



Deutsches Herzzentrum München  
des Freistaates Bayern  
Klinikum der Technischen Universität München 

Vroni



Early Diagnosis and Treatment of Familial Hypercholesterolemia

**The VRONI Study** FH Screening in Germany

Child, 7 years old



Fotographs deleted for privacy reasons

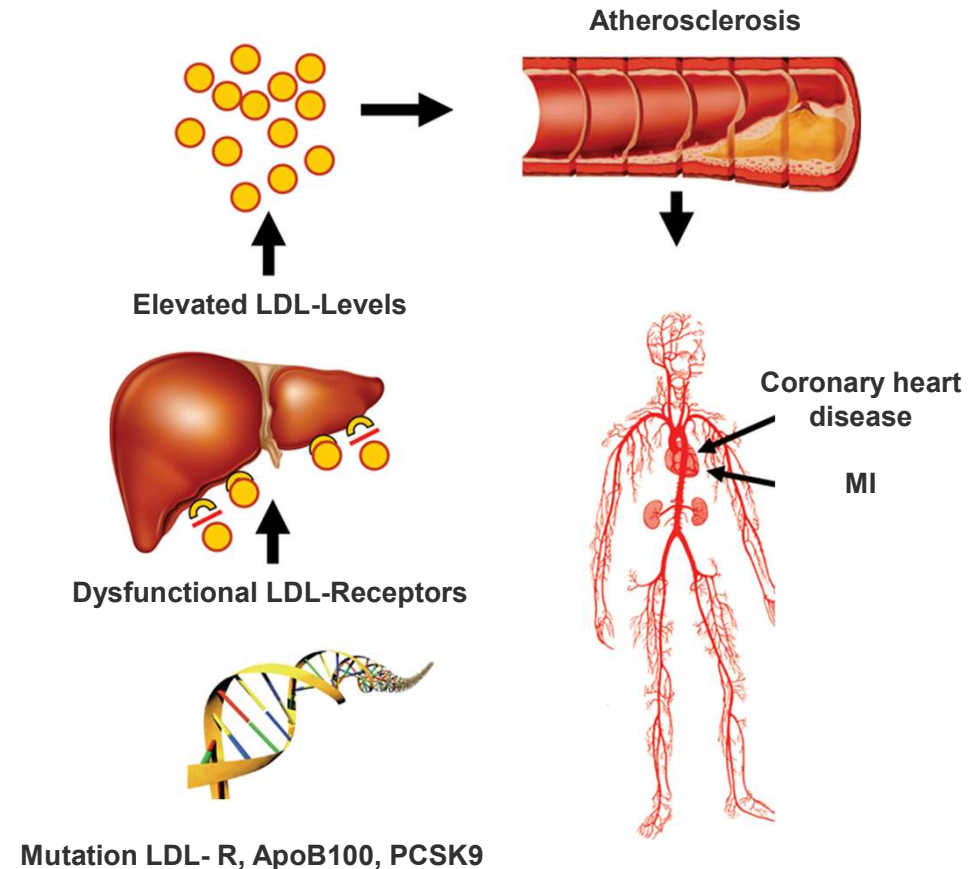
## ➤ Most common genetic disorder

### ■ High prevalence:

- HoFH: 1: 160.000/320.000 LDL-C: 1000 mg/dl
- HeFH: 1:150/200 LDL-C: 190-500 mg/dl

### ■ Etiology:

Mutation in the **LDL-Rezeptor, Apo-B-100, PCSK-9**



- FH patients lose 15-21 years of life
- In Germany, 3000 children are born with FH every year!  
~50 children/week
- Underdiagnosed worldwide <5% diagnosed in Germany
- First CV event at an average age of 38.4 years
- Average age of diagnosis is 44 years! Too late!

➤ **Early diagnosis and treatment reduce cardiovascular risk!**



# HERZINFARKT MIT 35?

„OHNE  
MICH!“

**MACH DEN  
VRONI-CHECK!**  
DIREKT BEIM KINDER- & JUGENDARZT



Träume Leben. Gesund bleiben.



