte chemotactic protein 4	
C-C motif chemokine 28	Interleukin-12 subunit beta	Matrix metalloproteinase-1	
C-C motif chemokine 3	Interleukin-13	Matrix metalloproteinase-10	
C-C motif chemokine 4	Interleukin-15 receptor subunit alpha	Neurturin	
Natural killer cell receptor 2B4	Interleukin-17A	Neurotrophin-3	
CD40L receptor	Interleukin-17C	Osteoprotegerin Oncostatin-M	
T-cell surface glycoprotein CD5	Interleukin-18	Programmed cell death 1 ligand 1	
T cell surface glycoprotein CD6 isoform	Interleukin-18 receptor 1	Stem cell factor	
CUB domain-containing protein 1	Interleukin-1 alpha	SIR2-like protein 2	
Macrophage colony-stimulating factor 1	Interleukin-2	Signaling lymphocytic activation molecule	
Cystatin D	Interleukin-20	Sulfotransferase 1A1	
Fractalkine	Interleukin-20 receptor subunit alpha	STAM-binding protein	
C-X-C motif chemokine 1	Interleukin-22 receptor subunit alpha-1	Transforming growth factor alpha	
C-X-C motif chemokine 10	Interleukin-24	Latency-associated peptide transforming growth factor beta-1	
C-X-C motif chemokine 11	Interleukin-2 receptor subunit beta	Tumor necrosis factor	
C-X-C motif chemokine 5	Interleukin-33	TNF-beta	
C-X-C motif chemokine 6		Tumor necrosis factor receptor superfamily member 9	
C-X-C motif chemokine 9		Tumor necrosis factor ligand superfamily member 14	
Delta and Notch-like epidermal growth factor-related receptor		TNF-related apoptosis-inducing ligand	
Eukaryotic translation initiation factor 4E-binding protein 1		TNF-related activation-induced cytokine	
Protein S100-A12		Thymic stromal lymphopoietin	

# How is this quantified?

NPX, (Normalized Protein eXpression), is Olink's arbitrary unit which is in Log2 scale



# Comparing biomarkers against which variables?

- Compare with your friends biomarkers (network analysis)
- Anthropometric variables (BMI, hip perimeter, heart rate...)
- Blood serum (Iron, calcium, triglycerides, estradiol, testosterone...)
- Fatty Acids
- Recreational drugs use (alcohol, tobacco...)
- Sport frequency
- Diet (how much chocolate, white fish, vegetable, sugary drinks...)
- Diseases (astma, traumatic accidents, dermatitis...)
- Medication (antiinflamatories, painkillers, antibiotics, hormonal...)

All of these, also with respect time (Fit Futures 2, Fit Futures 3...)

