



Biobanking meets omics

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Nordic Biobank Conference 2022

Conflict of interest

- Nothin to declare



Hannover Medical School (MHH)

- MHH:
 - one of Germany's leading medical universities
 - Top 5 ranked in research in Germany
 - 100 million euros per annum of external funding
 - outstanding research institution
 - **central biobank of MHH: Hannover Unified Biobank (HUB)**

Hannover Unified Biobank, HUB

- Central MHH Biobank, Clinical Biobank
- central storage, central IT structures (BIMS, CentraXX)
- 2.2 million samples from about 700 000 patients are stored in the HUB IT systems
- Currently 32 third-party funded projects
- HUB team: 41 persons, laboratory and storage, logistics, IT, QM & project management, research
- **Documentation of all biobank processes**
- High quality biobanking; high automation in processing and storage
- HUB certification (DIN EN ISO 9001, since 2014), accreditation planned for 2023

HUB-Sample quality

Gapless documentation of biobank processes

- Pre-analytics and transport (time stamps, temperature monitoring)
- Storage and retrieval (constant temperature monitoring)



HUB-Sample quality Automated preparation and storage

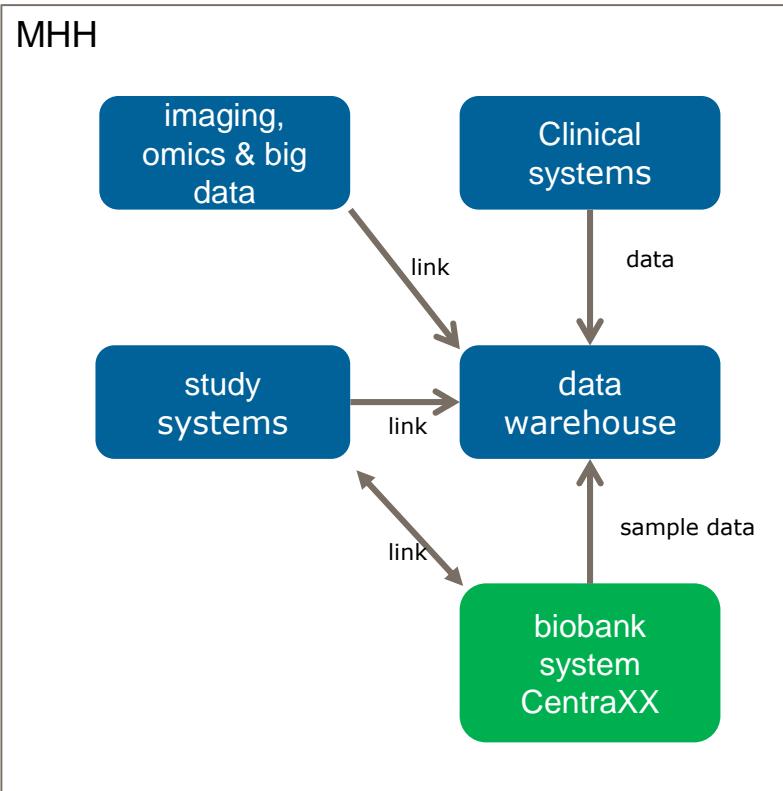


Hamilton Easy Blood, Liquid Pipettor



Hamilton Bios M, 900 000 samples

HUB – IT, data security!!



- Building of **data integration centers** with link to biobank quality data
- Close collaboration with German **Medical Informatics Initiative** (HiGHmed)

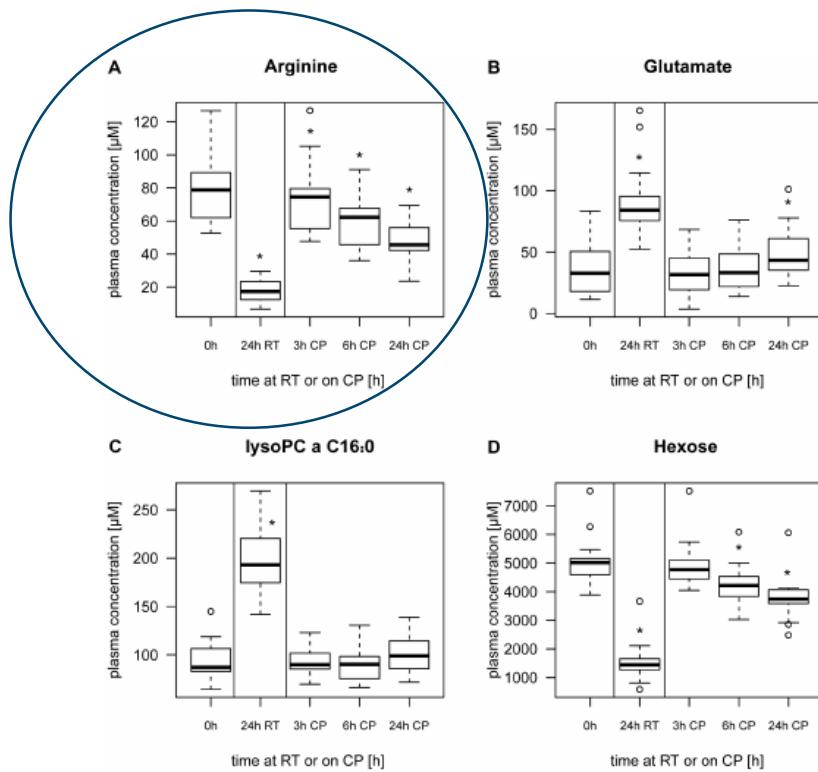
Biobanking quality research

Metabolomics changes of not optimal biosample preparation conditions

Stability of metabolite profiles in plasma samples under different storage conditions