Digitale Gesundheitsversorgung  
in Bayern



**MYVRONI.DE**

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# Early diagnosis by measuring LDL-C



## ➤ Who ?

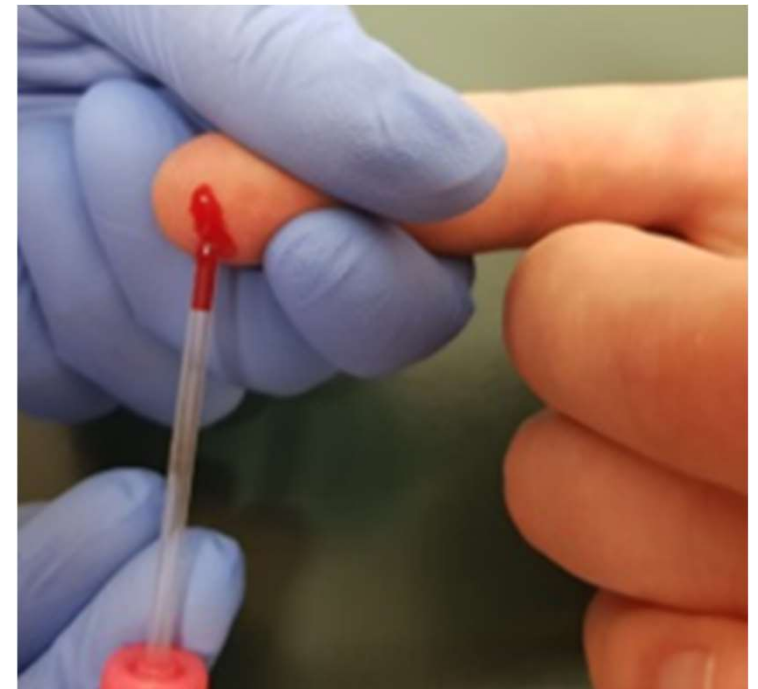
- Every child in Bavaria, voluntary and free of charge

## ➤ When?

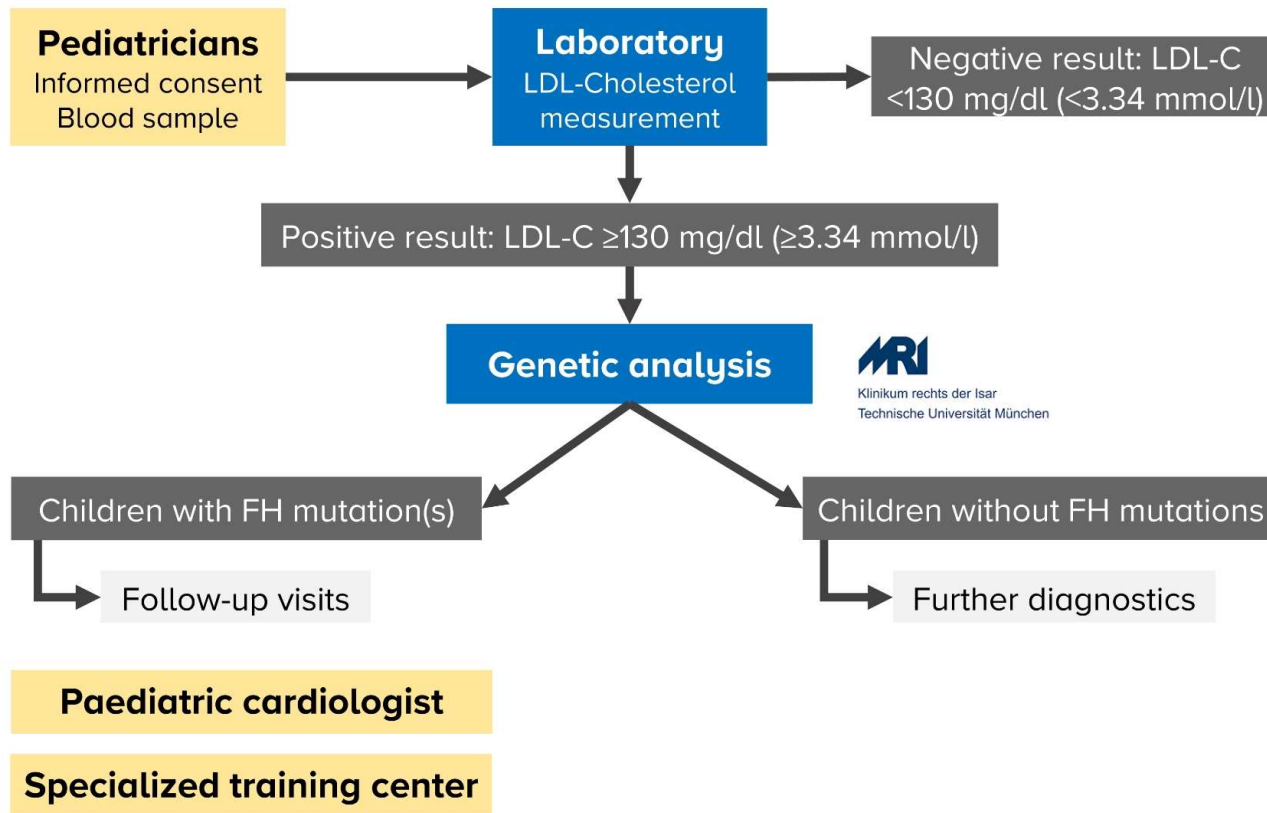
- aged 5-14 years, in the context of the regular preventive checkups (U9-J1)