Friends

Diet

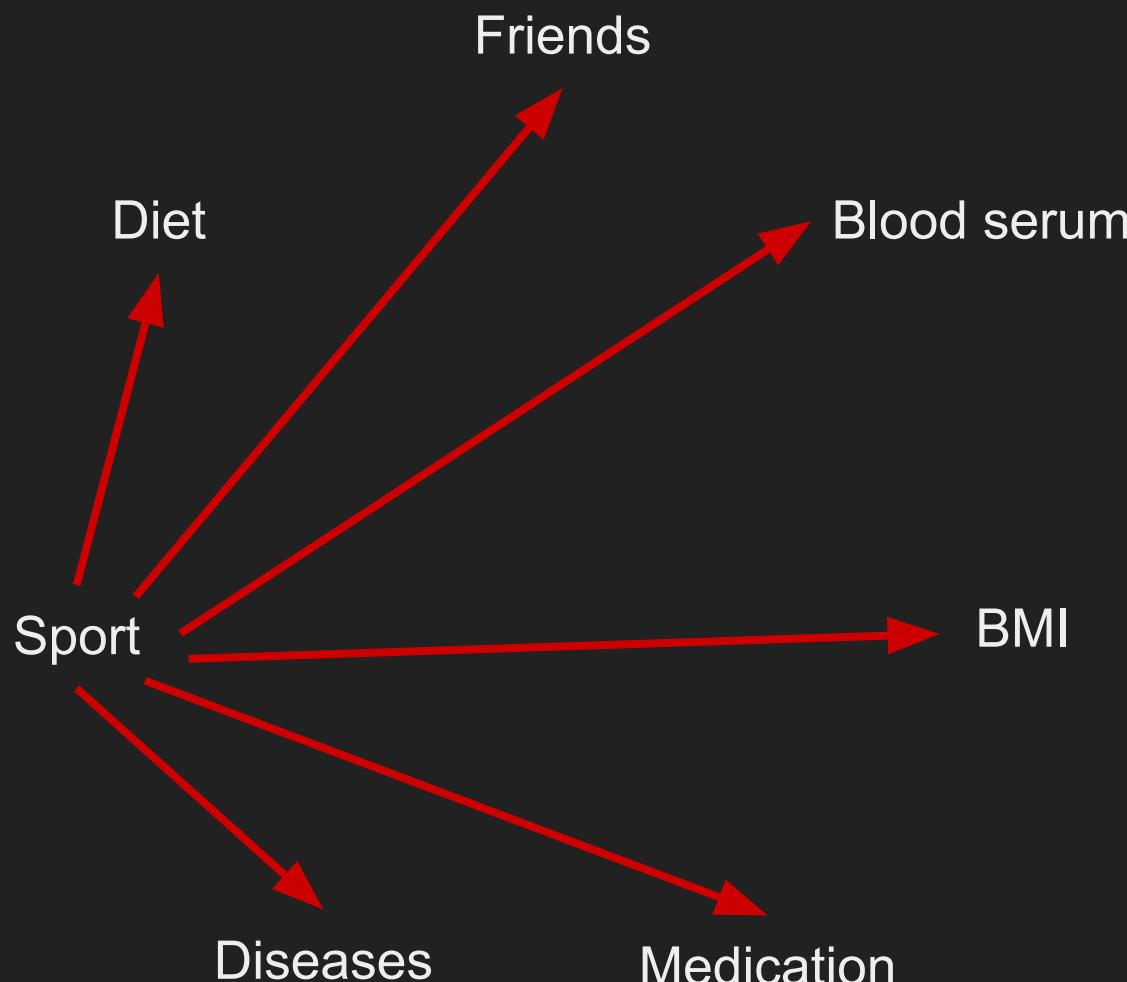
Blood serum

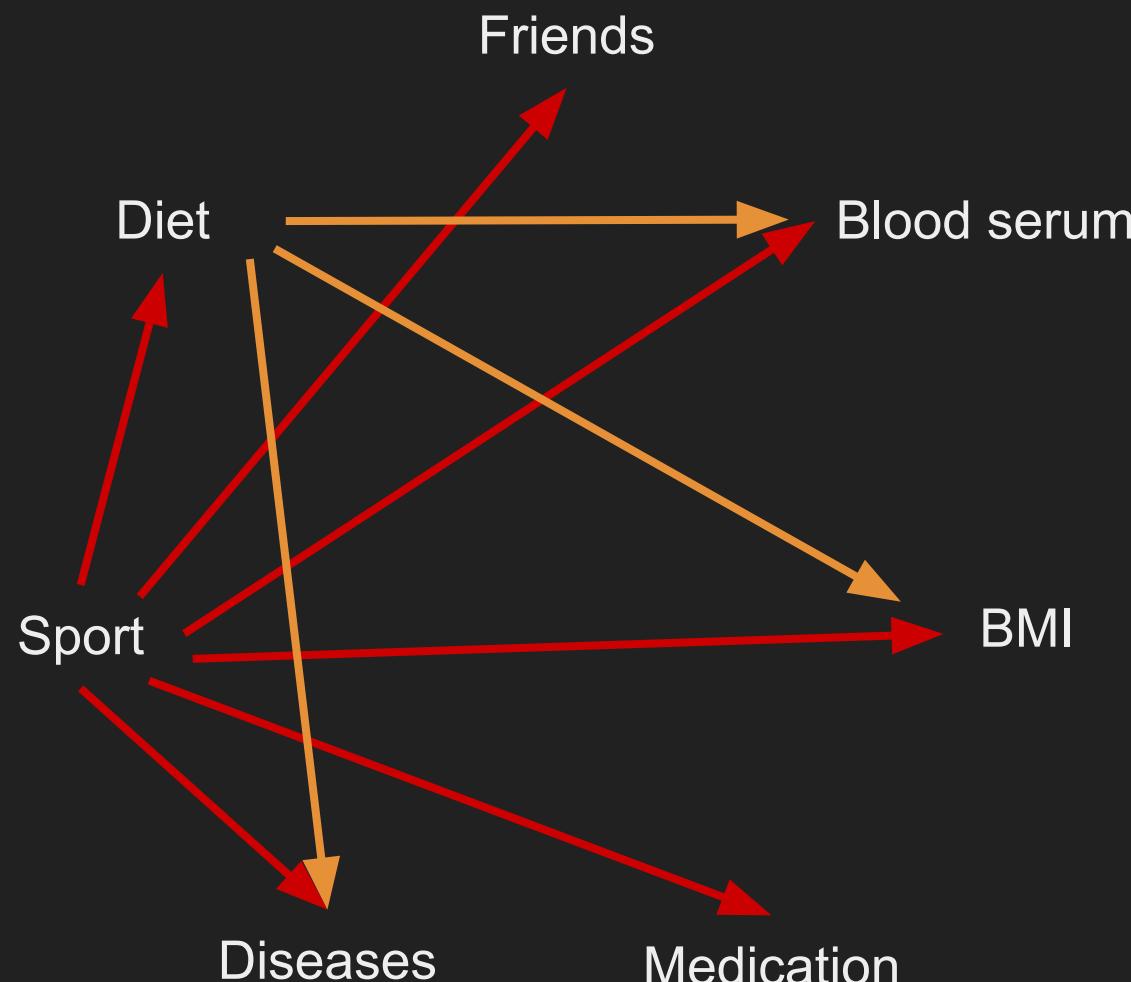
Sport

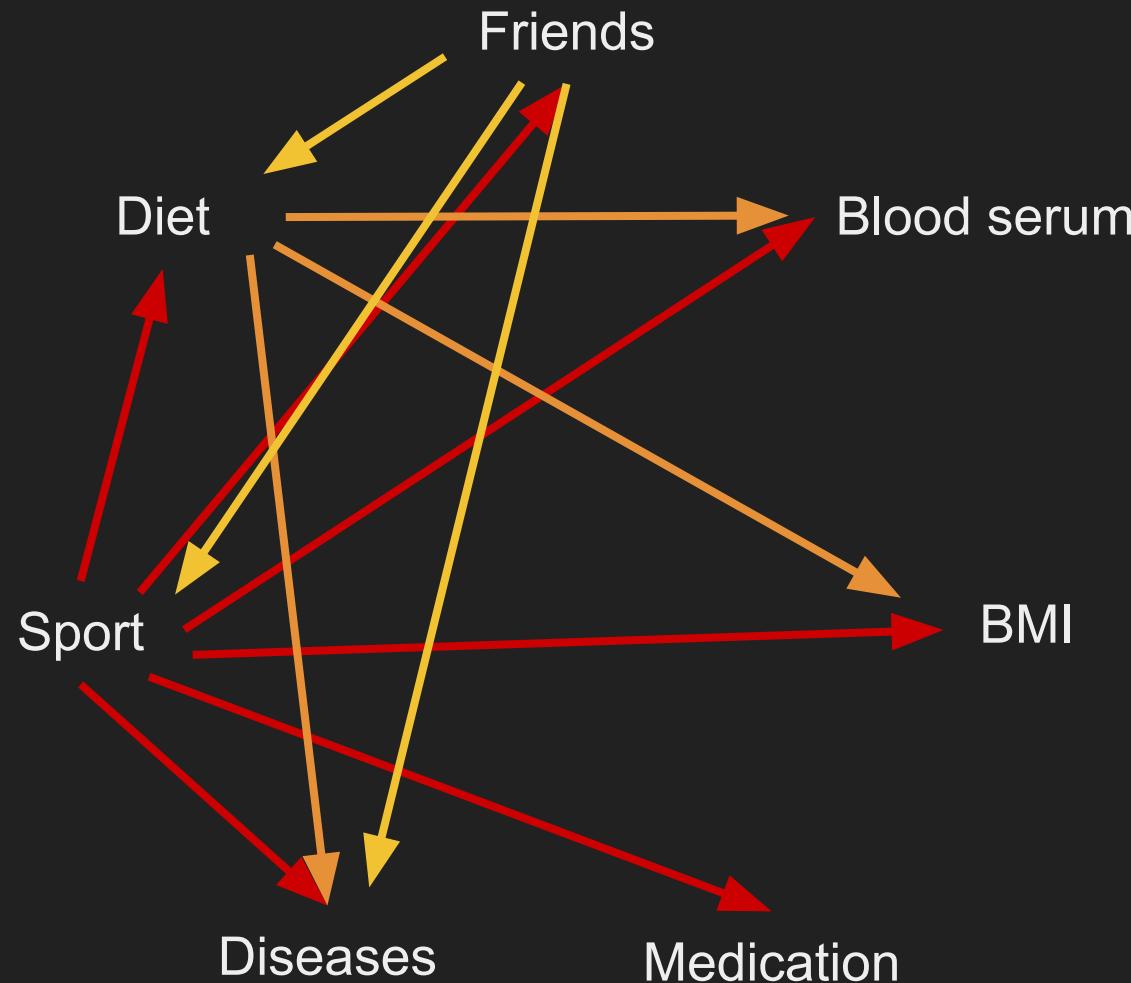
BMI

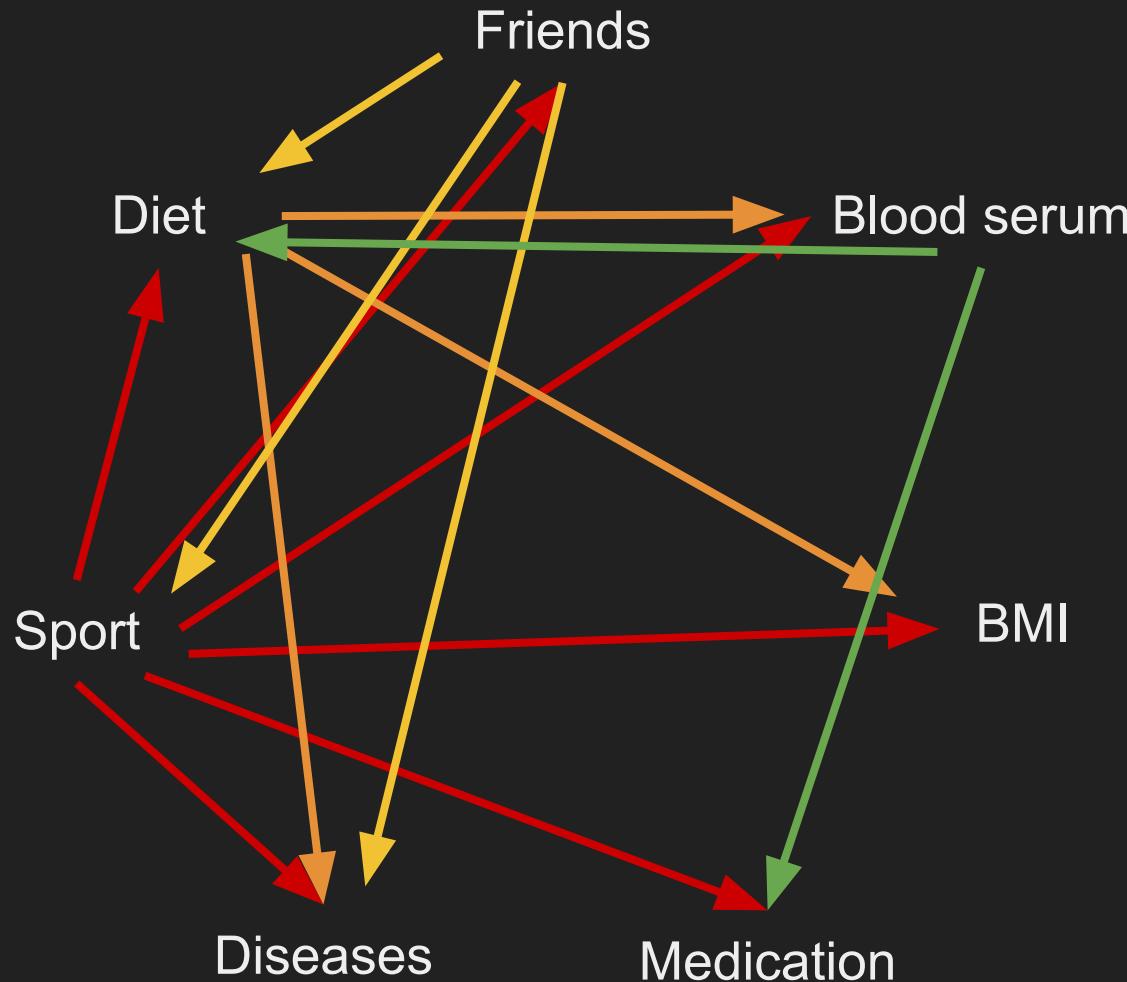
Diseases

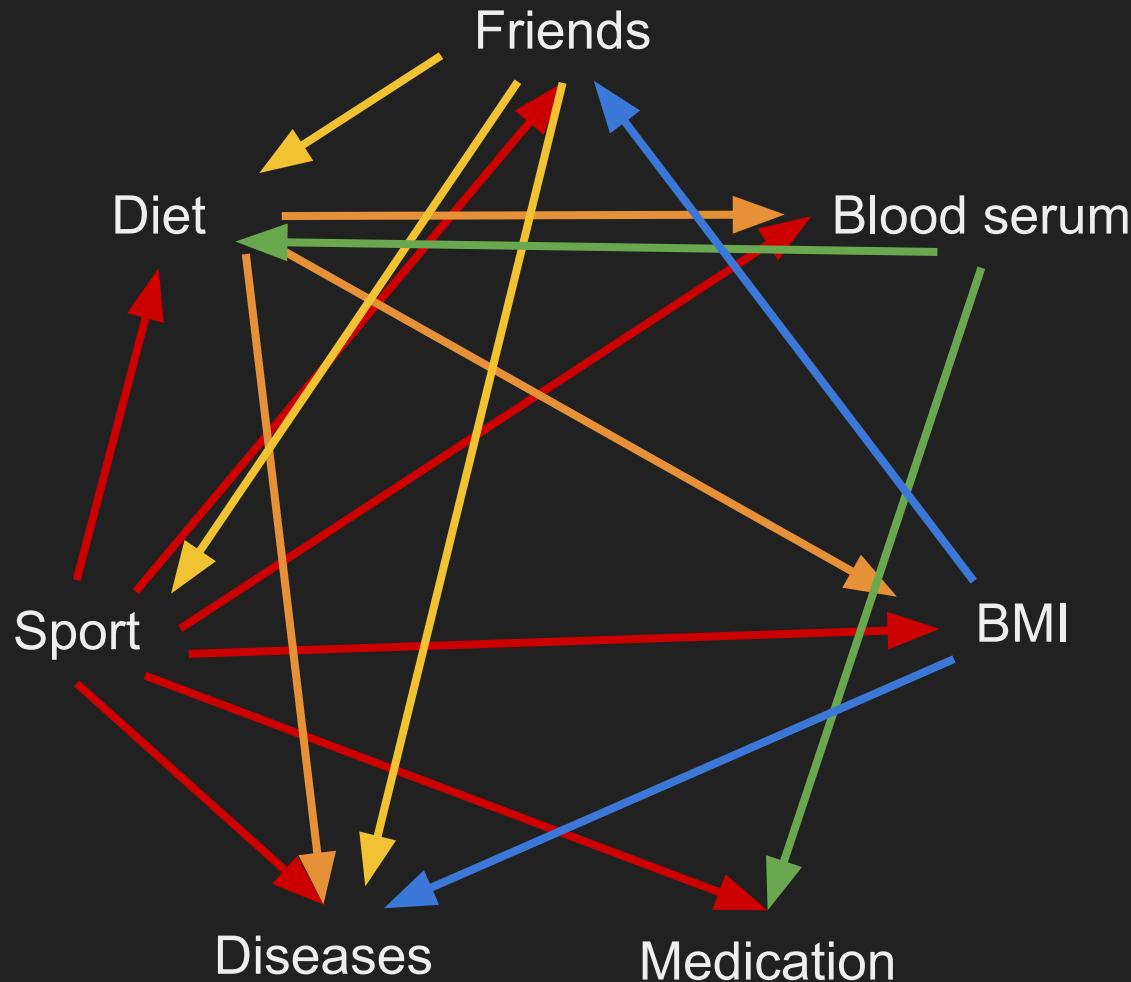
Medication

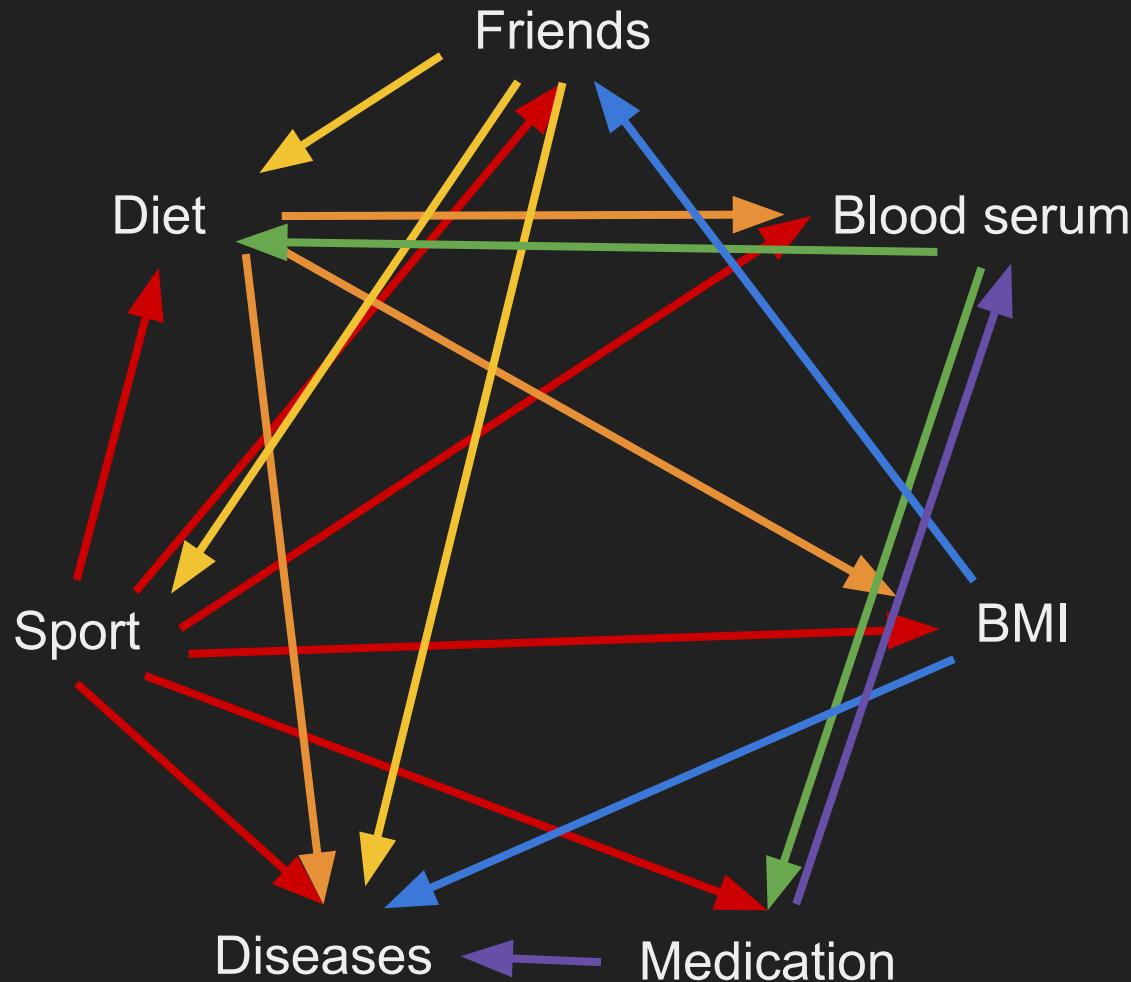


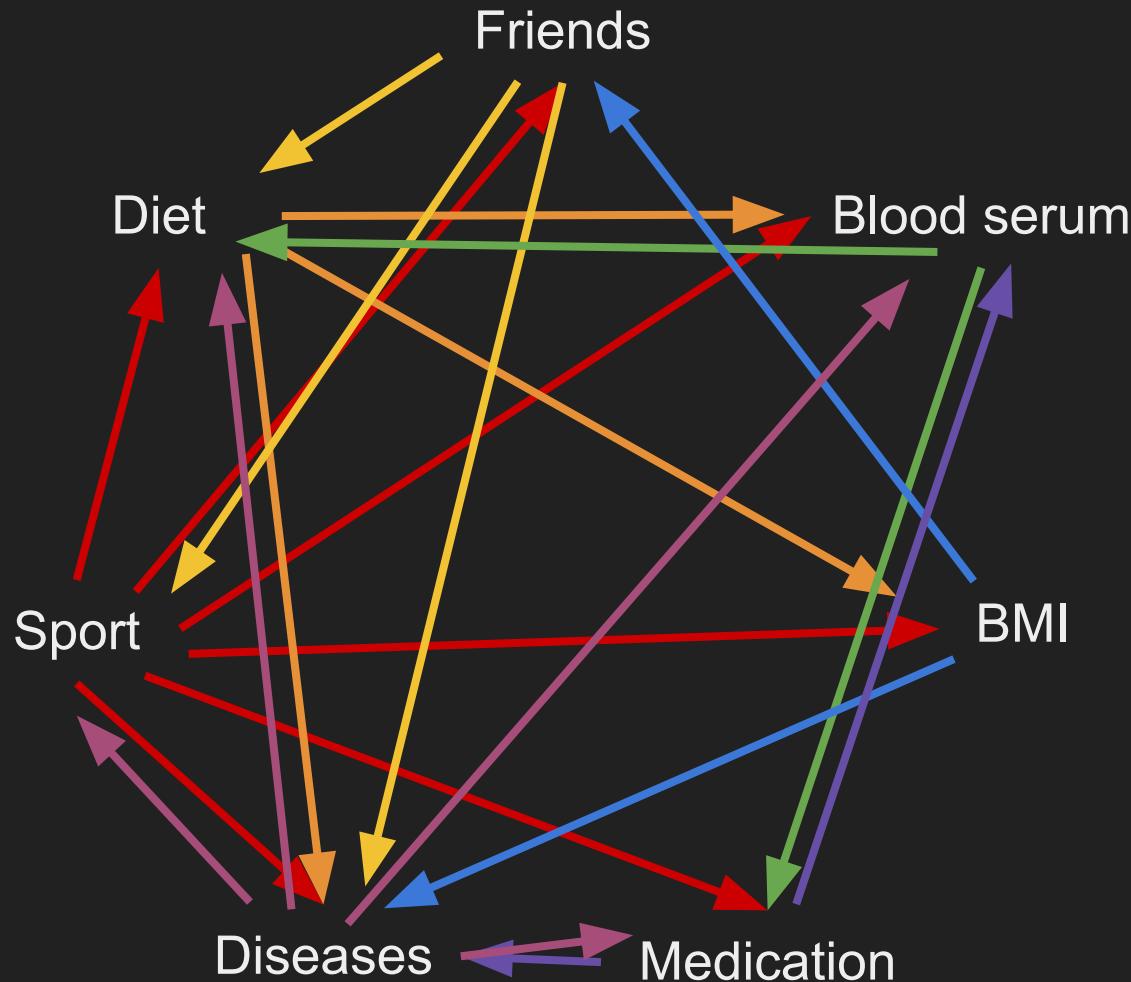


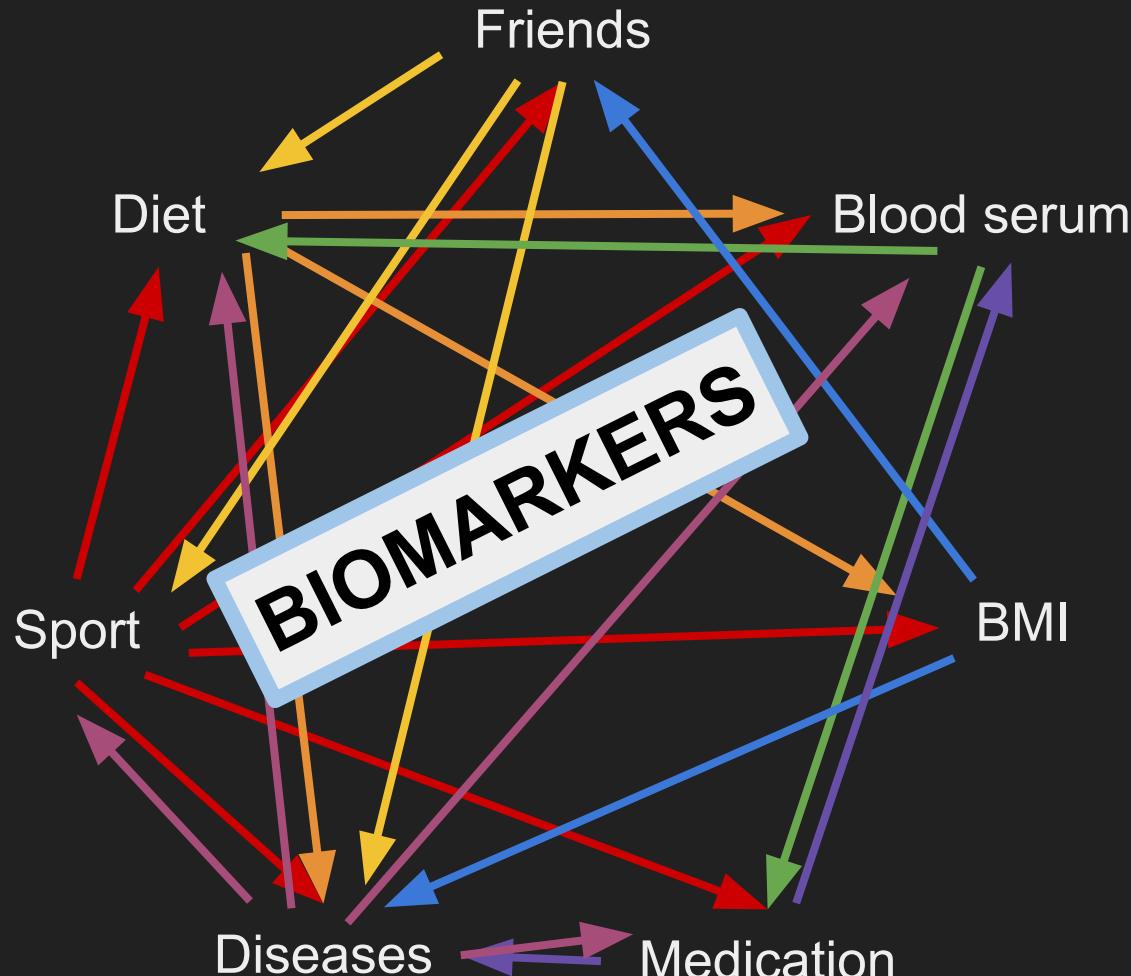


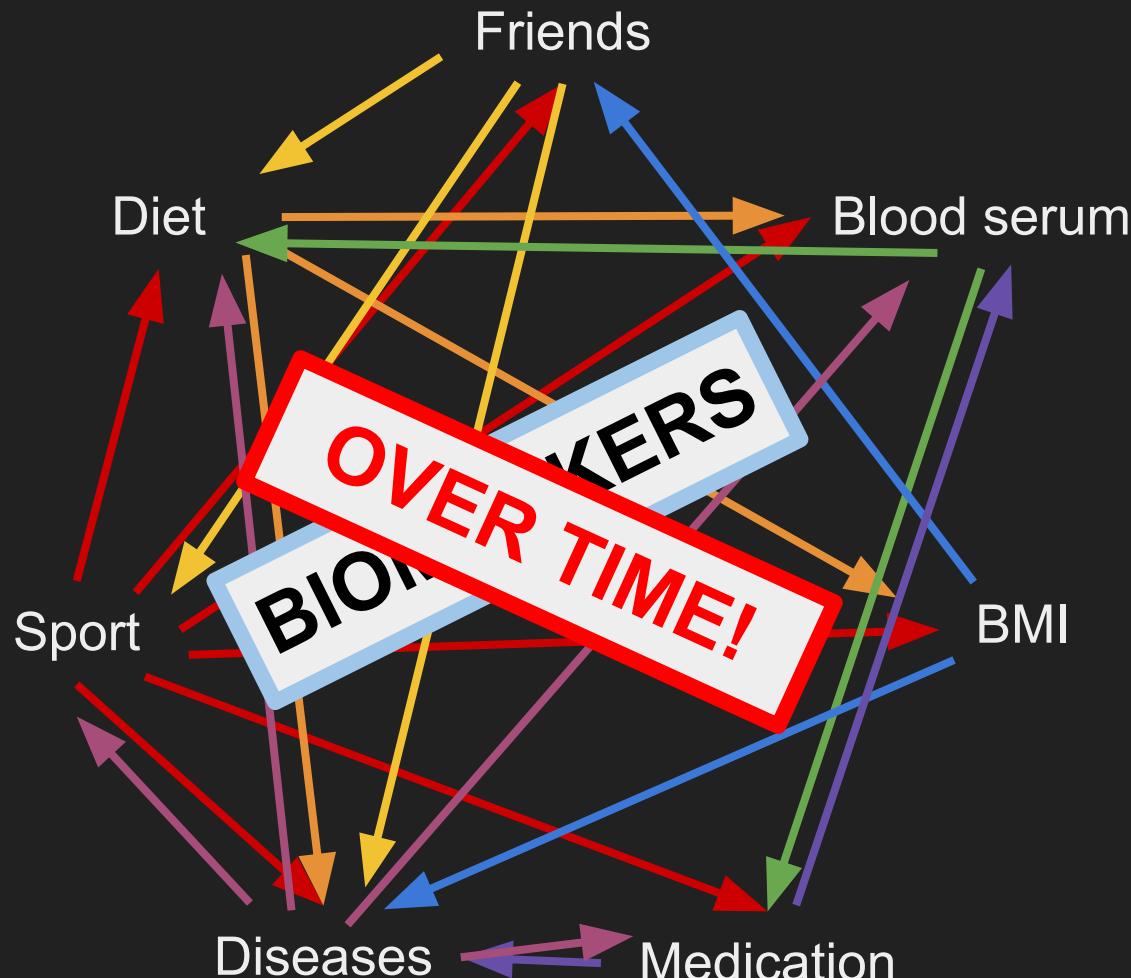












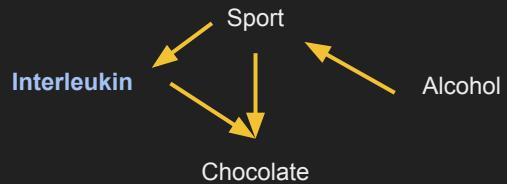
**1** Obesity and social network influence

**2** Anthropometry and blood serum

**3** Host factors

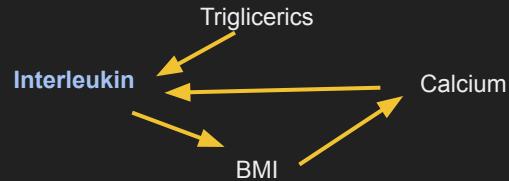
**4** Diseases and medicines

## Obesity and social network influence



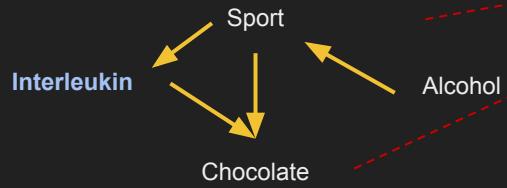
Host factors

## Anthropometry and blood serum



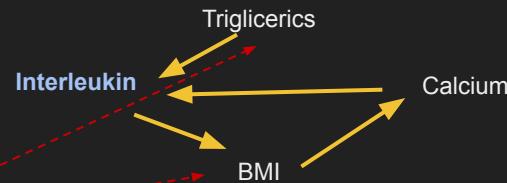
Diseases and medicines

## Obesity and social network influence



Host factors

## Anthropometry and blood serum



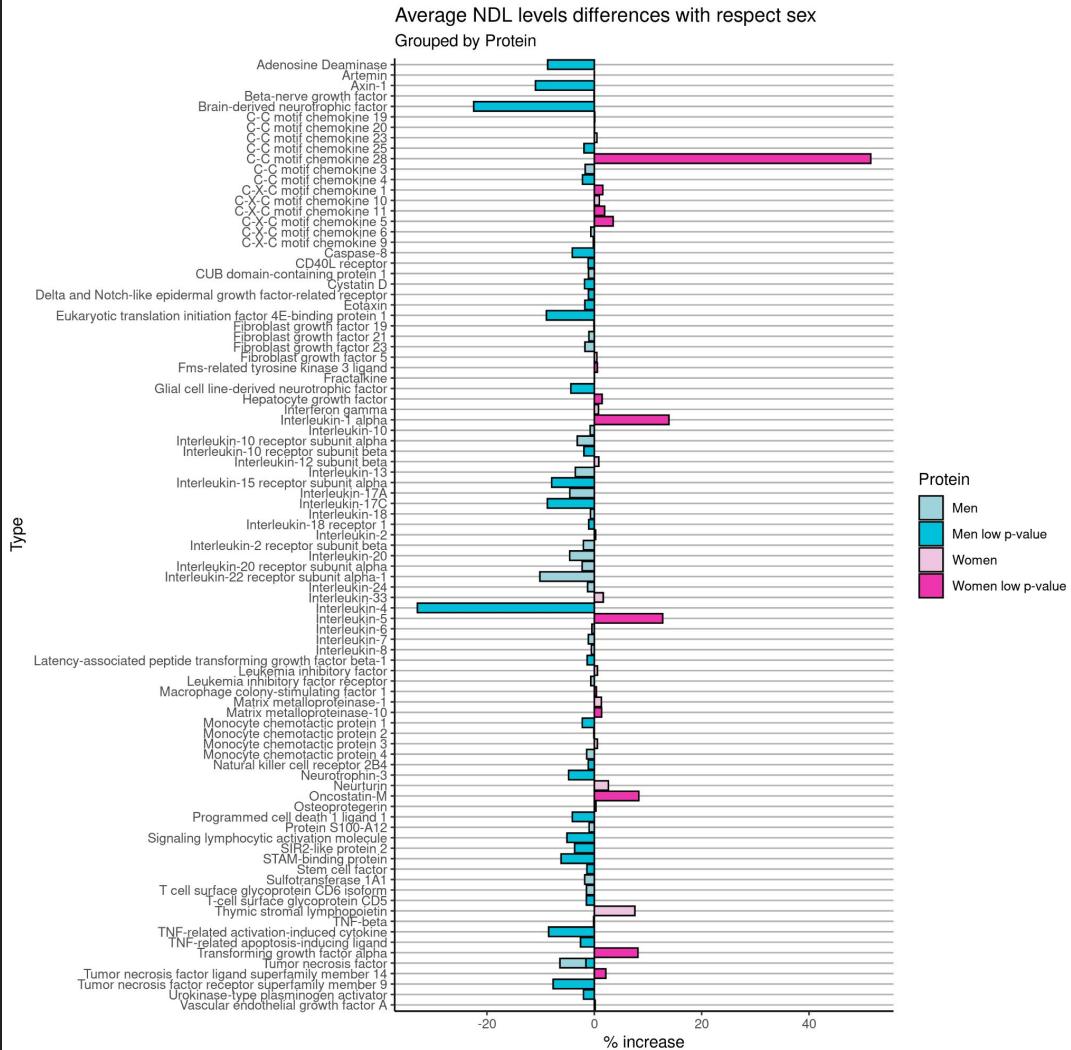
Diseases and medicines

# #0 - Introduction

Acronym	Protein	Significance	$\bar{x}_{men}$	$\bar{x}_{women}$
ADA	Adenosine Deaminase	****	5.16	4.75
ARTN	Artemin	ns	-0.21	-0.22
AXIN1	Axin-1	****	1.19	1.07
BDNF	Brain-derived neurotrophic factor	***	4.61	3.76
BNGF	Beta-nerve growth factor	ns	1.93	1.93
CASP8	Caspase-8	*	1.46	1.4
CCL11	Eotaxin	****	7.9	7.76
CCL19	C-C motif chemokine 19	ns	9.37	9.37
CCL20	C-C motif chemokine 20	ns	6.06	6.06
CCL23	C-C motif chemokine 23	ns	9.35	9.39
CCL25	C-C motif chemokine 25	**	6.17	6.05
CCL28	C-C motif chemokine 28	****	0.83	1.26
CCL3	C-C motif chemokine 3	ns	2.24	2.2
CCL4	C-C motif chemokine 4	****	6.58	6.44