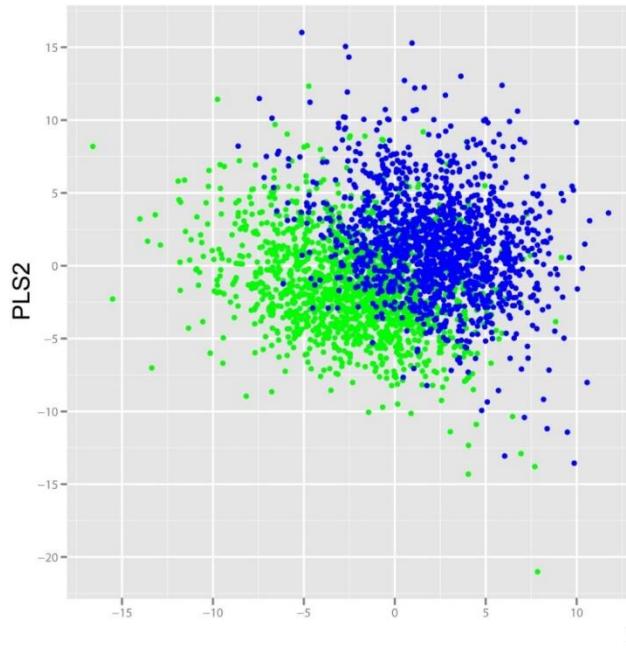
- 22 healthy volunteers (5 male, 17 female), overnight fasting
- Different temperatures and time delays after centrifugation (time to freeze, ttf)
- 159 metabolites analyzed
- 145 plasma metabolite concentrations were stable for at least 24 h on cool packs
- 115 of these were also stable for at least 24 h at RT

Stability of metabolite profiles in plasma under different pre-analytical conditions

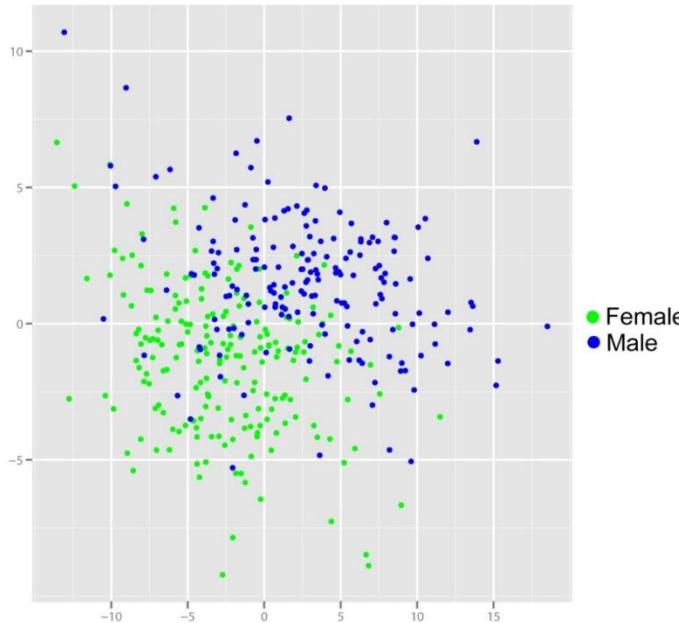


Gender specific metabolite differences

A KORA F4 study population (n= 3060)