## ➤ How?

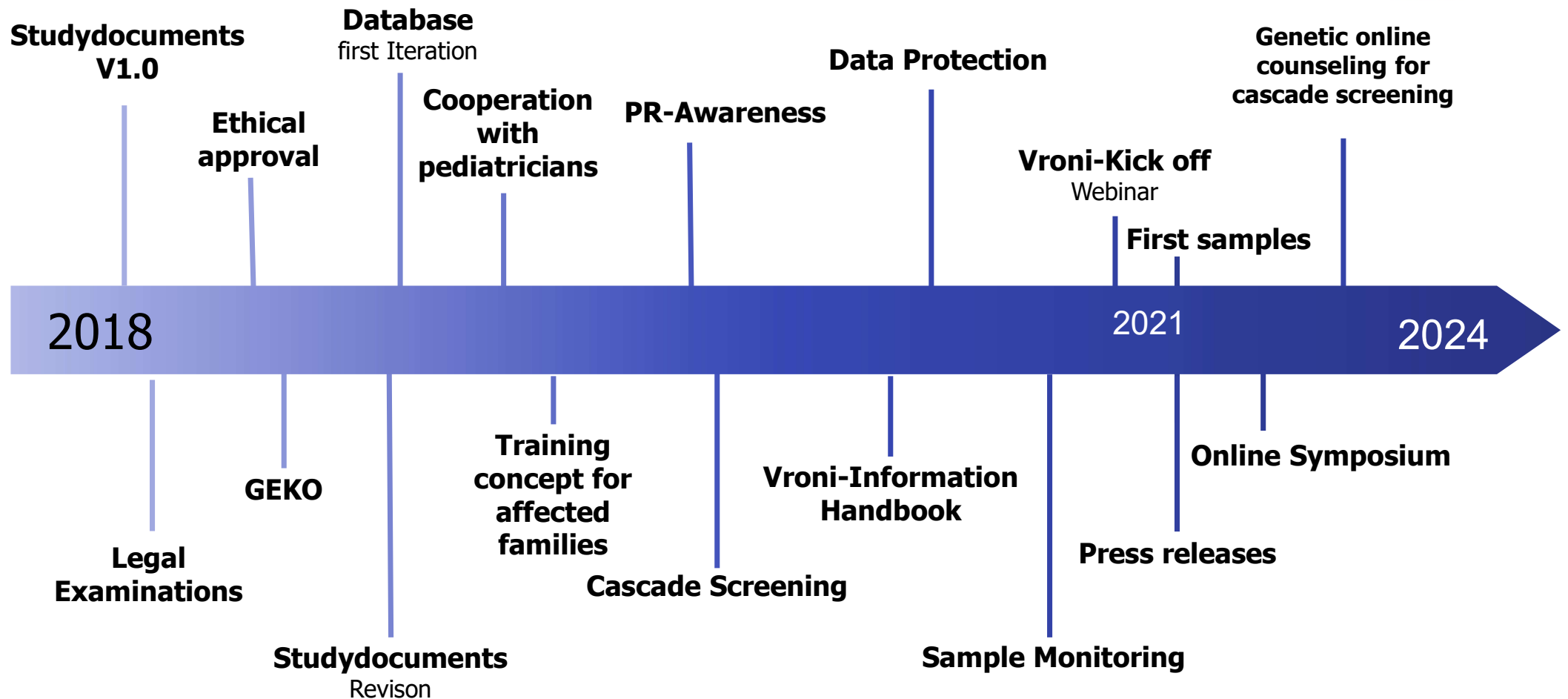
- 200µl of capillary or venous blood



Screening: Bavarian children aged 5-14 years

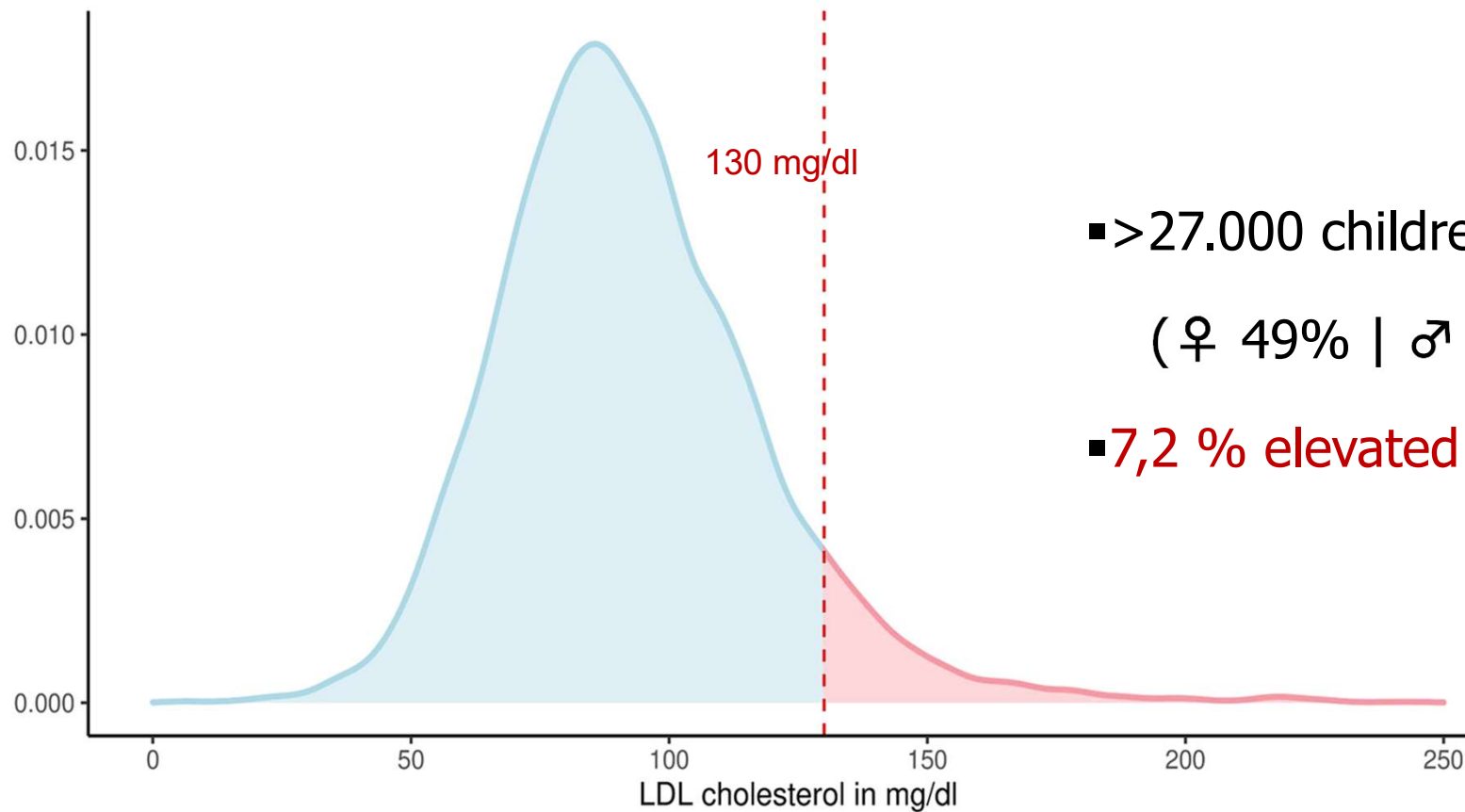