CD244	Natural killer cell receptor 2B4	***	6.38	6.31
CD40	CD40L receptor	***	9.29	9.18
CD5	T-cell surface glycoprotein CD5	**	4.05	3.99
CD6	T cell surface glycoprotein CD6 isoform	ns	3.65	3.59
CD61	CUB domain-containing protein 1	ns	2.44	2.41
CSF1	Macrophage colony-stimulating factor 1	*	7.87	7.9
CST1	Cystatin D	****	6.87	6.75
CX3CR1	Friedreich's	ns	6.52	6.52
CX3CL1	CX-C motif chemokine 1	***	8.72	8.85
CX3CL10	CX-C motif chemokine 10	ns	9.51	9.56
CX3CL11	CX-C motif chemokine 11	**	7.1	7.24
CX3CL5	CX-C motif chemokine 5	****	12.1	12.53
CX3CL6	CX-C motif chemokine 6	ns	9.08	9.02
CX3CL9	CX-C motif chemokine 9	ns	7.29	7.28
DNR1	Delta and Notch-like epidermal growth factor-related receptor	****	7.35	7.27
EP3BP1	Eukaryotic translation initiation factor 4E-binding protein 1	***	5.99	5.5
ENLAGE	Protein S100-A12	ns	5.16	5.11
FGF19	Fibroblast growth factor 19	ns	7.88	7.87
FGF21	Fibroblast growth factor 21	ns	3.16	3.13
FGF23	Fibroblast growth factor 23	ns	2.68	2.65
FOXP1	Foxp1-related transcription factor 5	ns	1.42	1.43
FTZL2	Fms-related tyrosine kinase 2 ligand	*	8.78	8.83
GDNF	Glia cell-line derived neurotrophic factor	***	2.17	2.08
IGF1	Hepatocyte growth factor	****	7.8	7.91
IPMG	Interferon gamma	ns	0.62	0.63
IL10	Interleukin-10	ns	4.14	4.11
IL10RA	Interleukin-10 receptor subunit alpha	ns	1.41	1.37
IL10RB	Interleukin-10 receptor subunit beta	***	7.61	7.47
IL12B	Interleukin-12 subunit beta	ns	4.81	4.85
IL13	Interleukin-13	ns	1.06	1.02
IL13RA	Interleukin-15 receptor subunit alpha	***	1.31	1.22
IL17A	Interleukin-17A	ns	0.83	0.8
IL17C	Interleukin-17C	***	1.72	1.58
IL18	Interleukin-18	ns	7.07	7.02
IL18R1	Interleukin-18 receptor 1	**	7.61	7.53
IL1A	Interleukin-1 alpha	***	1.04	1.18
I2	Interleukin-2	ns	0.74	0.74
I20	Interleukin-20	ns	0.54	0.52
I20RA	Interleukin-20 receptor subunit alpha	ns	0.75	0.73
I22RA1	Interleukin-22 receptor subunit alpha-1	ns	0.33	0.3
I24	Interleukin-24	ns	0.7	0.72
I2B2B	Interleukin-2 receptor subunit beta	ns	0.52	0.51
I33	Interleukin-33	ns	0.97	0.98
I4	Interleukin-4	***	1.13	1.05
I5	Interleukin-5	**	1.73	1.69
I6	Interleukin-6	ns	2.85	2.84
I7	Interleukin-7	ns	5.27	5.21
I8	Interleukin-8	ns	7.56	7.52
IIF	Leukemia inhibitory factor	ns	0.4	0.46
ILPR	Leukemia inhibitory factor receptor	ns	3.4	3.38
MC3P1	Monocyte chondroitin proteoglycan 1	****	10.01	9.79
MCP1	Monocyte chemoattractant protein 1	ns	10.03	10.02
MCP3	Monocyte chemoattractant protein 3	ns	2.23	2.25
MCP4	Monocyte chemoattractant protein 4	ns	3.47	3.42
MMP1	Matrix metalloproteinase-1	ns	6.86	6.95
MMP10	Matrix metalloproteinase-10	**	8.83	8.95
NRIN	Neuritin	ns	0.91	0.94
NT3	Neurotrophin 3	**	2.19	2.09
OPG	Osteoprotegerin	ns	9.68	9.71
OSR1	Osmolality sensor	ns	4.5	4.59
PDIJ	Programmed cell death 1 ligand 1	****	5.07	4.47
SCF	Steel cell factor	****	9.28	9.35
SIRF2	SH2-domain protein 2	**	3.01	2.9
SLAMF1	Signaling lymphocytic activation molecule	****	3.2	3.05
ST1A1	Sulfotransferrase 1A1	ns	2.04	2
STAMBP1	STAM-binding protein	****	2.74	2.58
TGF&	Transforming growth factor alpha	****	3.59	3.88
TGF&B1	Latency-associated peptide transforming growth factor beta-1	ns	8.1	7.99
TGF&B2	Transforming growth factor beta-2	ns	0.47	0.45
TNF&	TNF-beta	ns	3.09	3.08
TNFSF9	Tumor necrosis factor superfamily member 9	****	7.19	6.68
TNFSF14	Tumor necrosis factor ligand superfamily member 14	**	4.62	4.71
TRAIL	TNF-related apoptosis-inducing ligand	****	8.39	8.18
TRANCE	TNF-related activation-induced cytokine	****	5.97	5.5
TSLP	Thymic stromal lymphopoietin	ns	0.42	0.46
TWINK	Tumor necrosis factor ligand weak inducer of apoptosis	****	9.02	8.88
UDR	Unknown ribonucleoprotein activator	****	10.07	9.37
VIScFA	Vascular endothelial growth factor A	ns	10.2	10.22

Table 2: Sex differences for each biomarker



**NDL:** Value measured by the machine

**LOD:** Limit of detection

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**LOD:** Limit of detection

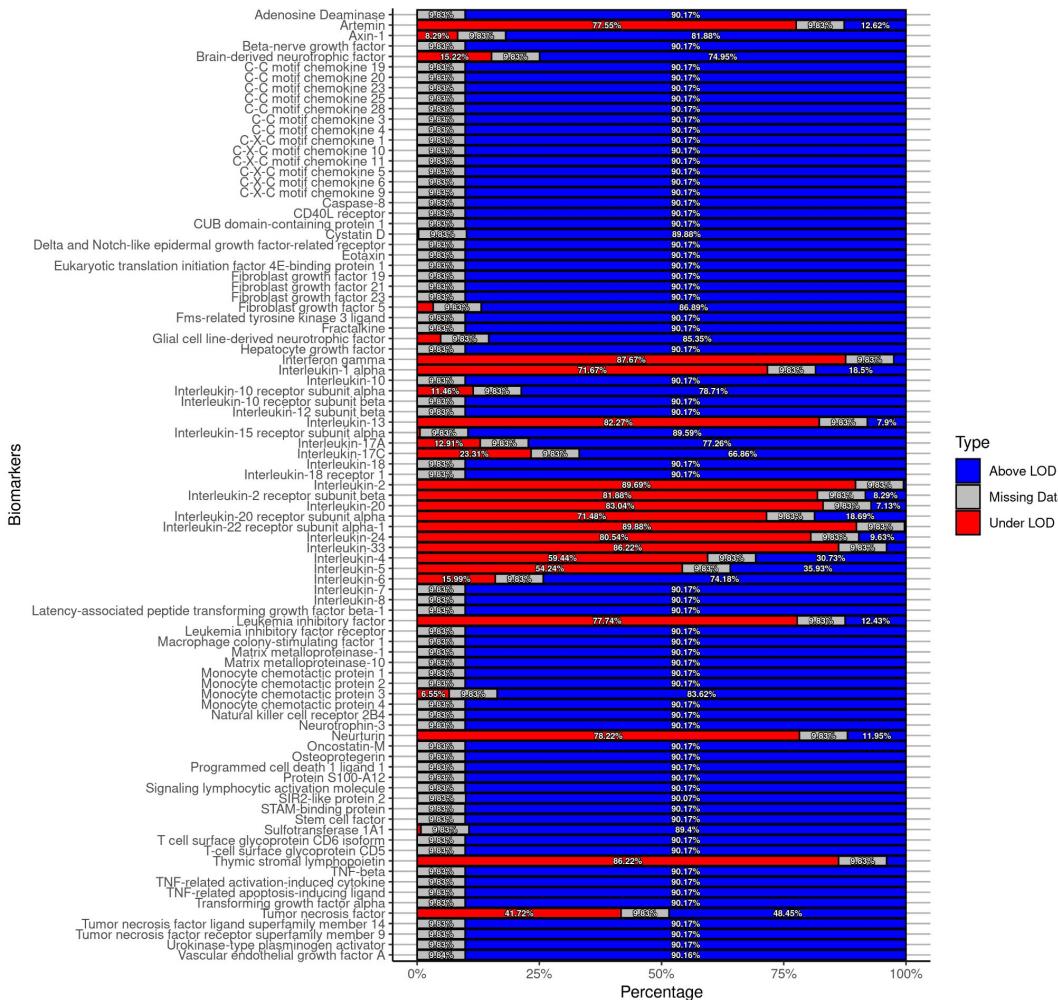
**NDL > LOD**

**NDL:** Value measured by the machine

**LOD:** Limit of detection

**NDL < LOD**

Proportion of values, above LOD (blue), under LOD (red), and missing (grey)



**#1 - Obesity and social network influence in inflammatory biomarkers in a general youth population.**

*How many people die  
of obesity per year ?*

# **COVID-19**

~ 2.5 millions deaths per year

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# **Obesity**

~ 4 millions deaths per year

~ 11 millions deaths due poor nutritional choices

Health Effects of Overweight and Obesity in 195 Countries over 25 Years  
List of authors. The GBD 2015 Obesity Collaborators

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

## RONALDO WITH FACE MASKS URGED: IN THESE DIFFICULT MOMENTS, LET US HELP ONE ANOTHER

BY ADMIN IN NEWS APRIL 14, 2020 NO COMMENTS



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*How many people does  
Cristiano Ronaldo kills per year ?*

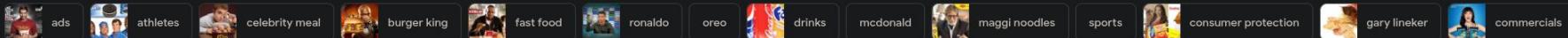
Randomized Controlled Trial > BMC Public Health. 2020 Nov 10;20(1):1677.

doi: 10.1186/s12889-020-09779-y.

## Promoting healthy foods in the new digital era on Instagram: an experimental study on the effect of a popular real versus fictitious fit influencer on brand attitude and purchase intentions

Frans Folkvord <sup>1 2</sup>, Elze Roes <sup>3</sup>, Kirsten Bevelander <sup>3 4</sup>

**Results:** Results showed that parasocial interaction mediated the relation between the type of influencer and product attitude as well as purchase intention. Parasocial interaction was higher for participants exposed to the popular real fit influencer compared to the fictitious fit influencer, leading to higher healthy food brand attitude and purchase intention.



Celebrity Endorsements Sling Unhealthy ...  
insteading.com



Athletes in junk food ads | CBC.ca  
cbc.ca



Teen favs musicians endorse mostly junk ...  
cnn.com



Celebrity Endorsements Sling Unhealthy ...  
insteading.com



The Era of the Celebrity...  
nytimes.com



Celebrity endorsements 'effective' at ...  
foodnavigator.com



7 Unhealthy Brands Endorsed by Athletes  
businessinsider.com



Teen favs musicians endorse mostly junk ...  
cnn.com



Paid Millions to Endorse Junk Food ...  
sciencealert.com



celebrities hawking fast food and soda ...  
globalnews.ca



Fast Food and Junk Fo...  
marieclaire.com



Weirdest Celeb Food and Drink Endorsemen...  
spoonuniversity.com



Food promoted by music stars usually ...  
foodmag.com.au



endorse junk food ...  
indiatellevision.com



Celebrity Endorse...  
insteading.com



Junk Food Celebrities  
thedocorwillseeyounow.com



Fast Food and Junk Food Commercials ...  
marieclaire.com



Indian celebs have endorsed junk food ...  
theresprint.in



stop endorsing 'unhealthy' food ...  
folomojo.com



5 Random Celebrity Junk Foods - View ...  
viewthevibe.com



Celebs Who Endorsed Unhealthy Foods  
theresipe.com



promote junk foods and drinks ...  
foodnavigator-asia.com



UK ban on junk food ads on TV ...  
theguardian.com



Celebrities Endorse Mostly Unhealthy Foods  
healthline.com

- Related searches
- celebrity endorsement ads
  - healthy food ads with celebrities
  - advertising celebrity endorsement ads



Teens and parents urged to challenge ...  
cbc.ca



Athletes Support Obesity - IMC Haw...  
imcclass.com



Pepsi and Celebrity Endors...  
abimbolatutu.wordpress.com

*The NEW ENGLAND JOURNAL of MEDICINE*

SPECIAL ARTICLE

# The Spread of Obesity in a Large Social Network over 32 Years

Nicholas A. Christakis, M.D., Ph.D., M.P.H., and James H. Fowler, Ph.D.

*The NEW ENGLAND JOURNAL of MEDICINE*

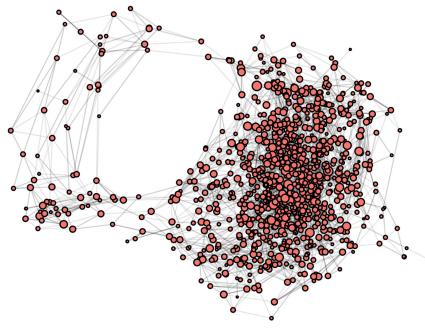
SPECIAL ARTICLE

# Your friends make you fat

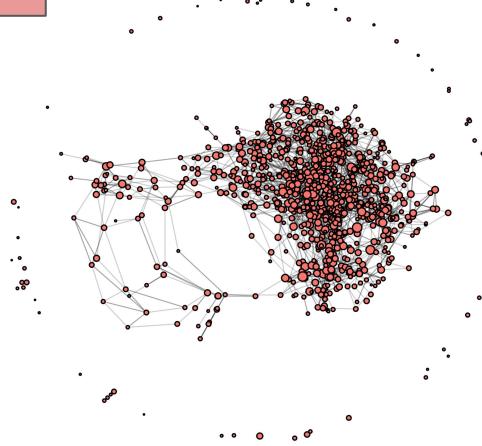
Nicholas A. Christakis, M.D., Ph.D., M.P.H., and James H. Fowler, Ph.D.



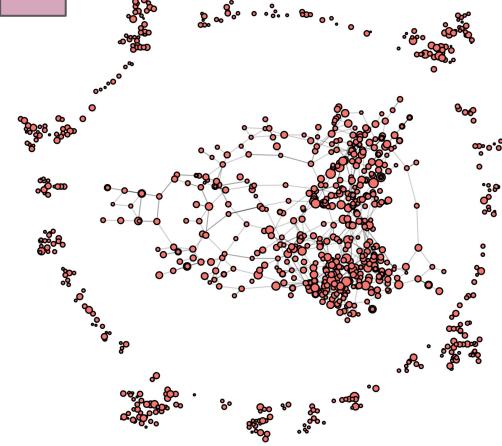
 Overall



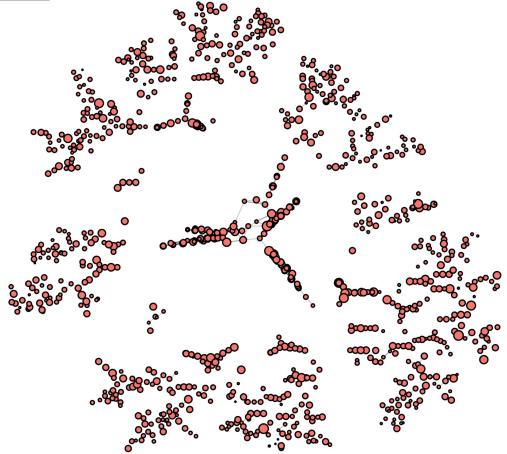
 Physically



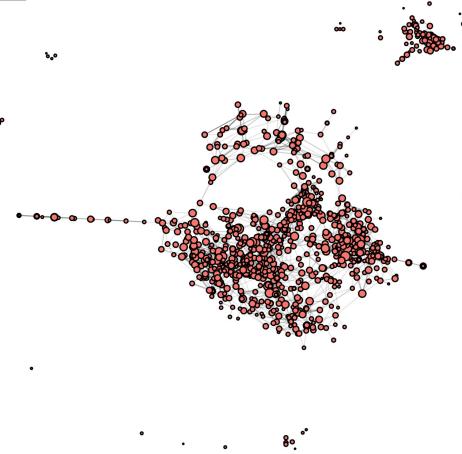
 Other



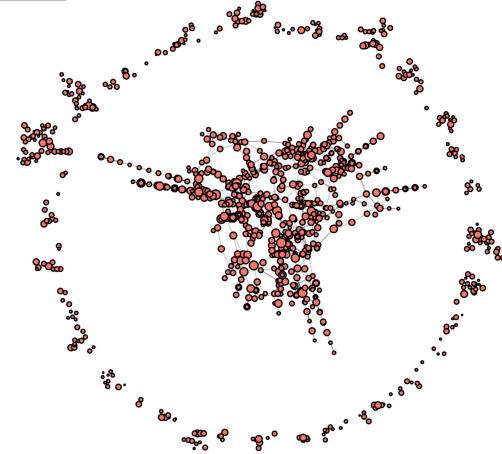
 Sports



 School



 Home



# BMI CHART



**Underweight**

BMI < 18.5



**Normal**

BMI 18.5 – 24.9



**Overweight**

BMI 25 – 29.9



**Obese**

BMI > 30

$$\text{BMI} = \text{Kg} / \text{M}^2$$

Body mass index is a value that allows you to assess the degree of correspondence between a person's mass and his height and thereby indirectly judge whether the mass is insufficient, normal or excess. It is important in determining the indications for the need for treatment.