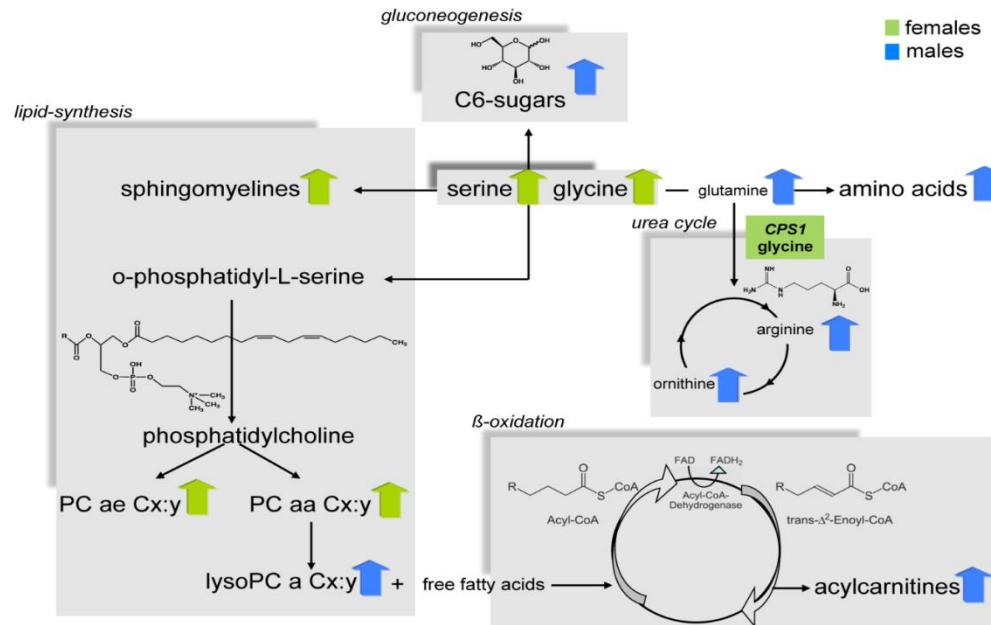


B Replication sample KORA F3 (n= 377)



77% of all analyzed metabolites show significant differences between males and females

Systematic view of metabolic variations in the metabolism of males and females



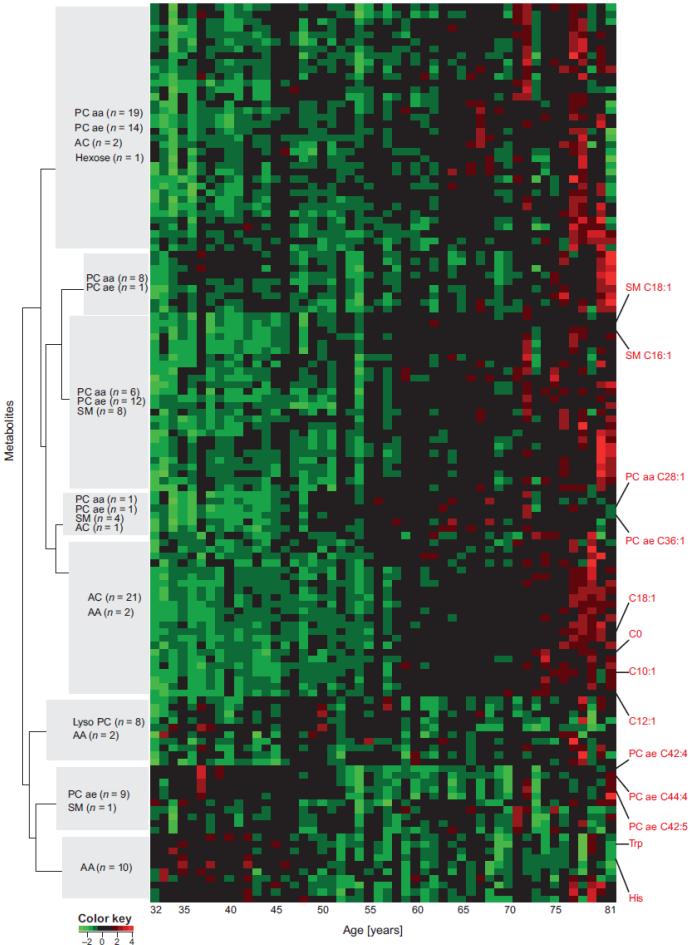
Sex specific medication and prediction?

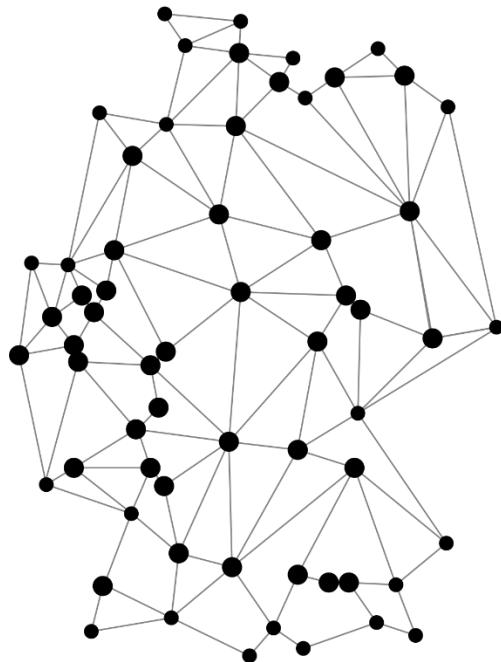
Age specific metabolite differences

- Kora discovery: 1038 female and 1124 male participants (32–81 years)
- TwinsUK replication: 724 female participants
- 131 metabolites analyzed
- 71/34 metabolites were significantly associated with age in women/men

Age specific metabolite differences

NORDIC Biobank Conference





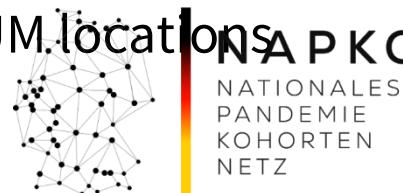
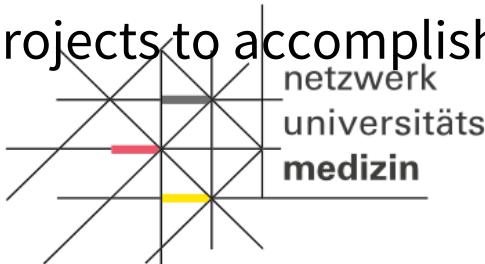
NAPKON