	Underweight	Healthy	Overweight	Obese
Underweight	47	285	48 ↓	24 ↓
Healthy	282 ↑	1870 ↑	345 ↓	90 ↓
Overweight	46 ↓	347	97 ↑	34
Obese	22 ↓	135	42	29 ↑

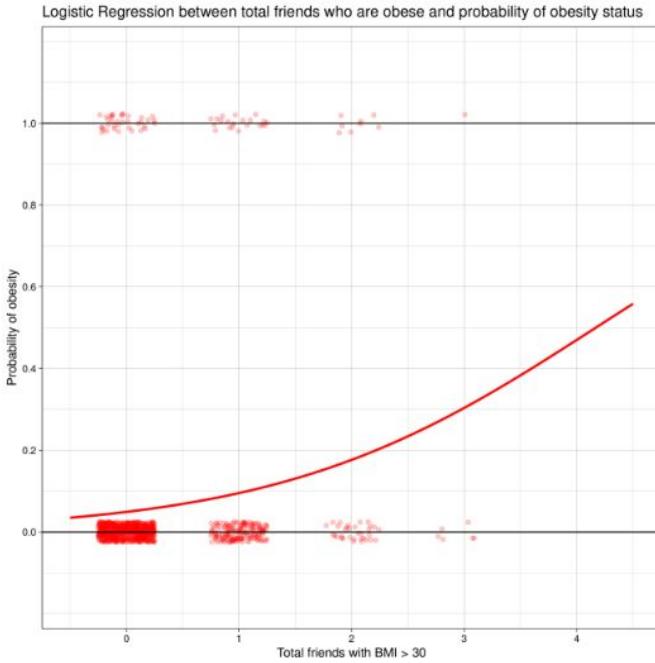
[Table A] Number of relationships between each BMI category. People tend to prefer relationships within their own BMI group. Underweight and Healthy tend to avoid Overweight and Obese, while Overweight and Obese tend to avoid Underweight only.

Over ↑ and underrepresented ↓ means individual binomial p-values < 0.0001

Whole table has a  $\chi^2$  test p-value =  $10^{-10}$

Network	Total Relationships	Equal Relationships	MIN	Q1	Median	Average	Q3	MAX	SD	p-value
Overall	3767	2043	1691	1846	1890.5	1892.661	1936	2140	69.7	0.016
Physical	2823	1584	1240	1379	1417	1417.441	1458	1590	57.13	0.002
School	2979	1590	1318	1459	1497	1497.958	1538	1666	56.23	0.051
Sports	598	415	233	288	301	301.938	316	371	20.78	0
Home	1247	722	530	605	627	626.908	648	738	31	0.001
Other	1095	612	450	531	551	550.655	570	648	28.63	0.016

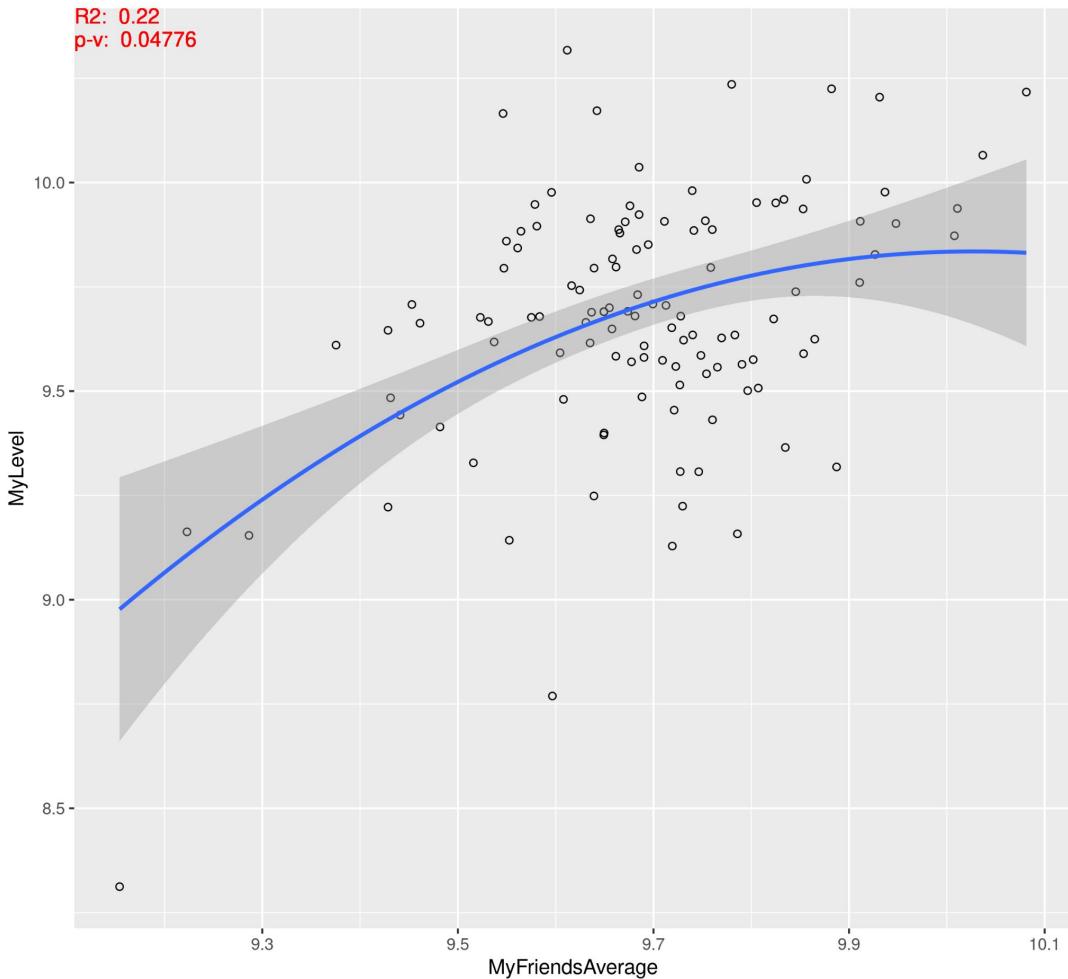
**Table 5:** Simulated networks ( $n=1000$ ) same-to-same relationships against the real network same-to-same relationships. All simulated network shows bias of BMI spread in the real network.



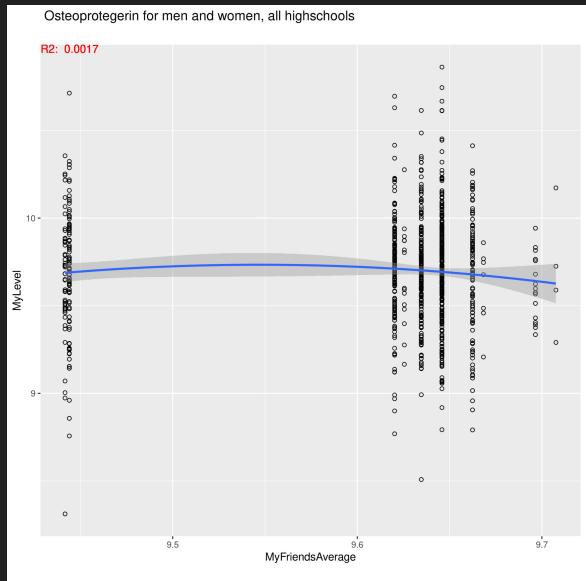
**Figure 1:** Logistic regression between number of obese friends and obesity status. Each dot represent a person who can be obese (1) or non-obese (0), and who has a total number of obese friends (x-axis).

# Osteoprotegerin for Man in H1

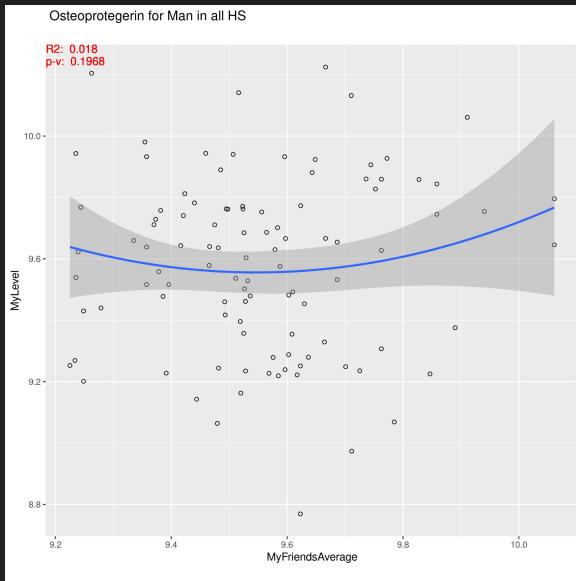
R2: 0.22  
p-v: 0.04776



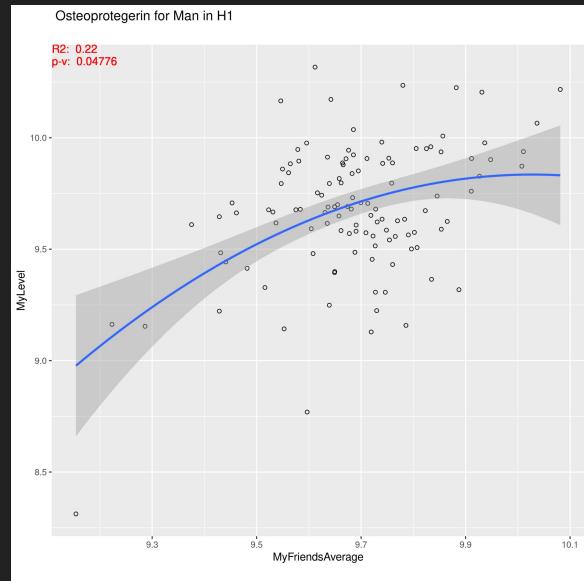
## No stratification



## Stratified for sex only



## Stratified for sex and highschool

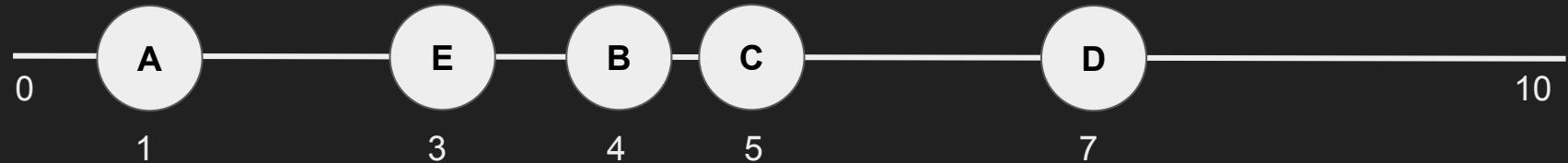


Protein	Sex	Highschool	R2	Pvalue
Delta and Notch-like epidermal growth factor-related receptor	Woman	H1	0.15	*
Eukaryotic translation initiation factor 4E-binding protein 1	Woman	H1	0.09	*
Interleukin-24	Woman	H1	0.15	*
Oncostatin-M	Woman	H1	0.22	*
Caspase-8	Woman	H2	0.05	*
Glial cell line-derived neurotrophic factor	Woman	H2	0.1	*
Interleukin-1 alpha	Woman	H2	0.05	*
Interleukin-2	Woman	H2	0.06	*
Tumor necrosis factor receptor superfamily member 9	Woman	H2	0.15	*
C-C motif chemokine 28	Woman	H3	0.09	**
C-C motif chemokine 3	Woman	H3	0.07	*
C-X-C motif chemokine 5	Woman	H3	0.09	*
CD40L receptor	Woman	H3	0.07	**
Cystatin D	Woman	H3	0.05	*
Leukemia inhibitory factor receptor	Woman	H3	0.14	*
Natural killer cell receptor 2B4	Woman	H3	0.06	*
CUB domain-containing protein 1	Woman	H4	0.14	*
Delta and Notch-like epidermal growth factor-related receptor	Woman	H4	0.18	*
Interleukin-10 receptor subunit beta	Woman	H4	0.25	**
Interleukin-18 receptor 1	Woman	H4	0.17	*
Monocyte chemoattractant protein 4	Woman	H4	0.15	*
Neurturin	Woman	H4	0.38	**
Programmed cell death 1 ligand 1	Woman	H4	0.32	***
Sulfotransferase 1A1	Woman	H4	0.22	**
Urokinase-type plasminogen activator	Woman	H4	0.28	**
C-X-C motif chemokine 1	Woman	H5	0.14	*
C-X-C motif chemokine 5	Woman	H5	0.31	**
C-X-C motif chemokine 9	Woman	H5	0.21	*
Interleukin-18	Woman	H5	0.12	*
Interleukin-22 receptor subunit alpha-1	Woman	H5	0.13	*
Interleukin-5	Woman	H5	0.18	*
Matrix metalloproteinase-1	Woman	H5	0.12	*
Programmed cell death 1 ligand 1	Woman	H5	0.16	*
STAM-binding protein	Woman	H5	0.14	*
Sulfotransferase 1A1	Woman	H5	0.12	*
T-cell surface glycoprotein CD5	Woman	H5	0.13	*
C-C motif chemokine 23	Woman	H6	0.95	***
Fms-related tyrosine kinase 3 ligand	Woman	H6	0.76	**
Interleukin-17A	Woman	H6	0.64	*
Interleukin-2 receptor subunit beta	Woman	H6	0.75	*
Interleukin-20 receptor subunit alpha	Woman	H6	0.73	*
Interleukin-6	Woman	H6	0.9	***
C-C motif chemokine 23	Woman	H7	0.09	*
Fibroblast growth factor 19	Woman	H7	0.09	**
Interleukin-18 receptor 1	Woman	H7	0.11	**
Natural killer cell receptor 2B4	Woman	H7	0.16	**
Osteoprotegerin	Woman	H7	0.08	*
T cell surface glycoprotein CD6 isoform	Woman	H7	0.12	**
Caspase-8	Woman	H8	0.47	**
TNF-related activation-induced cytokine	Woman	H8	0.13	*

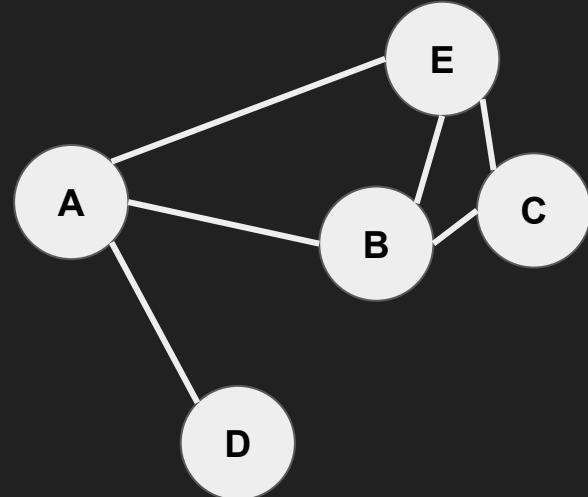
Protein	Sex	Highschool	R2	Pvalue
Delta and Notch-like epidermal growth factor-related receptor	Woman	H1	0.15	*
Eukaryotic translation initiation factor 4E-binding protein 1	Woman	H1	0.09	*
Interleukin-24	Woman	H1	0.15	*
Oncostatin-M	Woman	H1	0.22	*
Caspase-8	Woman	H2	0.05	*
Glial cell line-derived neurotrophic factor	Woman	H2	0.1	*
Interleukin-1 alpha	Woman	H2	0.05	*
Interleukin-2	Woman	H2	0.06	*
Tumor necrosis factor receptor superfamily member 9	Woman	H2	0.15	*
C-C motif chemokine 28	Woman	H3	0.09	**
C-C motif chemokine 3	Woman	H3	0.07	*
C-X-C motif chemokine 5	Woman	H3	0.09	*
CD40L receptor	Woman	H3	0.07	**
Cystatin D	Woman	H3	0.05	*
Leukemia inhibitory factor receptor	Woman	H3	0.14	*
Natural killer cell receptor 2B4	Woman	H3	0.06	*
CUB domain-containing protein 1	Woman	H4	0.14	*
Delta and Notch-like epidermal growth factor-related receptor	Woman	H4	0.18	*
Interleukin-10 receptor subunit beta	Woman	H4	0.25	**
Interleukin-18 receptor 1	Woman	H4	0.17	*
Monocyte chemoattractant protein 4	Woman	H4	0.15	*
Neurturin	Woman	H4	0.38	**
Programmed cell death 1 ligand 1	Woman	H4	0.32	***
Sulfotransferase 1A1	Woman	H4	0.22	**
Urokinase-type plasminogen activator	Woman	H4	0.28	**
C-X-C motif chemokine 1	Woman	H5	0.14	*
C-X-C motif chemokine 5	Woman	H5	0.31	**
C-X-C motif chemokine 9	Woman	H5	0.21	*
Interleukin-18	Woman	H5	0.12	*
Interleukin-22 receptor subunit alpha-1	Woman	H5	0.13	*
Interleukin-5	Woman	H5	0.18	*
Matrix metalloproteinase-1	Woman	H5	0.12	*
Programmed cell death 1 ligand 1	Woman	H5	0.16	*
STAM-binding protein	Woman	H5	0.14	*
Sulfotransferase 1A1	Woman	H5	0.12	*
T-cell surface glycoprotein CD5	Woman	H5	0.13	*
C-C motif chemokine 23	Woman	H6	0.95	***
Fms-related tyrosine kinase 3 ligand	Woman	H6	0.76	**
Interleukin-17A	Woman	H6	0.64	*
Interleukin-2 receptor subunit beta	Woman	H6	0.75	*
Interleukin-20 receptor subunit alpha	Woman	H6	0.73	*
Interleukin-6	Woman	H6	0.9	***
C-C motif chemokine 23	Woman	H7	0.09	*
Fibroblast growth factor 19	Woman	H7	0.09	**
Interleukin-18 receptor 1	Woman	H7	0.11	**
Natural killer cell receptor 2B4	Woman	H7	0.16	**
Osteoprotegerin	Woman	H7	0.08	*
T cell surface glycoprotein CD6 isoform	Woman	H7	0.12	**
Caspase-8	Woman	H8	0.47	**
TNF-related activation-induced cytokine	Woman	H8	0.13	*

Table 2: Protein for women, which are similar to your male friend, stratify by highschool

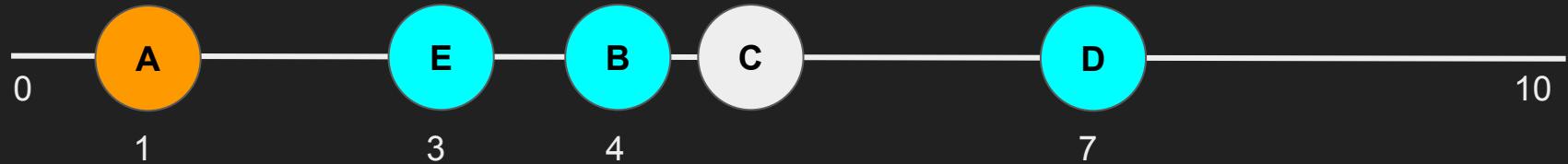
Biomarker Level



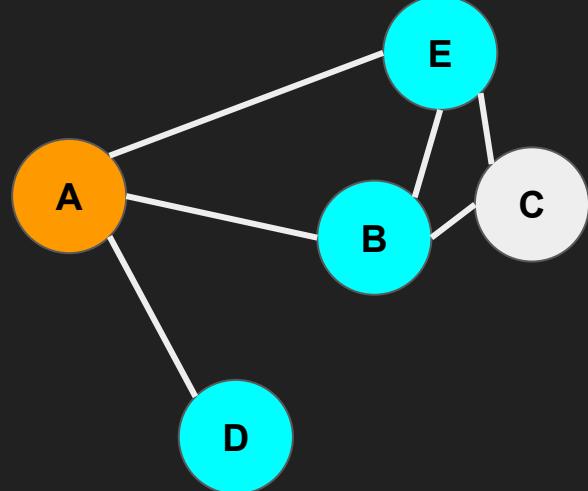
Network



Biomarker Level



Network



$$(3-1)^2$$

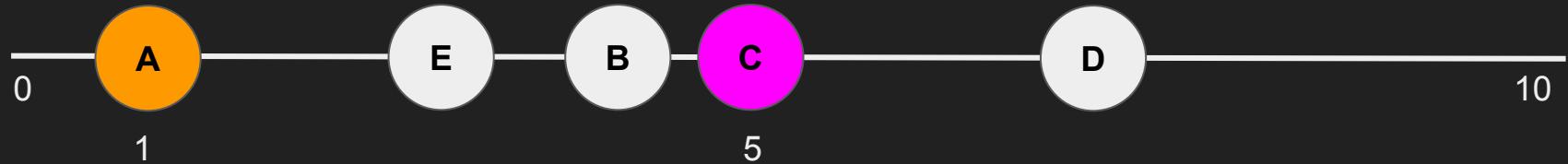
$$(4-1)^2$$

$$(7-1)^2$$

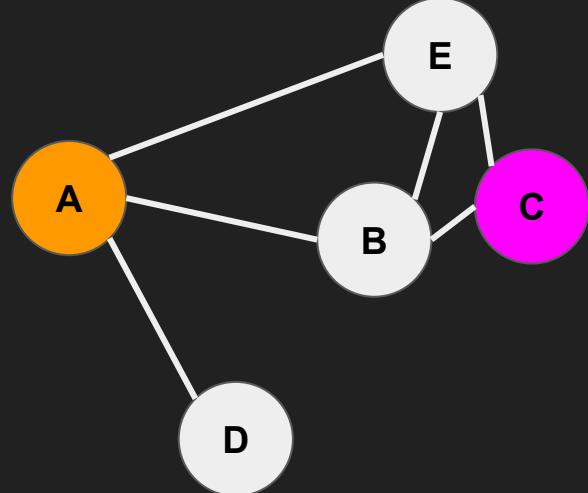
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$$49/3 = 16.3$$

Biomarker Level



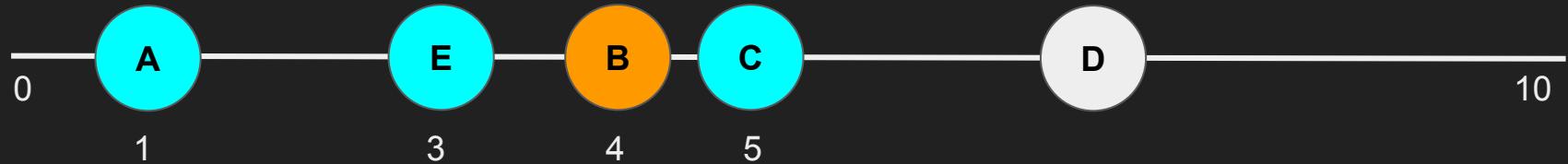
Network



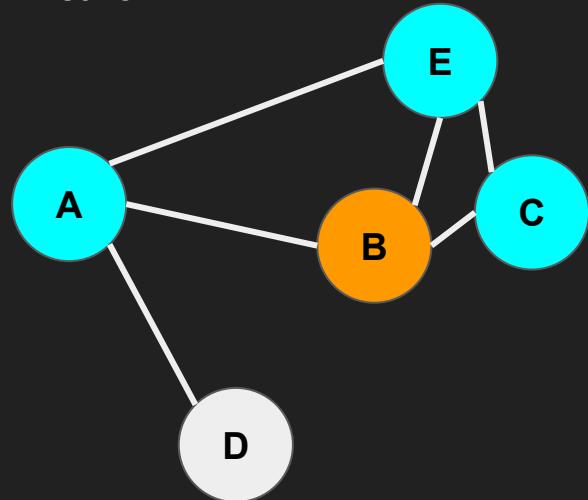
$$\frac{(3-1)^2 + (4-1)^2 + (7-1)^2}{4} = \frac{49}{3} = 16.3$$

$$\frac{(5-1)^2}{1} = 16$$

Biomarker Level

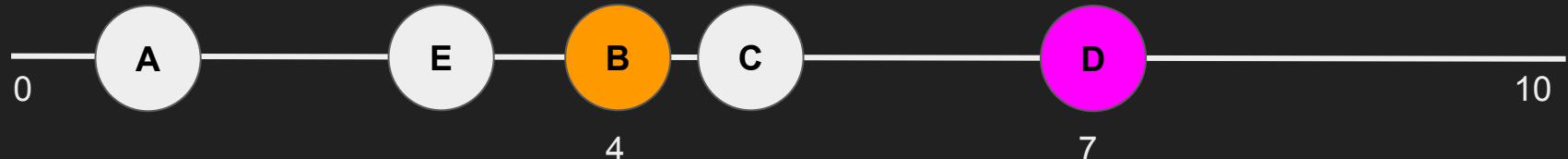


Network

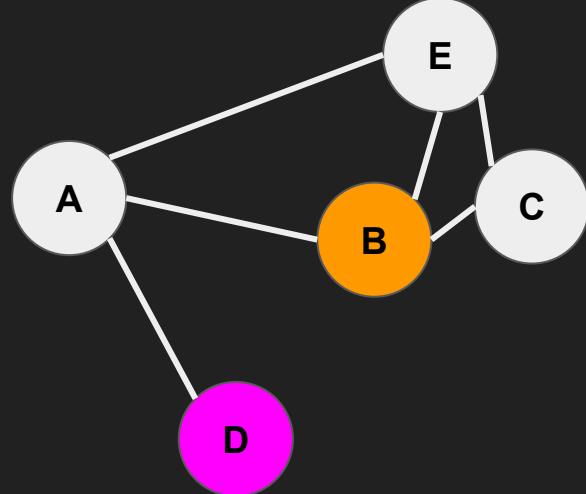


$$\frac{(4-1)^2 + (4-3)^2 + (4-5)^2}{3} = 3.6$$

Biomarker Level



Network



$$\frac{(4-1)^2 + (4-3)^2 + (4-5)^2}{11/3 = 3.6}$$

$$\frac{(4-7)^2}{9/1 = 9}$$

# Enemies Average Distances

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## Friends Average Distances

**>1** , Enemies are (bigger) further away from you than your friends.  
Your friends are more similar to you.

**<1**, Enemies are (smaller) closer to you than your friends.  
Your enemies are more similar to you.

Protein	Men	Women
Adenosine Deaminase	<b>1.12</b>	<b>1.03</b>
Artemin	<b>0.98</b>	<b>1.04</b>
Axin-1	<b>1.06</b>	<b>1.02</b>
Brain-derived neurotrophic factor	<b>1.06</b>	<b>1.14</b>
Beta-nerve growth factor	<b>1.29</b>	<b>0.91</b>
Caspase-8	<b>1.01</b>	<b>1.04</b>
Eotaxin	<b>0.94</b>	<b>1.04</b>
C-C motif chemokine 19	<b>1</b>	<b>0.96</b>
C-C motif chemokine 20	<b>1.09</b>	<b>0.97</b>
C-C motif chemokine 23	<b>1.06</b>	<b>1.1</b>
C-C motif chemokine 25	<b>1.06</b>	<b>1.02</b>
C-C motif chemokine 28	<b>0.76</b>	<b>0.84</b>
C-C motif chemokine 3	<b>1</b>	<b>0.96</b>
C-C motif chemokine 4	<b>0.98</b>	<b>1.02</b>
Natural killer cell receptor 2B4	<b>1.02</b>	<b>1</b>
CD40L receptor	<b>1.03</b>	<b>1.04</b>
T-cell surface glycoprotein CD5	<b>1.09</b>	<b>1.07</b>
T cell surface glycoprotein CD6 isoform	<b>1.04</b>	<b>0.97</b>
CUB domain-containing protein 1	<b>1.04</b>	<b>1.14</b>
Macrophage colony-stimulating factor 1	<b>1.01</b>	<b>1.13</b>
Cystatin D	<b>1.04</b>	<b>0.97</b>
Fractalkine	<b>1.12</b>	<b>1.03</b>

Arachin	0.98	1.04
Axin-1	1.06	1.02
Brain-derived neurotrophic factor	1.29	0.93
Beta-nerve growth factor	1.01	1.04
Caspase-8	1	0.98
C-C motif chemokine 19	1	0.96
C-C motif chemokine 20	1.09	0.97
C-C motif chemokine 23	1.06	1.1
C-C motif chemokine 25	1.06	1.02
C-C motif chemokine 28	0.76	0.84
C-C motif chemokine 3	0.98	0.96
C-C motif chemokine 4	1.06	1.02
Natural killer cell receptor 2B4	1.02	1
CD40L receptor	1.03	1.04
T-cell surface glycoprotein CD5	1.09	1.07
T cell surface glycoprotein CD6 isoform	1.04	0.97
CUB domain-containing protein 1	1.04	1.14
Macrophage colony-stimulating factor 1	1.01	1.13
Cystatin D	1.04	0.97
Fractalkine	1.12	1.03
Fractalkine	1.06	1.04
C-C motif chemokine 1	1.07	1.06
C-C motif chemokine 10	0.98	0.97
C-C motif chemokine 11	1.05	1.03
C-C motif chemokine 12	1.05	1.03
C-C motif chemokine 2	1.06	1.06
C-C motif chemokine 5	1.03	0.98
Fractalkine	1.06	1.02
Fractalkine	1.06	1.02
Glia-derived neurotrophic factor	1.08	1.05
Hepatocyte growth factor	1.04	1.04
Interferon gamma	1.04	0.79
Interleukin-10	0.99	1.16
Interleukin-10 receptor subunit alpha	1.02	0.98
Interleukin-10 receptor subunit beta	1.1	1.05
Interleukin-11 receptor subunit beta	1.04	1.04
Interleukin-13	1.04	1.11
Interleukin-13 receptor subunit alpha1	1.02	1
Interleukin-13 receptor subunit alpha2	0.98	1
Interleukin-17C	1.06	1.04
Interleukin-18	0.97	1.08
Interleukin-18 receptor 1	0.94	1.08
Interleukin-18 receptor 3	1.06	1.13
Interleukin-3	1.09	0.97
Interleukin-20	1.22	0.98
Interleukin-22 receptor subunit alpha	1.02	0.96
Interleukin-22 receptor subunit alpha-1	1	0.92
Interleukin-24	0.98	1.03
Interleukin-24 receptor subunit beta	1.08	0.93
Interleukin-33	1.03	0.99
Interleukin-4	0.98	1.05
Interleukin-5	0.97	1.04
Interleukin-6	0.98	1
Interleukin-7	1.05	1
Interleukin-10 inhibitory factor	0.98	1.05
Lecterine inhibitory factor receptor	1.06	0.98
Monocyte chemoattractant protein 1	1.02	1.08
Monocyte chemoattractant protein 2	0.99	1.06
Monocyte chemoattractant protein 3	1.01	0.92
Monocyte chemoattractant protein 4	1.03	1.03
Monocyte chemoattractant protein 5	1.05	0.97
Monocyte chemoattractant protein 6	1.03	1.1
Monocyte chemoattractant protein 7	0.93	1.06
Neurotrophin-3	0.98	1.02
Neurotrophin-4	1.07	1.08
Oncostatin M	1.09	1.05
Programmed cell death 1 ligand 1	0.98	1.06
Stress cell factor	1.05	1.08
SMN-like protein 2	1.04	1.02
Stimulatory peptide activation molecule	1.02	0.98
Stimulatory protein 1A1	1.01	1.07
Stimulatory protein 1B1	1.01	1.09
Transforming growth factor alpha	1.09	1.02
Latency-associated peptide transforming growth factor beta-1	1.04	0.99
Tumor necrosis factor superfamily member 1	0.97	1.09
TNF beta	1.04	1.02
Tumor necrosis factor receptor superfamily member 1A	1.02	1.08
Tumor necrosis factor ligand superfamily member 1A	1.08	1.01
Tumor necrosis factor ligand superfamily member 1B	1.01	1.11
TNF-related apoptosis-inducing ligand	1.05	1.08
TNF-related apoptosis-inducing ligand type I	1.1	1.11
Thrombin receptor	1.03	0.98
Transferrin receptor	1.02	1.03
Unrelated-type phosphoglycerate kinase	1.24	1.08
Vascular endothelial growth factor A	1	1.16

Table 3: Ratio of square distances between each person friend and each person non-friends, stratify by sex. Values greater than 1 indicate that friends have a smaller difference in biomarkers levels compared with their non-friends counterpart.

**>1**, your friends are more similar to you than your enemies

**<1**, your are more similar to your enemies than your friends

Protein	Men	Women
Adenosine Deaminase	1.12	1.03
Artemin	0.98	1.04
Axin-1	1.06	1.02
Brain-derived neurotrophic factor	1.06	1.14
Beta-nerve growth factor	1.29	0.91
Caspase-8	1.01	1.04
Eotaxin	0.94	1.04
C-C motif chemokine 19	1	0.96
C-C motif chemokine 20	1.09	0.97
C-C motif chemokine 23	1.06	1.1
C-C motif chemokine 25	1.06	1.02
C-C motif chemokine 28	0.76	0.84
C-C motif chemokine 3	1	0.96
C-C motif chemokine 4	0.98	1.02
Natural killer cell receptor 2B4	1.02	1
CD40L receptor	1.03	1.04
T-cell surface glycoprotein CD5	1.09	1.07
T cell surface glycoprotein CD6 isoform	1.04	0.97
CUB domain-containing protein 1	1.04	1.14
Macrophage colony-stimulating factor 1	1.01	1.13
Cystatin D	1.04	0.97
Fractalkine	1.12	1.03

Artemin	0.98	1.04
Artemin	1.06	1.02
Brain-derived neurotrophic factor	1.29	0.93
Beta-nerve growth factor	1.04	1.04
Caspase-8	1	0.98
C-C motif chemokine 19	1	0.96
C-C motif chemokine 20	1.09	0.97
C-C motif chemokine 23	1.06	1.1
C-C motif chemokine 25	1.06	1.02
C-C motif chemokine 28	0.76	0.84
C-C motif chemokine 3	0.98	0.96
C-C motif chemokine 4	1	0.98
Natural killer cell receptor 2B4	1.02	1
CD40L receptor	1.03	1.04
T-cell surface glycoprotein CD5	1.09	1.07
T cell surface glycoprotein CD6 isoform	1.04	0.97
CUB domain-containing protein 1	1.04	1.14
Macrophage colony-stimulating factor 1	1.01	1.13
Cystatin D	1.04	0.97
Fractalkine	1.12	1.03
Artemin	1.06	1.02
C-C motif chemokine 10	1.05	0.97
C-C motif chemokine 11	1.05	1.02
C-C motif chemokine 12	1.05	1.02
C-C motif chemokine 6	0.93	1
C-C motif chemokine 9	1	0.98
Duffy and Nod2	1.14	1.09
Fukutin truncated intracellular domain-binding protein 1	1.21	1.03
Fractalkine	1.04	1.06
Fibroblast growth factor 19	1.08	1.06
Fibroblast growth factor 2	1.04	1.02
Fibroblast growth factor 23	1.08	1.06
Fibroblast growth factor 5	1.03	0.98
Fibroblast growth factor 2 ligand	1.13	1.09
Gilt cell line-derived oncogenetic factor	1.08	1.05
Hepatocyte growth factor	1.04	1
Intrinsic gamma	1.04	0.79
Intrinsic IgM	0.99	1.16
Intrinsic IgM receptor subunit alpha	1.02	0.98
Intrinsic IgM receptor subunit beta	1.1	1.05
Intrinsic IgM receptor subunit beta	1.08	1.05
Intrinsic IgM receptor subunit alpha	1.04	1.11
Intrinsic IgM receptor subunit alpha	1.02	1
Intrinsic IgM receptor	0.93	1
Intrinsic IgM receptor 1	1.04	1.04
Intrinsic IgM receptor 2	0.97	1.08
Intrinsic IgM receptor 3	0.94	1.08
Intrinsic IgM receptor 3 alpha	1.09	1.12
Intrinsic IgM receptor 3 alpha	1.09	0.97
Intrinsic IgM receptor 20	1.22	0.98
Intrinsic IgM receptor subunit alpha	1.02	0.98
Intrinsic IgM receptor subunit alpha-1	1	0.92
Intrinsic IgM receptor 24	0.98	1.03
Intrinsic IgM receptor subunit beta	1.08	0.93
Intrinsic IgM receptor	1.03	0.99
Intrinsic IgM receptor	0.98	1.05
Intrinsic IgM receptor	0.97	1.04
Intrinsic IgM receptor	1.08	1
Intrinsic IgM receptor	1.05	0.93
Lectin-like oxidized LDL receptor	1.06	0.98
Lectin-like oxidized LDL receptor	1.01	0.92
Leukemia inhibitory factor	1.04	0.98
Leukemia inhibitory factor receptor	1.04	1.08
Mitogen-activated protein kinase 4	1.02	1.08
Mitogen-activated protein kinase 2	0.92	1.06
Mitotic spindle protein 3	1.01	0.92
Matrix metalloproteinase 1	1.05	0.97
Matrix metalloproteinase 10	1.1	1.1
Neurogranulin	0.93	1.06
Neurogranulin	1.07	1.08
Oncostatin M	1.09	1.05
Programmed cell death 1 ligand 3	0.93	1.06
Stress cell factor	1.05	1.08
SH2B-like protein 2	1.04	1.02
Stimulatory G-protein activation molecule	1.02	0.98
Stimulatory G-protein activation molecule 1	1.01	1.07
Stimulatory G-protein activation molecule 1	1.01	0.99
Transforming growth factor alpha	1.09	1.02
Latency-associated peptide transforming growth factor beta-1	1.01	0.99
TNF type	0.97	1.09
Tumor necrosis factor receptor superfamily member 9	1.04	1.02
Tumor necrosis factor ligand superfamily member 14	1.02	1.08
Tumor necrosis factor ligand superfamily ligand	1.08	1.01
TNF-related apoptosis-inducing ligand	1.1	1.11
TNF-related apoptosis-inducing ligand	1.03	1.08
Thrombin receptor	1.01	0.98
Transferrin receptor	1.02	1.03
Unrelated-type phosphoglycerate kinase	1.24	1.08
Vascular endothelial growth factor A	1	1.16

Table 3: Ratio of square distances between each person friend and each person non-friends, stratify by sex. Values greater than 1 indicate that friends have a smaller difference in biomarkers levels compared with their non-friends counterpart.