NATIONALES PANDEMIE KOHORTEN NETZ

establishing a national, multicentric COVID-19 cohort with comprehensive, harmonized biosampling and data collection

The pandemic and new infrastructures

- Network University Medicine (NUM)
 - Network of all German universities and medical faculties (36)
 - Funded by the Federal Ministry of Education and Research (BMBF)
 - Goal: pandemic preparedness
 - 13 projects to accomplish goal
- National Pandemic Cohort Network (NAPKON)
 - Biggest project in NUM
 - National prospective cohort of patients with COVID-19 infection
 - Comprehensive, harmonized biosampling and data collection at all NUM locations



The four infrastructure core units of NAPKON

Interaction Core Unit (ICU)

overall governance, support of the use & access processes, project management, communication

Integration Core Unit (IGCU)

integration of external and existing cohort data into NAPKON

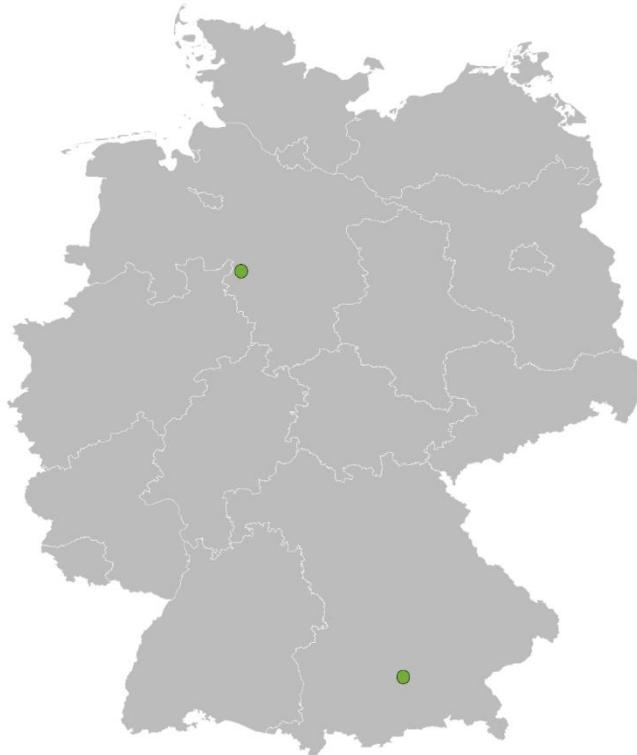
Epidemiology Core Unit (ECU)

methodological consultation of the project and third parties applying for data/biosamples

Biosample Core Unit (BCU)

Harmonization of sampling, processing & storage of biospecimen, quality assurance, regular auditing of biobanks

The four infrastructure core units of NAPKON



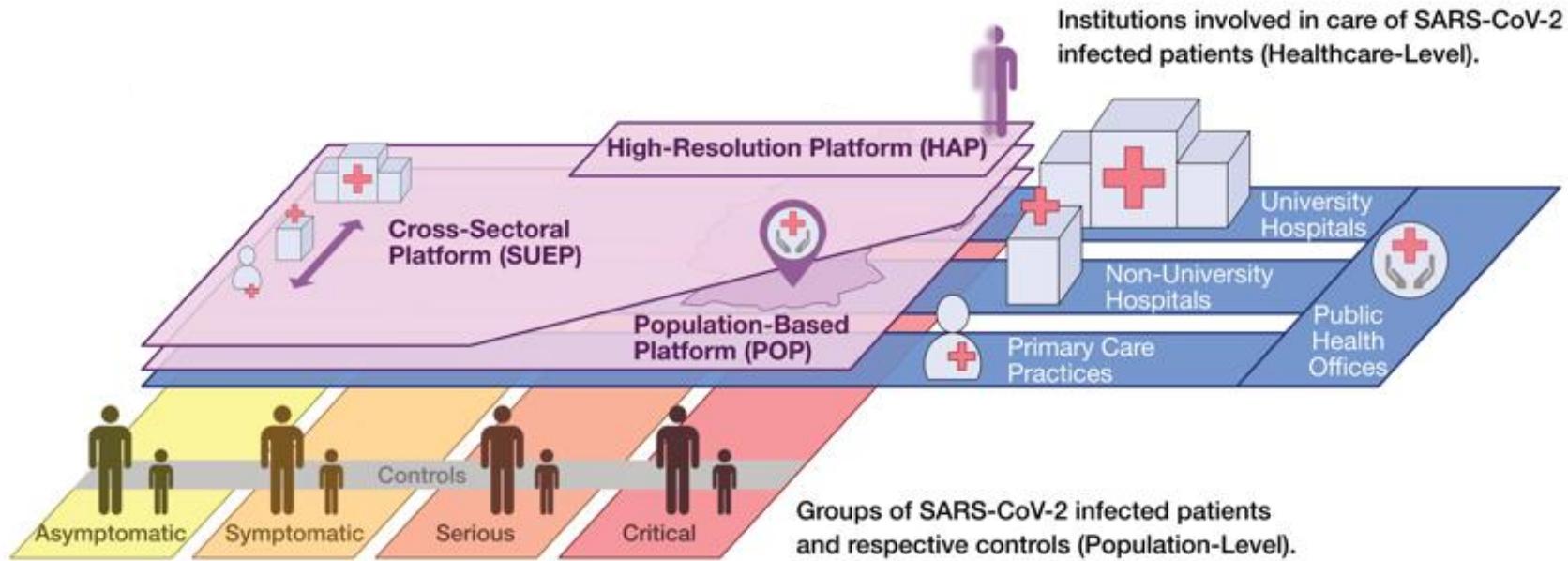
Thomas Illig



Gabi Anton

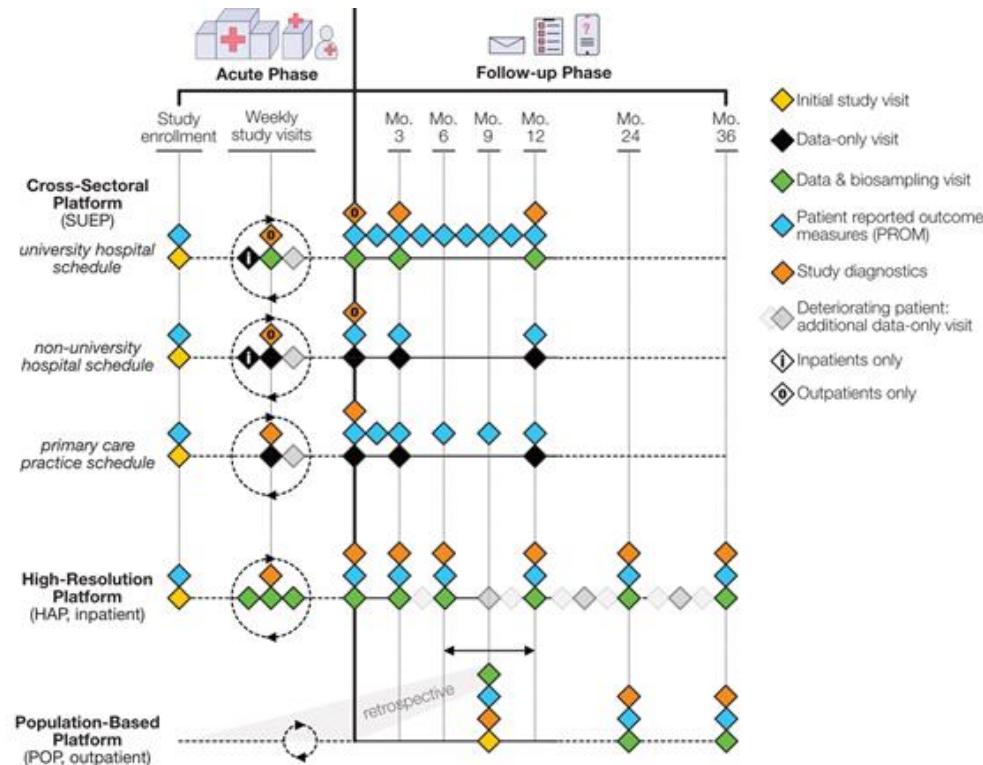
Biosample Core Unit (BCU)
Harmonization of sampling, processing &
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The three NAPKON cohort platforms



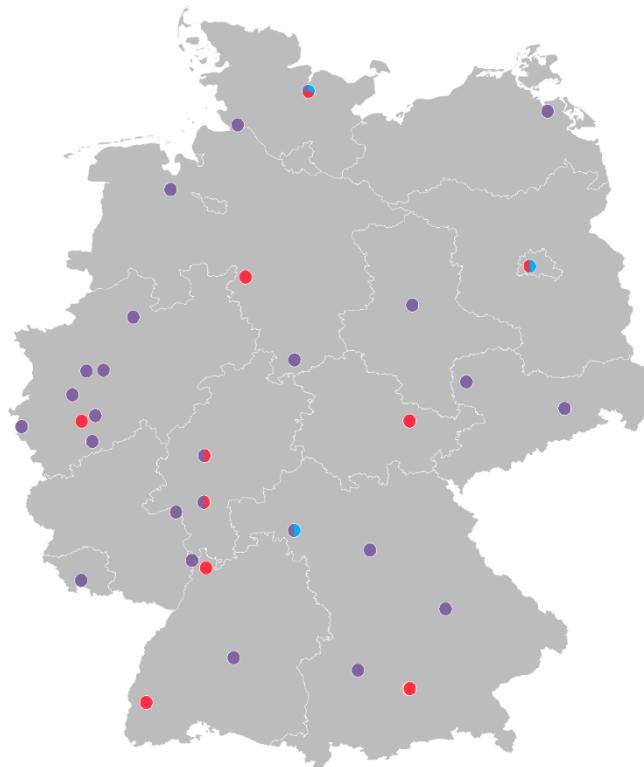
Schons et. al. 2022

Visit schedules



Schons et. al. 2022

NAPKON partner sites



POP [3]