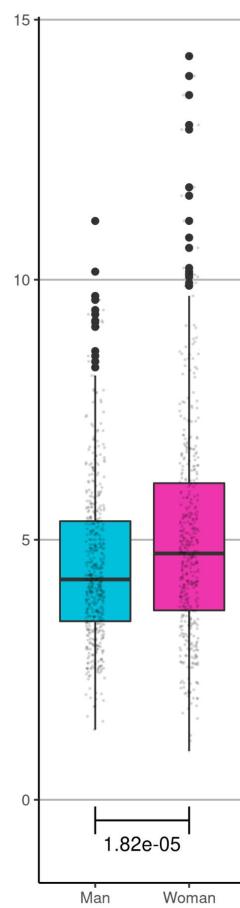
>1.1    12 proteins for men, and another 12 for women

<0.9    3 proteins for men, and 5 for women

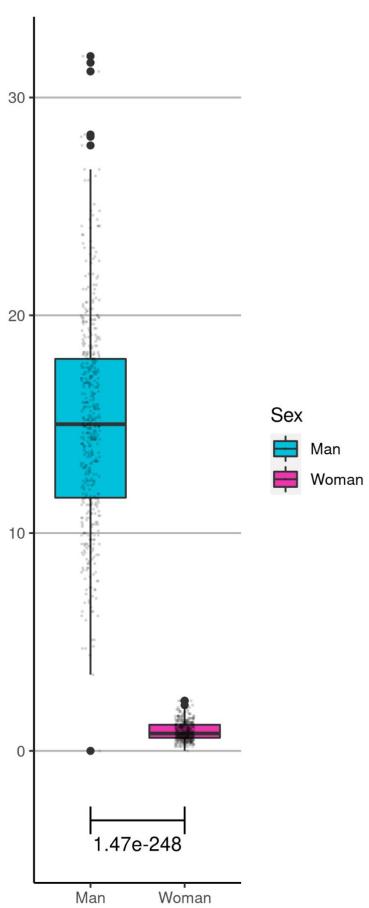
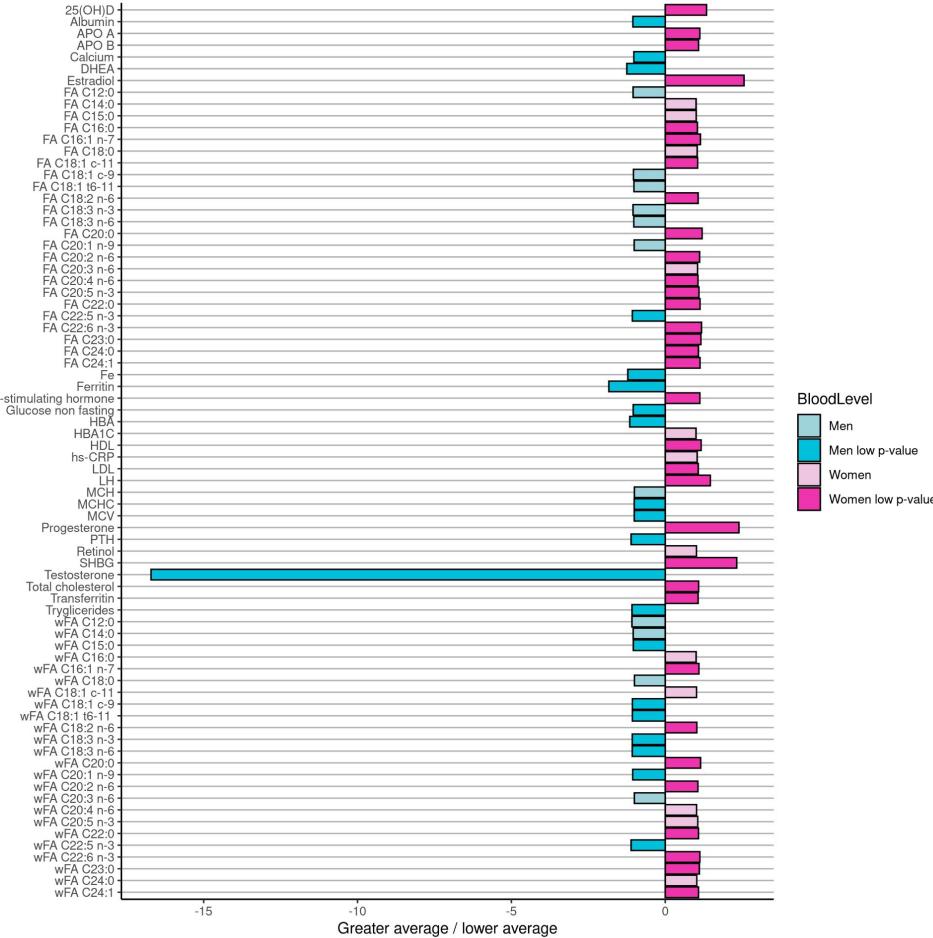
**#2 - Relationship between  
anthropometry, lipoprotein profile and  
inflammatory biomarkers in a  
general youth population**

Analysis	Reference range	Result
P-ALAT	10-70	20
B-Hemoglobin	13,0-17,0	13.1
B-Leukocytter	4,0-11,0	6.3
B-Trombocytter	150-450	283
Nyre-estimert GFR (overfl.=1,73m2)		113
P-25-OH Vitamin D2		<10
P-25-OH Vitamin D3		36
P-Vitamin D (25-OH) (D2+D3)	50-150	36 ***
P-Alkalisk fosfatase (IFCC 2011)	35-105	45
P-Ferritin	29-383	140
P-GT	10- 80	10
P-Kreatinin	60-105	74
P-Testosteron	6,7-31,9	29.3
P-Vit. B9 (Folsyre)	>5	11
B-HbA1c	20-48	37

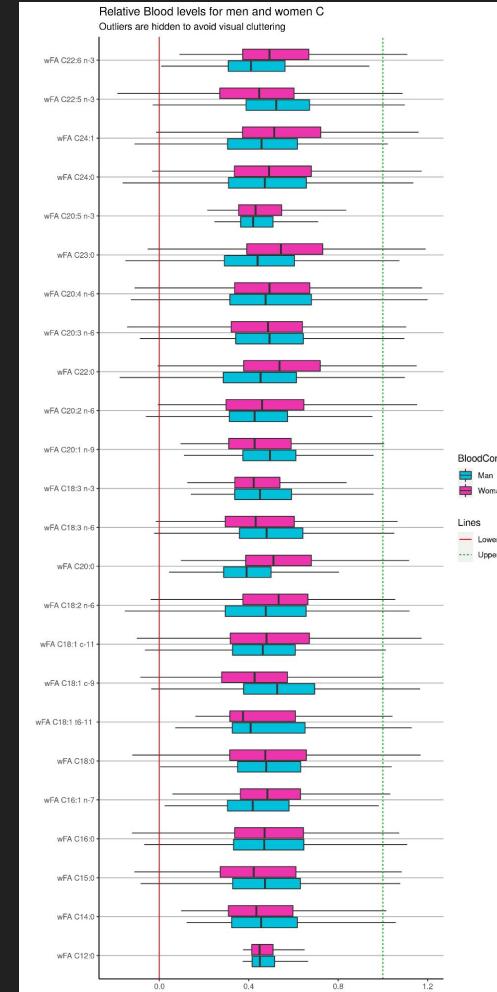
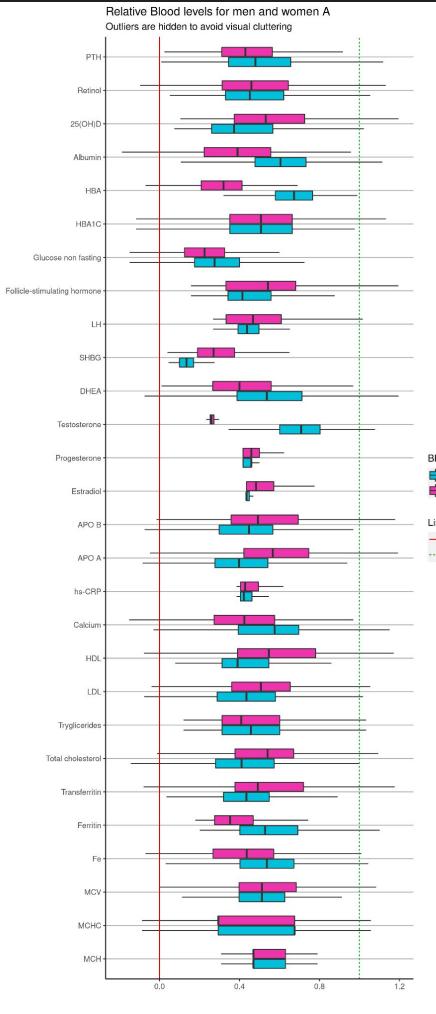
FA C20:2 n-6 (mcg/ml)



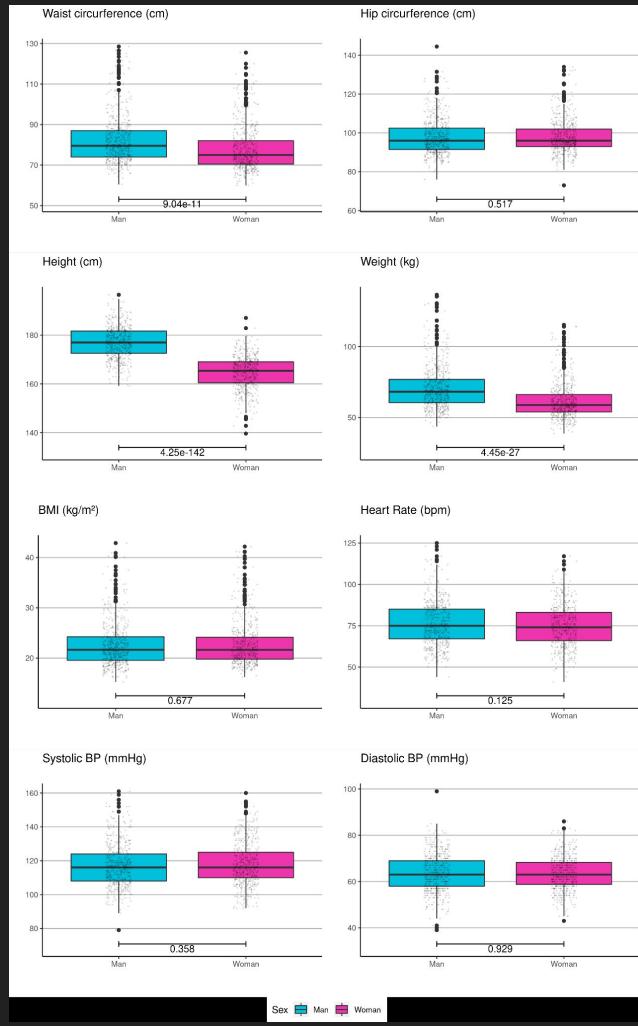
Testosterone (nmol/L)

Ratio of averages for each blood levels with respect sex  
Grouped by BloodLevel

Analysis	Reference range	Result
P-ALAT	10-70	20
B-Hemoglobin	13, 0-17, 0	13.1
B-Leukocytter	4, 0-11, 0	6.3
B-Trombocytter	150-450	283
Nyre-estimert GFR (overfl.=1,73m2)		113
P-25-OH Vitamin D2		<10
P-25-OH Vitamin D3		36
P-Vitamin D (25-OH) (D2+D3)	50-150	36 ***
P-Alkalisk fosfatase (IFCC 2011)	35-105	45
P-Ferritin	29-383	140
P-GT	10- 80	10
P-Kreatinin	60-105	74
P-Testosteron	6, 7-31, 9	29.3
P-Vit. B9 (Folsyre)	>5	11
B-HbA1c	20-48	37



Description	Short	Unit	Men Lower Limit	Men Upper Limit	Women Lower Limit	Women Upper Limit	$\bar{x}_{men}$	$\bar{x}_{women}$	Significance	$Men_{out}$	$Women_{out}$
Mean corpuscular hemoglobin (pg). EDTA whole blood	MCH	pg	26.08	32.3	26.08	32.3	29.25	29.12	ns	2.2%	5%
Mean corpuscular hemoglobin concentration (g/dL). EDTA whole blood	MCHC	g/dL	32.23	34.85	32.23	34.85	33.68	33.39	****	4.2%	5.3%
Mean corpuscular volume (fl). EDTA whole blood	MCV	fL	78.03	95.53	78.03	95.53	87.09	86.43	*	2.1%	5.8%
Fe ( $\mu$ mol/L). Serum	Fe	$\mu$ mol/L	2.09	31.69	2.09	31.69	18.47	15.18	****	3.8%	0.5%
Ferritin (ug/L). Serum	Ferritin	ug/L	-21.95	112.37	-21.95	112.37	57.6	31.42	****	6.3%	0%
Transferrin (g/L). Serum	Transferrin	g/L	2.04	3.79	2.04	3.79	2.83	3.02	****	2.9%	0.7%
Total cholesterol (mmol/L). Serum	Total cholesterol	mmol/L	2.54	5.61	2.54	5.61	3.91	4.25	****	3.4%	0.2%
Triglycerides (mmol/L). Serum	Triglycerides	mmol/L	0.05	2.13	0.05	2.13	1.13	1.05	*	5.9%	0%
Low density lipoprotein cholesterol (mmol/L). Serum	LDL	mmol/L	1.01	3.75	1.01	3.75	2.3	2.46	***	4%	0.5%
High density lipoprotein cholesterol (mmol/L). Serum	HDL	mmol/L	0.7	1.98	0.7	1.98	1.24	1.45	****	1.9%	0.2%
Calcium (mmol/L). Serum	Calcium	mmol/L	2.15	2.48	2.15	2.48	2.34	2.29	****	5.1%	4.5%
High-sensitive CRP. Serum	hs-CRP		-5.11	8.15	-5.11	8.15	1.49	1.55	ns	3.6%	0%
Apolipoprotein A1 (g/L). Serum	APO A	g/L	0.88	1.71	0.88	1.71	1.22	1.37	****	3.8%	0.7%
Apolipoprotein B (g/L). Serum	APO B	g/L	0.3	0.97	0.3	0.97	0.61	0.66	****	3.8%	0.2%
Serum estradiol, E2 (nmol/L)	Estradiol	nmol/L	-0.54	0.93	-0.54	0.93	0.11	0.29	****	0%	0%
Serum progesterone (nmol/L)	Progesterone	nmol/L	-9.19	15.18	-9.19	15.18	1.81	4.32	****	0%	0%
Serum testosterone (nmol/L)	Testosterone	nmol/L	-7.41	24.23	-7.41	24.23	15.12	0.9	****	3.4%	0%
Serum dehydroepiandrosterone sulphate ( $\mu$ mol/L)	DHEA	$\mu$ mol/L	1.29	11.83	1.29	11.83	7.24	5.8	****	6.5%	0%
Serum sex hormone binding globulin (SHBG) (nmol/L)	SHBG	nmol/L	0	200	0	200	28.69	66.61	****	0%	0%
Serum luteinizing hormone (LH) (IU/L)	LH	IU/L	-4.88	15.17	-4.88	15.17	4.22	6.18	****	0.2%	0%
Serum follicle-stimulating hormone (FSH) (IU/L)	Follicle-stimulating hormone	IU/L	-1.03	8.7	-1.03	8.7	3.62	4.07	**	2.2%	0%
Glucose (mmol/L). Non-fasting serum	Glucose non fasting	mmol/L	4	8	4	8	5.16	4.95	***	4.6%	5.7%
Glycated haemoglobin (%). EDTA whole blood	HbA1C	%	4.65	5.93	4.65	5.93	5.29	5.29	ns	1.9%	1.5%
Haemoglobin (g/dL). EDTA whole blood	HbA	g/dL	10.98	16.36	10.98	16.36	14.59	12.65	****	1.9%	3.9%
Albumin (g/L). Serum	Albumin	g/L	40.62	50.83	40.62	50.83	46.85	44.51	****	4.2%	6.4%
25(OH)D (nmol/L). Serum	25(OH)D	nmol/L	0.42	92.88	0.42	92.88	40.13	35.89	****	2.2%	0%
Retinol ( $\mu$ mol/L). Serum	Retinol	$\mu$ mol/L	0.62	4.32	0.62	4.32	2.46	2.49	ns	3.2%	0.5%
Plasma Parathyroid hormone (pmol/L)	PTH	pmol/L	1.25	7.19	1.25	7.19	4.43	3.99	****	5.1%	0%
FA C12:0 (mcg/ml). Serum	FA C12:0	mcg/ml	-21.76	32.95	-21.76	32.95	5.71	5.47	ns	1.6%	0%
FA C14:0 (mcg/ml). Serum	FA C14:0	mcg/ml	-10.61	72.5	-10.61	72.5	30.9	30.99	ns	4.1%	0%
FA C15:0 (mcg/ml). Serum	FA C15:0	mcg/ml	1.07	9.86	1.07	9.86	5.45	5.48	ns	3.2%	0%
FA C16:0 (mcg/ml). Serum	FA C16:0	mcg/ml	191.56	960.72	191.56	960.72	564.26	589.33	*	4.9%	0.7%
FA C16:1 n-7 (mcg/ml). Serum	FA C16:1 n-7	mcg/ml	-7.29	106.81	-7.29	106.81	46.61	53.26	***	3%	0%
FA C18:0 (mcg/ml). Serum	FA C18:0	mcg/ml	76.01	322.85	76.01	322.85	195.89	203.35	ns	4.3%	1.6%
FA C18:1 t6-11 (mcg/ml). Serum	FA C18:1 t6-11	mcg/ml	-6.12	47.68	-6.12	47.68	20.95	20.59	ns	4.5%	0%
FA C18:1 c-9 (mcg/ml). Serum	FA C18:1 c-9	mcg/ml	132.36	926.21	132.36	926.21	537.94	519.67	ns	5.1%	0.2%
FA C18:1 c-11(mcg/ml). Serum	FA C18:1 c-11	mcg/ml	11.53	63.91	11.53	63.91	36.78	38.76	*	4.1%	0.2%
FA C18:2 n-6 (mcg/ml). Serum	FA C18:2 n-6	mcg/ml	310.87	1022.44	310.87	1022.44	645.65	689.97	***	3.2%	1.8%

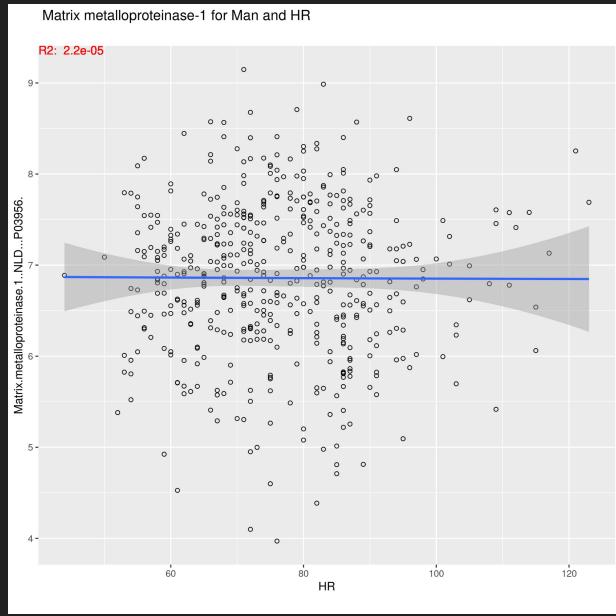


Concept	$\bar{x}_{men}$	$\bar{x}_{women}$	$SD_{men}$	$SD_{women}$	Significance
Waist	82.4	77.8	11.7	10.8	****
Hip	97.8	98.1	8.8	8.3	ns
Height	176.9	164.7	6.6	6.6	****
Weight	70.6	61.4	14.6	12.2	****
BMI	22.5	22.6	4.2	4.2	ns
HR	76.2	74.9	13.3	12.4	ns
SYSBP	117.4	118.1	12.8	12.9	ns
DIABP	63.5	63.5	8.1	7.4	ns

**Table 4:** Sex differences for antropometry variables

Protein	Waist	Hip	Height	Weight	BMI	HR	SYSBP	DIABP
C-C motif chemokine 3	****	**	ns	***	***	ns	ns	ns
C-C motif chemokine 4	**	ns	ns	ns	ns	ns	ns	ns
CUB domain-containing protein 1	****	****	ns	****	****	ns	ns	ns
Macrophage colony-stimulating factor 1	**	****	ns	***	***	ns	ns	ns
Delta and Notch-like epidermal growth factor-related receptor	*	*	ns	**	*	ns	ns	ns
Fibroblast growth factor 19	ns	ns	ns	ns	*	ns	ns	ns
Fibroblast growth factor 21	****	**	ns	*	**	ns	ns	ns
Glial cell line-derived neurotrophic factor	**	ns	ns	*	**	ns	ns	ns
Hepatocyte growth factor	****	***	ns	****	****	ns	ns	ns
Interleukin-18	****	****	ns	***	***	ns	ns	ns
Interleukin-18 receptor 1	****	****	ns	****	****	ns	ns	ns
Interleukin-20	ns	****	ns	**	ns	ns	ns	ns
Interleukin-6	****	***	ns	****	****	ns	ns	ns
Monocyte chemoattractant protein 3	****	****	ns	****	****	ns	ns	ns
Stem cell factor	****	****	ns	****	****	ns	ns	ns
Signaling lymphocytic activation molecule	ns	ns	*	ns	ns	ns	ns	ns
Tumor necrosis factor receptor superfamily member 9	***	ns	ns	*	**	ns	ns	ns

**Table 5:** Biomarkers that are statistically significant with respect the antropometry variables in men, after applying Bonferroni correction