Berlin, Kiel, Würzburg

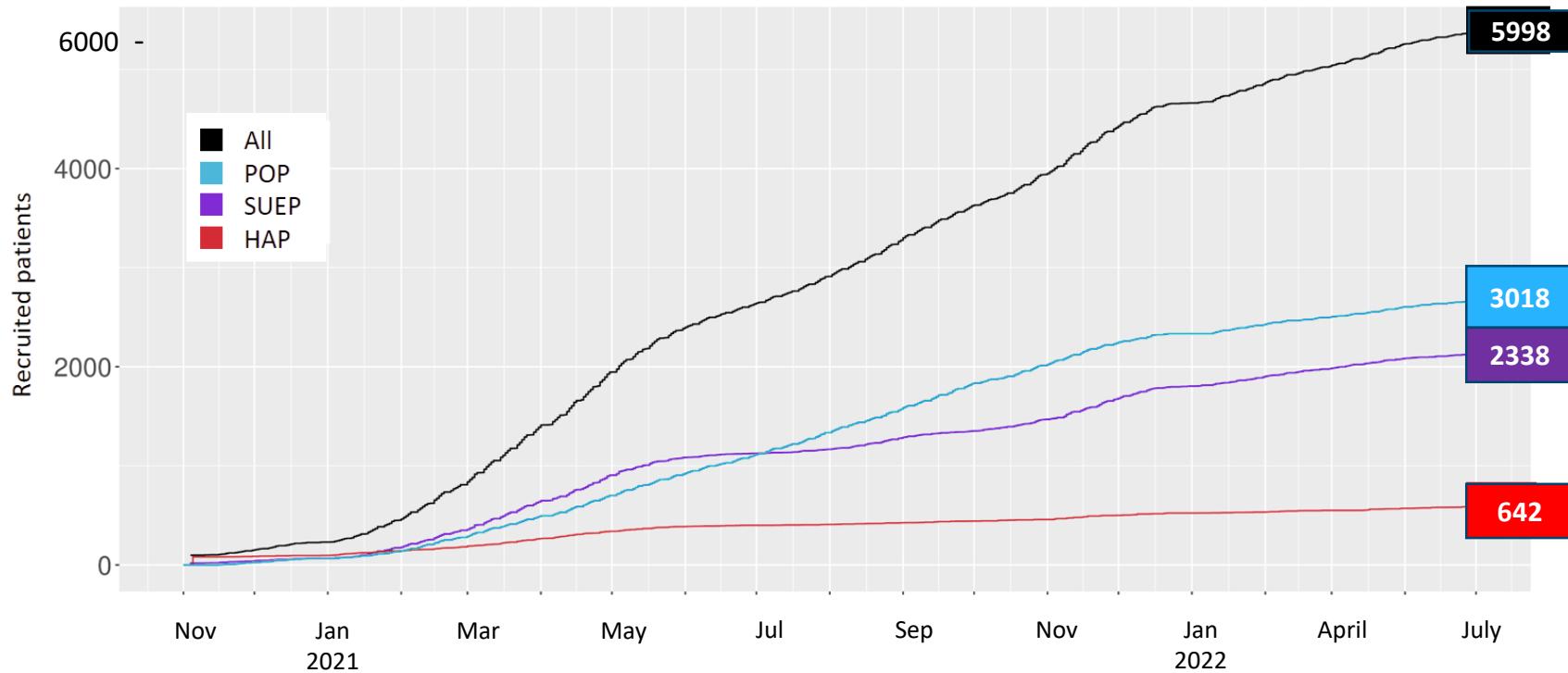
SUEP [29]

Augsburg, Bethel, Bielefeld, Bochum, Bonn, Dresden, Düsseldorf, Essen, Erlangen, Frankfurt, Freiburg, Gießen/Marburg, Göttingen, Greifswald, Hamburg, Heidelberg, Homburg, Kiel, Leipzig, Lippe, Magdeburg, Mainz, Mannheim, München, Münster, Oldenburg, Regensburg, Tübingen, Würzburg

HAP [10]

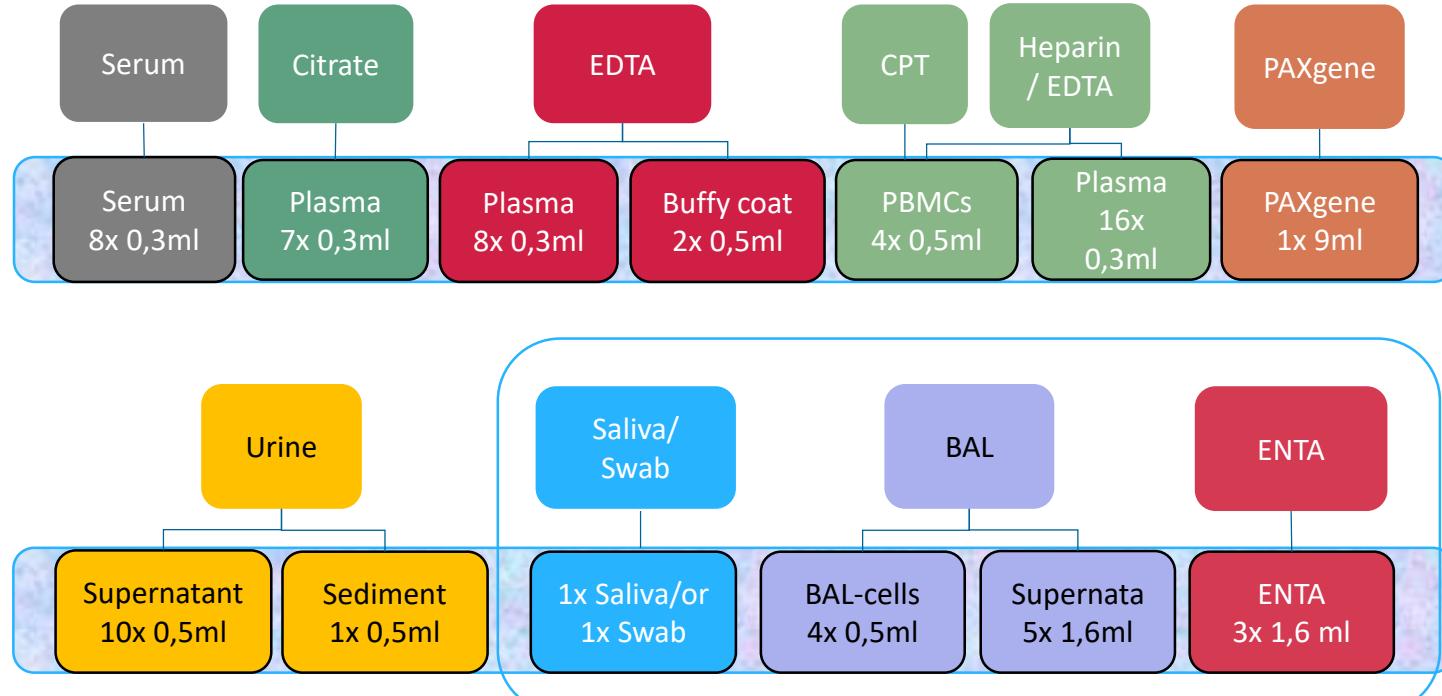
Berlin, Cologne, Frankfurt, Freiburg, Gießen/Marburg, Hannover, Heidelberg, Jena, Kiel, Munich

Recruitment status (August 2022)