Protein	Waist	Hip	Height	Weight	BMI	HR	SYSBP	DIABP
Caspase-8	*	***	ns	***	***	ns	ns	ns
C-C motif chemokine 3	*	ns	ns	*	ns	ns	ns	ns
CUB domain-containing protein 1	****	****	ns	****	****	ns	ns	ns
Macrophage colony-stimulating factor 1	****	***	ns	**	**	ns	ns	ns
Delta and Notch-like epidermal growth factor-related receptor	ns	ns	ns	*	*	ns	ns	ns
Fibroblast growth factor 21	*	*	ns	ns	*	ns	ns	ns
Hepatocyte growth factor	****	***	ns	**	***	ns	ns	ns
Interleukin-10 receptor subunit beta	****	*	ns	**	**	ns	ns	ns
Interleukin-18	**	*	ns	*	**	ns	ns	ns
Interleukin-18 receptor 1	****	***	ns	***	***	ns	ns	ns
Interleukin-2	*	ns	ns	ns	ns	ns	ns	ns
Interleukin-6	****	****	ns	****	****	ns	ns	ns
Interleukin-7	**	**	ns	**	*	ns	ns	ns
Monocyte chemotactic protein 3	****	****	ns	****	****	ns	ns	ns
Monocyte chemotactic protein 4	*	ns	ns	ns	*	ns	ns	ns
Latency-associated peptide transforming growth factor beta-1	*	*	ns	ns	ns	ns	ns	ns
TNF-related apoptosis-inducing ligand	**	*	ns	ns	*	ns	ns	ns
TNF-related activation-induced cytokine	*	**	ns	*	ns	ns	ns	ns
Vascular endothelial growth factor A	**	*	ns	*	***	ns	ns	ns

**Table 6:** Biomarkers that are statistically significant with respect the antropometry variables in women, after applying Bonferroni correction

Protein	MCH	MCHC	MCV	Fe	Tryptophan	Hb	HbA2	HbA	PtH	FA.C129	FA.C140	FA.C159	FA.C169	FA.C161 n-7	FA.C180	FA.C181 6-11	FA.C181 6-9	FA.C181 6-11	FA.C182 6-5	FA.C182 6-5	FA.C182 6-5	FA.C184 6-5	FA.C185 6-5	FA.C186 6-5	FA.C187 6-5	FA.C188 6-5	FA.C189 6-5	FA.C190	FA.C215 6-3	FA.C215 6-3	FA.C160	FA.C161 n-7	FA.C181 c-9	FA.C203 n-6	FA.C120	FA.C150	FA.C180	FA.C240
Adenosine Deaminase																																						
Axin-1																																						
Beta-derived neurotrophic factor																																						
C-C motif chemokine 2																																						
C-C motif chemokine 4																																						
CUB domain-containing protein 1																																						
Macrophage colony-stimulating factor 1																																						
C-X-C motif chemokine 9																																						
Fibroblast growth factor 5																																						
Interleukin-18 receptor 1																																						
Interleukin-20																																						
Interleukin-22 receptor subunit alpha-1																																						
Interleukin-6																																						
Leukemia inhibitory factor																																						
Monocyte chemoattractant protein 1																																						
Oncostatin-M																																						
Programmed cell death 1 ligand 1																																						
Stem cell factor																																						
Tumor necrosis factor																																						
Tumor necrosis factor receptor superfamily member 9																																						
TNF-related activation-induced cytokine																																						

**Table 7:** Biomarkers that are statistically significant with respect the blood variables in men, after applying Bonferroni correction.  
Non-significant values appears as a white space for easy reading.

Protein	MCH	MCHC	MCV	Fe	Tryptophan	Hb	HbA2	HbA	PtH	FA.C129	FA.C140	FA.C159	FA.C169	FA.C161 n-7	FA.C180	FA.C181 6-11	FA.C181 6-9	FA.C181 6-11	FA.C182 6-5	FA.C182 6-5	FA.C182 6-5	FA.C184 6-5	FA.C185 6-5	FA.C186 6-5	FA.C187 6-5	FA.C188 6-5	FA.C189 6-5	FA.C190	FA.C215 6-3	FA.C215 6-3	FA.C160	FA.C161 n-7	FA.C181 c-9	FA.C203 n-6	FA.C120	FA.C150	FA.C180	FA.C240
Adenosine Deaminase																																						
Axin-1																																						
Beta-derived neurotrophic factor																																						
C-C motif chemokine 2																																						
C-C motif chemokine 4																																						
CUB domain-containing protein 1																																						
Macrophage colony-stimulating factor 1																																						
C-X-C motif chemokine 9																																						
Fibroblast growth factor 5																																						
Interleukin-18 receptor 1																																						
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Interleukin-22 receptor subunit alpha-1																																						
Interleukin-6																																						
Leukemia inhibitory factor																																						
Monocyte chemoattractant protein 1																																						
Oncostatin-M																																						
Programmed cell death 1 ligand 1																																						
Stem cell factor																																						
SIR2-like protein 2																																						
Sulfatases-activating 1A1																																						
STAM-binding protein																																						
Tumor necrosis factor																																						
Tumor necrosis factor receptor superfamily member 9																																						
TNF-related apoptosis-inducing ligand																																						
TNF-related activation-induced cytokine																																						
Tumor necrosis factor																																						
Urokinase-type plasminogen activator																																						
Vascular endothelial growth factor A																																						

**Table 8:** Biomarkers that are statistically significant with respect the blood variables in women, after applying Bonferroni correction.  
Non-significant values appears as a white space for easy reading.

# #3 - Host risk factors and inflammatory biomarkers influence in a general youth population

Variable	p-value	Significance
GeneralHealth	7.52e-01	ns
BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*
WinterTransport	3.63e-01	ns
ScreenTime	9.56e-02	ns
LeanFishFrequency	4.71e-01	ns
FatFishFrequency	3.93e-01	ns
CheeseFrequency	7.37e-01	ns
ChocolateFrequency	5.98e-01	ns
FruitsFrequency	3.98e-01	ns
VegetablesFrequency	9.90e-01	ns
DairyFrequency	7.74e-01	ns
FruitJuiceFrequency	6.46e-02	ns
SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****

Table 1: Sex differences for all categorical host factor

Recreational drugs

Physical activity

Diet

STAPH

Variable	p-value	Significance
GeneralHealth	7.52e-01	ns
BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*
WinterTransport	3.63e-01	ns
ScreenTime	9.56e-02	ns
LeanFishFrequency	4.71e-01	ns
FatFishFrequency	3.93e-01	ns
CheeseFrequency	7.37e-01	ns
ChocolateFrequency	5.98e-01	ns
FruitsFrequency	3.98e-01	ns
VegetablesFrequency	9.90e-01	ns
DairyFrequency	7.74e-01	ns
FruitJuiceFrequency	6.46e-02	ns
SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****

Table 1: Sex differences for all categorical host factor

Recreational drugs

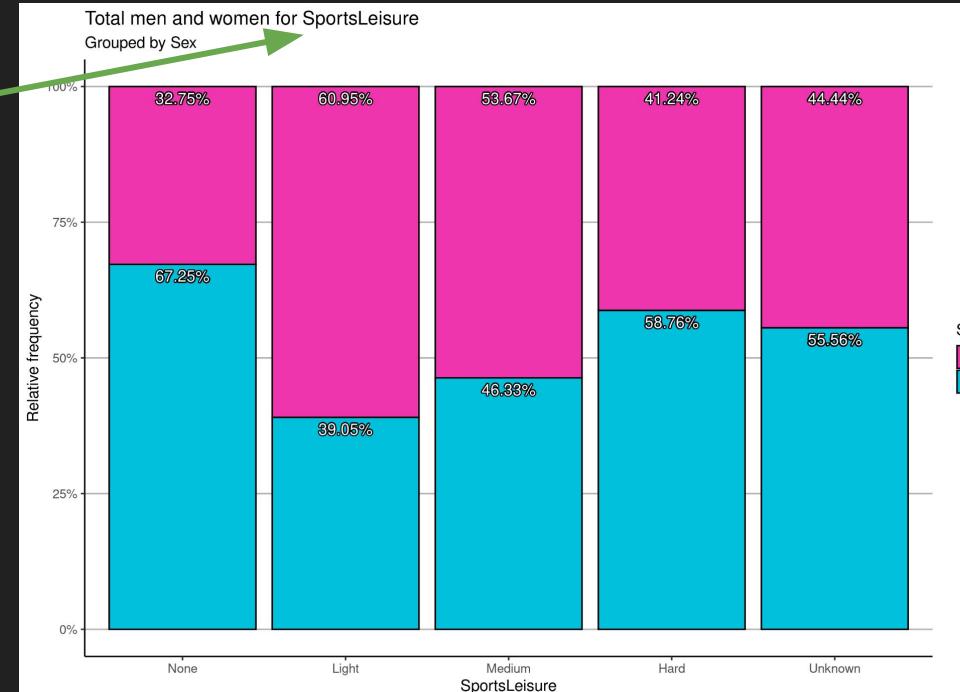
Physical activity

Diet

STAPH

Variable	p-value	Significance
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BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*
WinterTransport	3.63e-01	ns
ScreenTime	9.56e-02	ns
LeanFishFrequency	4.71e-01	ns
FatFishFrequency	3.93e-01	ns
CheeseFrequency	7.37e-01	ns
ChocolateFrequency	5.98e-01	ns
FruitsFrequency	3.98e-01	ns
VegetablesFrequency	9.90e-01	ns
DairyFrequency	7.74e-01	ns
FruitJuiceFrequency	6.46e-02	ns
SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****

Table 1: Sex differences for all categorical host factor



Recreational drugs

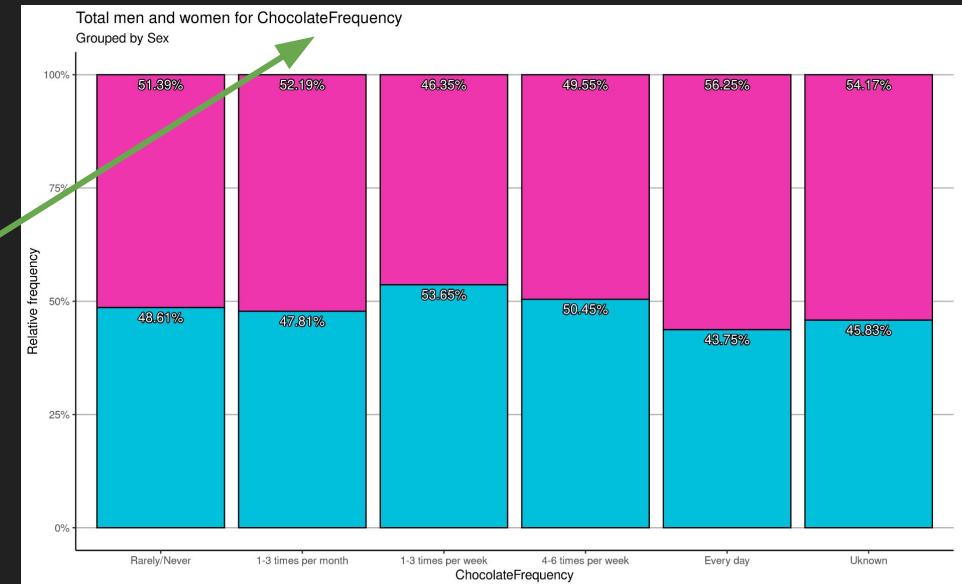
Physical activity

Diet

STAPH

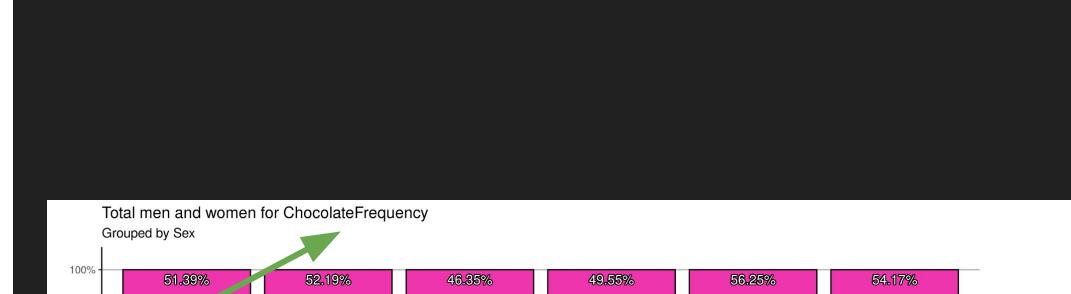
Variable	p-value	Significance
GeneralHealth	7.52e-01	ns
BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*
WinterTransport	3.63e-01	ns
ScreenTime	9.56e-02	ns
LeanFishFrequency	4.71e-01	ns
FatFishFrequency	3.93e-01	ns
CheeseFrequency	7.37e-01	ns
ChocolateFrequency	5.98e-01	ns
FruitsFrequency	3.98e-01	ns
VegetablesFrequency	9.90e-01	ns
DairyFrequency	7.74e-01	ns
FruitJuiceFrequency	6.46e-02	ns
SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****

Table 1: Sex differences for all categorical host factor



Recreational drugs {  
Physical activity }

Variable	p-value	Significance
GeneralHealth	7.52e-01	ns
BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*

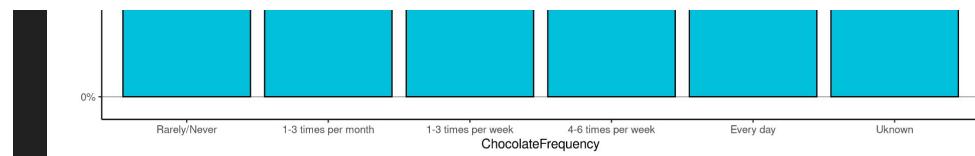


ChocolateFrequency	Rarely/Never	1-3 times per month	1-3 times per week	4-6 times per week	Every day	Unknown	Total	Freq
Man	35	(0.03)	120	(0.12)	294	(0.28)	56	(0.05)
Woman	37	(0.04)	131	(0.13)	254	(0.24)	55	(0.05)
Total	72		251		548		111	
Freq		0.07		0.24		0.53		0.11
							11	(0.01)
							14	
							18	
							24	
							530	0.51
							508	0.49
							1038	
							0.02	
								1

Diet

**Table 3:** *Sex differences for ChocolateFrequency*

SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****



STAPH

**Table 1:** *Sex differences for all categorical host factor*

# x92

# Biomarkers

Variable	p-value	Significance
GeneralHealth	7.52e-01	ns
BMI_Categorical	1.49e-01	ns
Smoke	1.07e-01	ns
Snuff	1.88e-03	**
Alcohol	1.08e-02	*
SportsLeisure	6.46e-11	****
SummerTransport	3.40e-02	*
WinterTransport	3.63e-01	ns
ScreenTime	9.56e-02	ns
LeanFishFrequency	4.71e-01	ns
FatFishFrequency	3.93e-01	ns
CheeseFrequency	7.37e-01	ns
ChocolateFrequency	5.98e-01	ns
FruitsFrequency	3.98e-01	ns
VegetablesFrequency	9.90e-01	ns
DairyFrequency	7.74e-01	ns
FruitJuiceFrequency	6.46e-02	ns
SugarJuiceFrequency	5.77e-01	ns
SugarDrinkFrequency	9.97e-01	ns
SweetenerDrinkFrequency	4.61e-01	ns
WaterFrequency	3.91e-01	ns
HighSchool	5.98e-16	****
D_NasalCarrier	1.90e-05	****
D_ThroatCarrier	2.22e-03	**
E_NasalCarrier	2.96e-04	***
E_ThroatCarrier	9.95e-07	****

Table 1: Sex differences for all categorical host factor

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	C-C motif chemokine 3	***	ns
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	**	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	***	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
HighSchool	Urokinase-type plasminogen activator	**	*
LeanFishFrequency	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-4	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	**
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

# Obesity

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	C-C motif chemokine 3	***	ns
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	**	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	***	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
HighSchool	Urokinase-type plasminogen activator	**	*
LeanFishFrequency	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-4	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	**
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

# Drugs

# Obesity

# Drugs

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	C-C motif chemokine 3	***	ns
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	**	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	***	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
LeanFishFrequency	Urokinase-type plasminogen activator	**	*
Smoke	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-4	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	**
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

# Drugs

# Obesity

# Diet

# Diet

# Drugs

# Diet

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	C-C motif chemokine 3	***	ns
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	**	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	***	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
LeanFishFrequency	Urokinase-type plasminogen activator	**	*
Smoke	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-4	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	**
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	C-C motif chemokine 3	***	ns
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	**	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	***	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
LeanFishFrequency	Urokinase-type plasminogen activator	**	*
Smoke	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-4	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	**
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMI_categorical	C-C motif chemokine 3	***	ns
BMI_categorical	CUB domain-containing protein 1	****	****
BMI_categorical	Delta and Notch-like epidermal growth factor-related receptor	ns	**
BMI_categorical	Fibroblast growth factor 21	**	ns
BMI_categorical	Glia cell line-derived neurotrophic factor	**	ns
BMI_categorical	Hepatocyte growth factor	****	**
BMI_categorical	Interleukin-10 receptor subunit beta	ns	**
BMI_categorical	Interleukin-18	**	**
BMI_categorical	Interleukin-18 receptor 1	****	****
BMI_categorical	Interleukin-6	****	****
BMI_categorical	Macrophage colony-stimulating factor	*	**
BMI_categorical	Matrix metalloproteinase-1	*	ns
BMI_categorical	Monocyte chemoattractant protein 3	****	****
BMI_categorical	Monocyte chemoattractant protein 4	ns	**
BMI_categorical	Stem cell factor	****	ns
BMI_categorical	TNF-related apoptosis-inducing ligand	ns	*
BMI_categorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMI_categorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
LeanFishFrequency	Urokinase-type plasminogen activator	**	*
Smoke	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-6	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweeterenerDrinkFrequency	Neurotrophin-3	ns	***
WinterTransport	C-C motif chemokine 19	*	ns

Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

Variable	Biomarker	Men	Women
Alcohol	Delta and Notch-like epidermal growth factor-related receptor	**	ns
Alcohol	Fibroblast growth factor 5	ns	*
Alcohol	Urokinase-type plasminogen activator	ns	**
BMICategorical	CUB domain-containing protein 1	****	****
BMICategorical	Fractalkine	ns	ns
BMICategorical	Fibroblast growth factor 21	**	ns
BMICategorical	Glia cell line-derived neurotrophic factor	**	ns
BMICategorical	Hepatocyte growth factor	****	**
BMICategorical	Interleukin-10 receptor subunit beta	ns	**
BMICategorical	Interleukin-18	ns	**
BMICategorical	Interleukin-18 receptor 1	****	****
BMICategorical	Interleukin-6	ns	****
BMICategorical	Macrophage colony-stimulating factor 1	*	**
BMICategorical	Matrix metalloproteinase-1	*	ns
BMICategorical	Monocyte chemoattractant protein 3	****	****
BMICategorical	Monocyte chemoattractant protein 4	ns	**
BMICategorical	Stem cell factor	****	ns
BMICategorical	TNF-related apoptosis-inducing ligand	ns	*
BMICategorical	Tumor necrosis factor receptor superfamily member 9	**	ns
BMICategorical	Vascular endothelial growth factor A	ns	****
ChocolateFrequency	Interleukin-2	ns	*
ChocolateFrequency	Leukemia inhibitory factor receptor	ns	*
DairyFrequency	Interleukin-20 receptor subunit alpha	**	ns
FatFishFrequency	Hepatocyte growth factor	*	ns
FatFishFrequency	Stem cell factor	***	ns
FatFishFrequency	Tumor necrosis factor	*	ns
FruitJuiceFrequency	Neurotrophin-3	ns	****
FruitJuiceFrequency	Interleukin-13	*	ns
GeneralHealth	Leukemia inhibitory factor	*	ns
GeneralHealth	Matrix metalloproteinase-1	ns	*
HighSchool	C-X-C motif chemokine 10	*	ns
HighSchool	Delta and Notch-like epidermal growth factor-related receptor	***	ns
HighSchool	Fibroblast growth factor 21	***	***
HighSchool	Fibroblast growth factor 23	**	ns
HighSchool	Fractalkine	**	ns
HighSchool	Interleukin-2	**	ns
HighSchool	Leukemia inhibitory factor receptor	*	ns
HighSchool	Monocyte chemoattractant protein 1	ns	*
HighSchool	Osteoprotegerin	**	ns
HighSchool	Tumor necrosis factor ligand superfamily member 14	*	ns
LeanFishFrequency	Urokinase-type plasminogen activator	**	*
Smoke	Fibroblast growth factor 21	ns	*
Smoke	Delta and Notch-like epidermal growth factor-related receptor	ns	*
Smoke	Fibroblast growth factor 21	ns	**
Smoke	Leukemia inhibitory factor receptor	ns	***
Smoke	Matrix metalloproteinase-10	*	ns
Smoke	Stem cell factor	ns	***
Smoke	Urokinase-type plasminogen activator	ns	****
Snuff	Adenosine Deaminase	*	ns
Snuff	Fractalkine	*	ns
Snuff	Glia cell line-derived neurotrophic factor	ns	*
Snuff	Stem cell factor	ns	*
Snuff	Urokinase-type plasminogen activator	ns	*
SportsLeisure	Adenosine Deaminase	ns	**
SportsLeisure	C-C motif chemokine 19	*	ns
SportsLeisure	Fibroblast growth factor 21	****	**
SportsLeisure	Interleukin-6	ns	**
SportsLeisure	Urokinase-type plasminogen activator	*	ns
SummerTransport	Interleukin-4	****	ns
SweetenerDrinkFrequency	Neurotrophin-3	ns	***
WinterTransport	C-C motif chemokine 19	*	ns