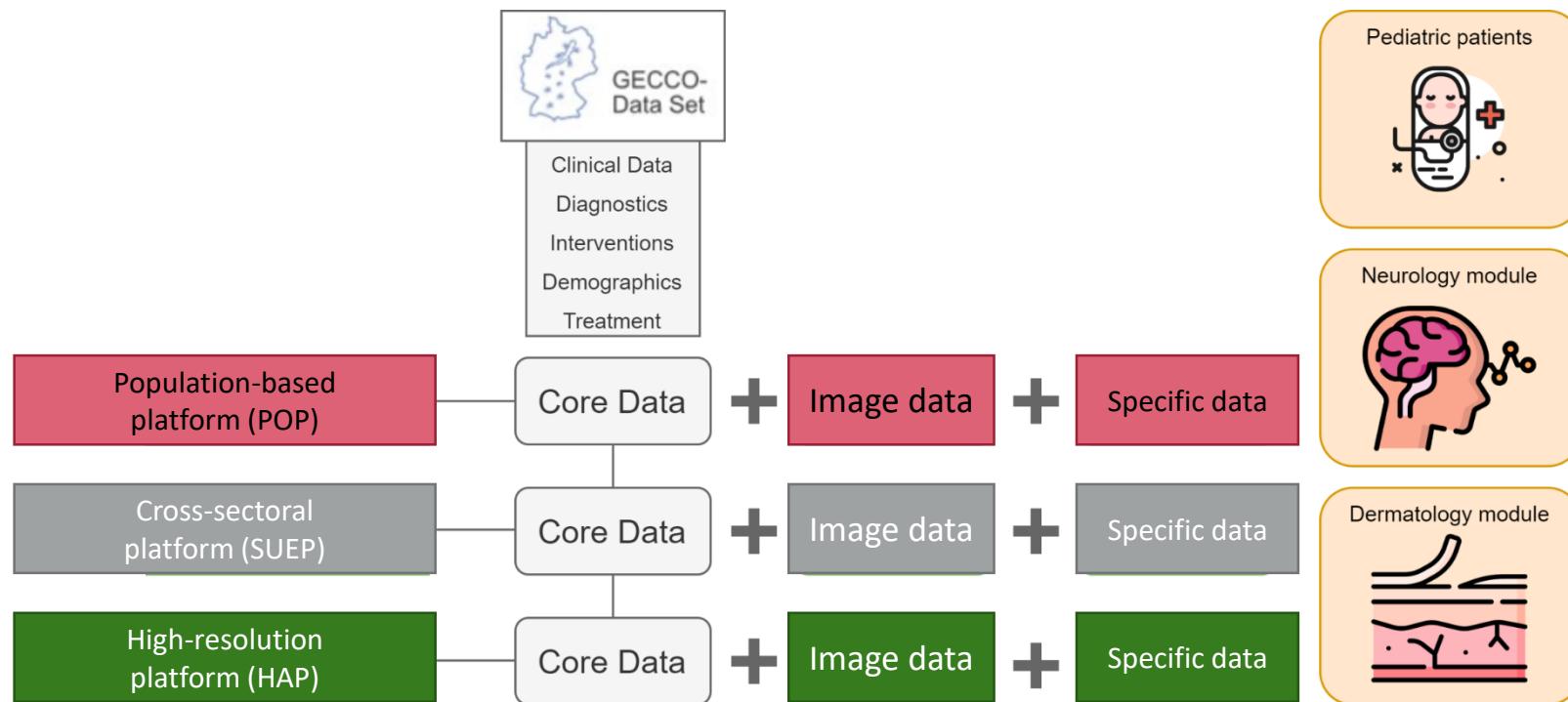


Biosample set

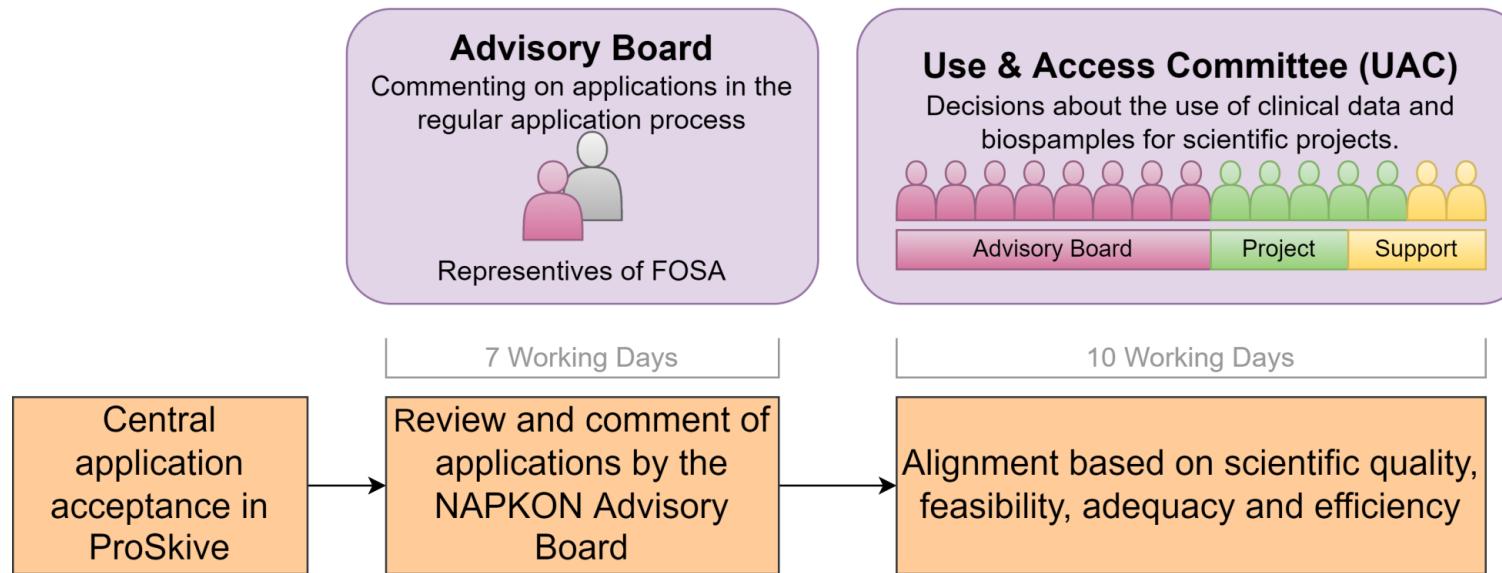


Select 1

Data collection in NAPKON cohorts



Getting access to data and samples



Sytematic molecular analyses of NAPKON samples

- 39.000 samples from 34 NAPKON partner sites distributed in 10 weeks

analysis	Sample type	BL	D3	D5	D8	M3	Analysis lab
DNA-/ RNA extraction	Buffy Coat & PAXgene	x			x	x	T. Illig & C. Gieger
Genotyping (GWAS)	DNA	x					T. Illig & C. Gieger
Promoter regions, histon modifications & epigenetics	DNA	x			x	x	S. Pullamsetti, T. Illig & C. Gieger
Transcriptomics	RNA	x			x	x	S. Pullamsetti
Proteomics	Plasma	x			x	x	M. Ralser
Metabolomics	Plasma	x			x	x	M. Nauck, U. Günther, C. Trautwein & A. Petersmann
Cytokine panel	Serum	x	x	x	x	x	M. Nauck
Virus genome sequencing	Saliva / swab	x*					S. Ciesek
Spike-, nukleocapsid- & neutralising NT antibodies	Serum	x			x	x	S. Ciesek
Serum PCR	Serum	x*			x*		S. Ciesek
S3 neutralisation	Serum	x					S. Ciesek

Thank you to all involved scientists

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Hannover Medical School

Hannover Unified Biobank

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HELMHOLTZ
MUNICH

Thank you!

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