### Levels for CDCP1 with BMICategorical

Stratified by sex

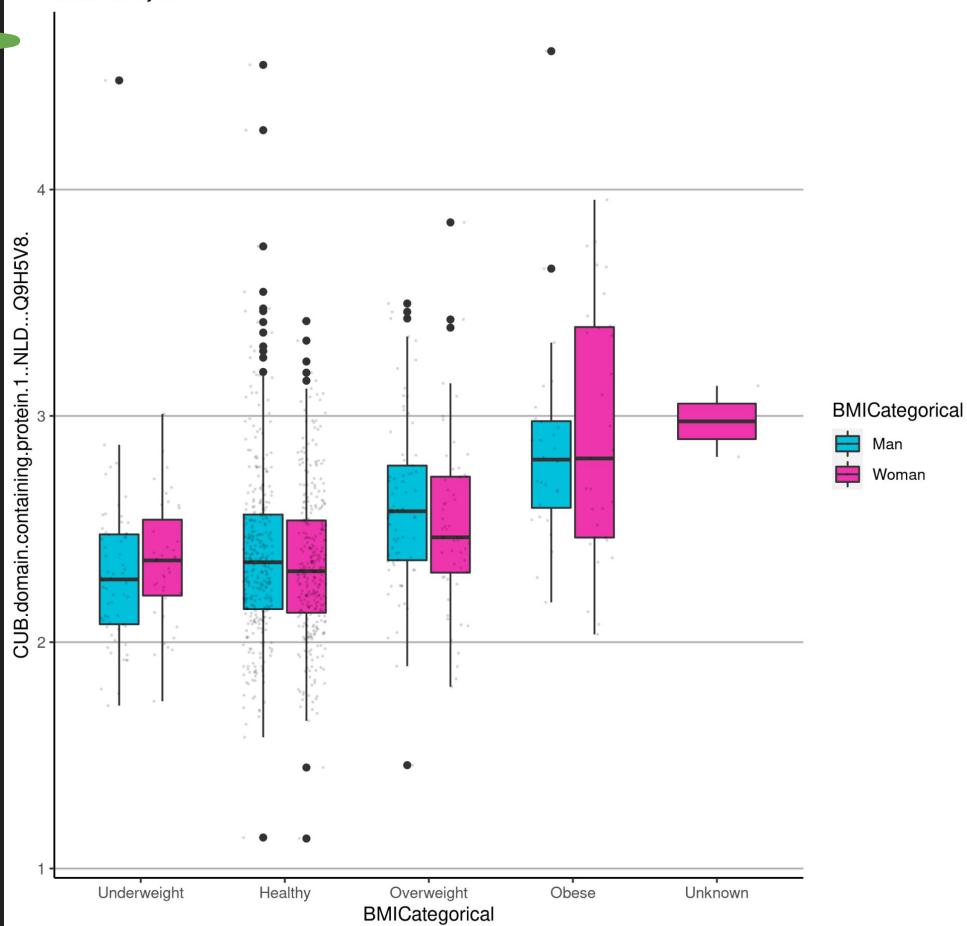


Table 4: Biomarkers that are statistically significant for either men or women, after Bonferroni correction

# #4 - Medicine usage, diseases, and inflammatory biomarkers in a general youth population

Modality	Count	Relative	Cumulative
Skin and subcutaneous tissue	264	0.56	0.56
Respiratory system	137	0.29	0.84
Mental and behavioural	16	0.03	0.88
Nervous system	15	0.03	0.91
Musculoskeletal system and connective tissue	10	0.02	0.93
Digestive system	7	0.01	0.95
Neoplasms	6	0.01	0.96
Injury, poisoning and certain other consequences of external causes	6	0.01	0.97
Endocrine, nutritional and metabolic	4	0.01	0.98
Eye and adnexa	3	0.01	0.99
Not elsewhere classified	2	0	0.99
Genitourinary system	2	0	0.99
Congenital malformations, deformations and chromosomal abnormalities	2	0	1
Circulatory system	1	0	1

Table 1: Absolute frequency of diseases for MEN by ICD10 group

Modality	Count	Relative	Cumulative
Skin and subcutaneous tissue	362	0.56	0.56
Respiratory system	159	0.24	0.8
Nervous system	34	0.05	0.85
Mental and behavioural	30	0.05	0.9
Musculoskeletal system and connective tissue	26	0.04	0.94
Injury, poisoning and certain other consequences of external causes	13	0.02	0.96
Digestive system	7	0.01	0.97
Not elsewhere classified	6	0.01	0.98
Endocrine, nutritional and metabolic	6	0.01	0.99
Neoplasms	2	0	0.99
Congenital malformations, deformations and chromosomal abnormalities	2	0	1
Infectious and parasitic	1	0	1
Genitourinary system	1	0	1
External causes of morbidity and mortality	1	0	1

Table 2: Absolute frequency of diseases for WOMEN by ICD10 group

Modality	Count	Relative	Cumulative
Pruritus, unspecified	102	0.21	0.21
Rhinitis	77	0.16	0.38
Atopic dermatitis, unspecified	71	0.15	0.53
Asthma	59	0.12	0.65
Dyshidrosis	56	0.12	0.77
Psoriasis	18	0.04	0.81
Eczema	14	0.03	0.84
Migraine, unspecified	9	0.02	0.85
ADHD	9	0.02	0.87
Food allergy	4	0.01	0.88
Celiac disease	4	0.01	0.89
Epilepsy, unspecified, not intractable, without status epilepticus	3	0.01	0.9
Anemia, unspecified	3	0.01	0.9
Juvenile osteochondrosis of patella	2	0	0.91
Insomnia	2	0	0.91
Diabetes Type 1	2	0	0.92
Crohns disease	2	0	0.92

Modality	Count	Relative	Cumulative
Pruritus, unspecified	152	0.23	0.23
Atopic dermatitis, unspecified	86	0.13	0.37
Asthma	84	0.13	0.5
Rhinitis	74	0.11	0.61
Dyshidrosis	69	0.11	0.72
Psoriasis	25	0.04	0.75
Migraine, unspecified	23	0.04	0.79
Eczema	23	0.04	0.82
Depression	10	0.02	0.84
Food allergy	8	0.01	0.85
ADHD	7	0.01	0.86
Dorsalgia, unspecified	6	0.01	0.87
Anxiety	6	0.01	0.88
Epilepsy, unspecified, not intractable, without status epilepticus	5	0.01	0.89
Tension headache (TTH)	4	0.01	0.9
Scoliosis	4	0.01	0.9
Insomnia	4	0.01	0.91
Diabetes Type 1	3	0	0.91
Unspecified abdominal pain	2	0	0.92
Other specified injuries of left lower leg	2	0	0.92
Osteomyelitis, unspecified	2	0	0.92
Lactose intolerance	2	0	0.92
Juvenile arthritis	2	0	0.93
Cervicalgia	2	0	0.93
Celiac disease	2	0	0.93

Protein	Prone, unadjusted	Male	Hepatocyte-specific	Female	Pubertal	Feminin	Feminin	Hypothalamic-specific	Neurite, unadjusted	Neurite, adjusted	Food allergy	Color disease
Adenosine Deaminase	**											
Artemisinin												
Artemisinin												
Brain-derived neurotrophic factor												
Beta-neurotrophin												
Caspase-8												
Cytokines												
C-X-C motif chemokine 19												
C-X-C motif chemokine 20												
C-X-C motif chemokine 23												
C-X-C motif chemokine 25												
C-X-C motif chemokine 26												
C-X-C motif chemokine 3												
C-X-C motif chemokine 4												
Natural killer cell receptor 2B4												
CD40L receptor												
T-cell surface glycoprotein CD6												
T cell surface glycoprotein CD6 isoform												
CLUB domain-containing protein 1												
Macrophage colony-stimulating factor 1												
Cysteine D												
Pricklelike												
C-X-C motif chemokine 1												
C-X-C motif chemokine 10												
C-X-C motif chemokine 11												
C-X-C motif chemokine 5												
C-X-C motif chemokine 6												
C-X-C motif chemokine 9												
Delta and Notch-like epidermal growth factor-related receptor												
Eukaryotic translation initiation factor 4E-binding protein 1												
Frizzled 6 (FZD6)												
Fibroblast growth factor 19												
Fibroblast growth factor 23												
Fibroblast growth factor 3												
Fms-related tyrosine kinase 3 ligand												
Glia cell line-derived neurotrophic factor												
Hepatocyte growth factor												
Interferon gamma												
Interleukin 10												
Interleukin 1 receptor subunit alpha												
Interleukin 10 receptor subunit beta												
Interleukin 12 subunit beta												
Interleukin 13												
Interleukin 1 receptor subunit alpha												
Interleukin 17A												
Interleukin 17C												
Interleukin 18												
Interleukin 18 receptor 1												
Interleukin 1-alpha												
Interleukin 2												
Interleukin 20												
Interleukin 20 receptor subunit alpha												
Interleukin 22 receptor subunit alpha-1												
Interleukin 22 receptor subunit beta												
Interleukin-33												
Interleukin-4												
Interleukin-5												
Interleukin-6												
Interleukin-7												
Interleukin-8												
Leukemia inhibitory factor												
Leukemia inhibitory factor receptor												
Monocyte chemoattractant protein 1												
Monocyte chemoattractant protein 2												
Monocyte chemoattractant protein 3												
Monocyte chemoattractant protein 4												
Mann's metalloproteinase-1												
Mann's metalloproteinase-10												
Neurotrophin 3												
Neurotrophin 4												
Oncostatin M												
Programmed cell death 1 ligand 1												
Skin cell factor												
GRB2 like protein 2												
Transforming growth factor alpha	**											
Lactoyl-associated peptide transforming growth factor beta-1												
Transforming growth factor beta-1												
TNF-beta												
Tumor necrosis factor receptor superfamily member 9	***											
Tumor necrosis factor receptor superfamily member 14												
TNF-related apoptosis-inducing ligand												
TNF-related activation-induced cytosine												
Thymic stromal lymphopoietin												
Tumor necrosis factor												
Urokinase-type plasminogen activator	**											
Vascular endothelial growth factor A												

Table 5: Significant biomarkers for diseases and men, adjusted after Bonferroni

Protein	Prone, unadjusted	Hepatocyte-specific	Female	Pubertal	Hypothalamic-specific	Neurite, unadjusted	Neurite, adjusted	Food allergy	Color disease	Autism	Sexual maturation (TM)	Scoliosis	Ischemia
Adenosine Deaminase	**												
Artemisinin													
Artemisinin													
Brain-derived neurotrophic factor													
Beta-neurotrophin													
Caspase-8													
Cytokines													
Pricklelike													
C-X-C motif chemokine 1													
C-X-C motif chemokine 10													
C-X-C motif chemokine 11													
C-X-C motif chemokine 5													
C-X-C motif chemokine 6													
C-X-C motif chemokine 9													
Delta and Notch-like epidermal growth factor-related receptor													
Eukaryotic translation initiation factor 4E-binding protein 1													
Frizzled 6 (FZD6)													
Fibroblast growth factor 19													
Fibroblast growth factor 23													
Fibroblast growth factor 3													
Fms-related tyrosine kinase 3 ligand													
Glia cell line-derived neurotrophic factor													
Macrophage colony-stimulating factor 1													
Cysteine D													
Pricklelike													
C-X-C motif chemokine 1													
C-X-C motif chemokine 10													
C-X-C motif chemokine 11													
C-X-C motif chemokine 5													
C-X-C motif chemokine 6													
C-X-C motif chemokine 9													
Delta and Notch-like epidermal growth factor-related receptor													
Eukaryotic translation initiation factor 4E-binding protein 1													
Frizzled 6 (FZD6)													
Fibroblast growth factor 19													
Fibroblast growth factor 23													
Fibroblast growth factor 3													
Fms-related tyrosine kinase 3 ligand													
Glia cell line-derived neurotrophic factor													
Macrophage colony-stimulating factor 1													
Cysteine D													
Pricklelike													
C-X-C motif chemokine 1													
C-X-C motif chemokine 10													
C-X-C motif chemokine 11													
C-X-C motif chemokine 5													
C-X-C motif chemokine 6													
C-X-C motif chemokine 9													
Delta and Notch-like epidermal growth factor-related receptor													
Eukaryotic translation initiation factor 4E-binding protein 1													
Frizzled 6 (FZD6)													
Fibroblast growth factor 19													
Fibroblast growth factor 23													
Fibroblast growth factor 3													
Fms-related tyrosine kinase 3 ligand													
Glia cell line-derived neurotrophic factor													
Macrophage colony-stimulating factor 1													
Cysteine D													
Pricklelike													
C-X-C motif chemokine 1													
C-X-C motif chemokine 10													
C-X-C motif chemokine 11													
C-X-C motif chemokine 5													
C-X-C motif chemokine 6													
C-X-C motif chemokine 9													
Delta and Notch-like epidermal growth factor-related receptor													
Eukaryotic translation initiation factor 4E-binding protein 1													
Frizzled 6 (FZD6)													
Fibroblast growth factor 19													
Fibroblast growth factor 23													
Fibroblast growth factor 3													
Fms-related tyrosine kinase 3 ligand													
Glia cell line-derived neurotrophic factor													
Macrophage colony-stimulating factor 1													
Cysteine D													
Pricklelike													
C-X-C motif chemokine 1													
C-X-C motif chemokine 10													
C-X-C motif chemokine 11													
C-X-C motif chemokine 5													
C-X-C motif chemokine 6													
C-X-C motif chemokine 9													
Delta and Notch-like epidermal growth factor-related receptor													
Eukaryotic translation initiation factor 4E-binding protein 1													
Frizzled 6 (FZD6)			</										



Modality	Count	Relative	Cumulative
Respiratory system	83	0.41	0.41
Nervous system	59	0.29	0.7
Musculo-skeletal system	35	0.17	0.88
Dermatologicals	12	0.06	0.94
Antiinfectives for systemic use	7	0.03	0.97
Systemic hormonal preparations, excluding sex hormones and insulins	2	0.01	0.98
Blood and blood forming organs	2	0.01	0.99
Alimentary tract and metabolism	2	0.01	1

Table 7: Absolute frequency of medicines for MEN by ATC group

Modality	Count	Relative	Cumulative
Genito-urinary system and sex hormones	163	0.33	0.33
Respiratory system	113	0.23	0.56
Nervous system	112	0.23	0.79
Musculo-skeletal system	85	0.17	0.96
Dermatologicals	8	0.02	0.98
Antiinfectives for systemic use	8	0.02	0.99
Alimentary tract and metabolism	3	0.01	1
Systemic hormonal preparations, excluding sex hormones and insulins	1	0	1

Table 8: Absolute frequency of medicines for WOMEN by ATC group

Modality	Count	Relative	Cumulative
Paracetamol	49	0.24	0.24
Ibx 200 mg	24	0.12	0.36
Zyrtec	21	0.1	0.47
Ventolin	18	0.09	0.55
Cetirizin	18	0.09	0.64
Symbicort	6	0.03	0.67
Ibx 400 mg	6	0.03	0.7
Seretide	5	0.02	0.73
Roaccutan	5	0.02	0.75
Concerta	4	0.02	0.77

Modality	Count	Relative	Cumulative
Paracetamol	82	0.17	0.17
Microgynon	82	0.17	0.33
Ibx 200 mg	52	0.11	0.44
Loette	32	0.06	0.5
Ventolin	29	0.06	0.56
Zyrtec	26	0.05	0.61
Ibx 400 mg	25	0.05	0.67
Cetirizin	22	0.04	0.71
Mercilon	12	0.02	0.73
Yasmin	10	0.02	0.75
Cerazette	10	0.02	0.77
Imigran	8	0.02	0.79
Yasminelle	6	0.01	0.8
Flutide	6	0.01	0.82
Symbicort	5	0.01	0.83
Livostin	5	0.01	0.84
Ibx 600 mg	4	0.01	0.84
Depo-provera	4	0.01	0.85
Bricanyl	4	0.01	0.86

**Table 11:** Significant biomarkers for medicines and men, adjusted for Bonferroni

Table 12: Significant biomarkers for medicines and women, adjusted for Bonferroni.

Protein	Ibux 200 mg	Ibux 400 mg	Ibux 600 mg
Artemin		****	
Interferon gamma		****	
Interleukin-2	****	****	****
Interleukin-22 receptor subunit alpha-1	****	****	
Interleukin-24		****	
Interleukin-2 receptor subunit beta		****	
Interleukin-33		****	
Neurturin		****	
Thymic stromal lymphopoietin	****	****	

Table 13: Comparison of antiinflamatories with respect biomarkers

Protein	Microgynon	Loette	Cerizan	Mercilon	Yasmin	Cerazette	Yasminelle	Depo-provera
Artemin		*		****	****	****	****	****
Beta-nerve growth factor			*					
Eotaxin	****		*					
C-C motif chemokine 23		***						
T cell surface glycoprotein CD6 isoform	*							
Macrophage colony-stimulating factor 1	****							
C-X-C motif chemokine 6	**							
Eukaryotic translation initiation factor 4E-binding protein 1	*							
Fibroblast growth factor 19	***							
Fibroblast growth factor 23		**						
Fibroblast growth factor 5	*							
Glial cell line-derived neurotrophic factor	****	****	*	***	***	***	***	***
Interferon gamma		****						
Interleukin-13			****	****	****	****	****	****
Interleukin-18 receptor 1	*							
Interleukin-2		****	****	****	****	****	****	****
Interleukin-20 receptor subunit alpha							*	*
Interleukin-22 receptor subunit alpha-1	****	****	****	****	****	****	****	****
Interleukin-24			****	****	****	****	****	****
Interleukin-2 receptor subunit beta								
Interleukin-33								
Interleukin-4							**	
Interleukin-5		*						
Leukemia inhibitory factor							***	***
Leukemia inhibitory factor receptor	****	**						
Monocyte chemoattractant protein 4	***							
Neurturin							****	****
Stem cell factor	****	**						
TNF-related apoptosis-inducing ligand	**	**						
TNF-related activation-induced cytokine	*							
Thymic stromal lymphopoietin								
Tumor necrosis factor	****							
Urokinase-type plasminogen activator	****	**						
Vascular endothelial growth factor A	*							

Table 14: Comparison of hormonal contraceptives with respect biomarkers

#5 - How visualize and explore

#6 - All again with timeseries