# Milestones





## Distribution of LDL-C



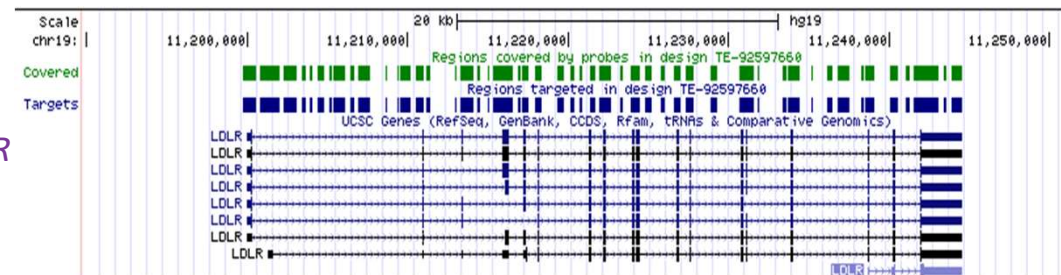
- >27.000 children screened for FH  
(♀ 49% | ♂ 51%)
- **7,2 % elevated LDL-C**

# Genetic results

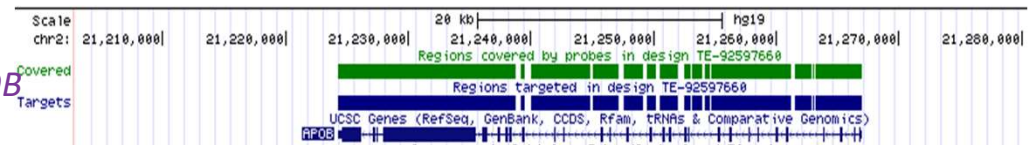


## 265 children with FH

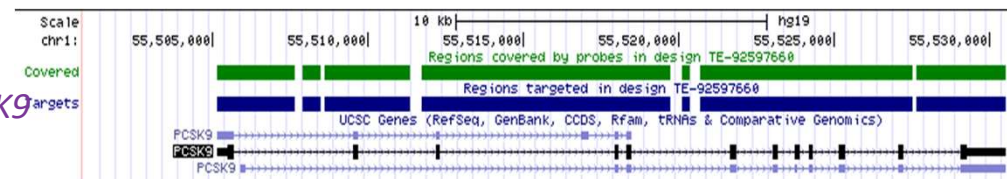
*LDLR*



*APOB*

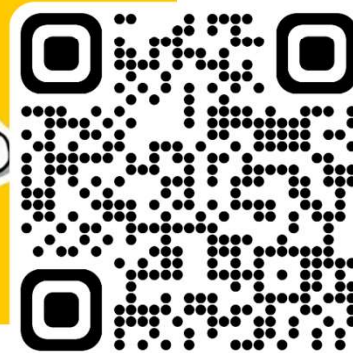


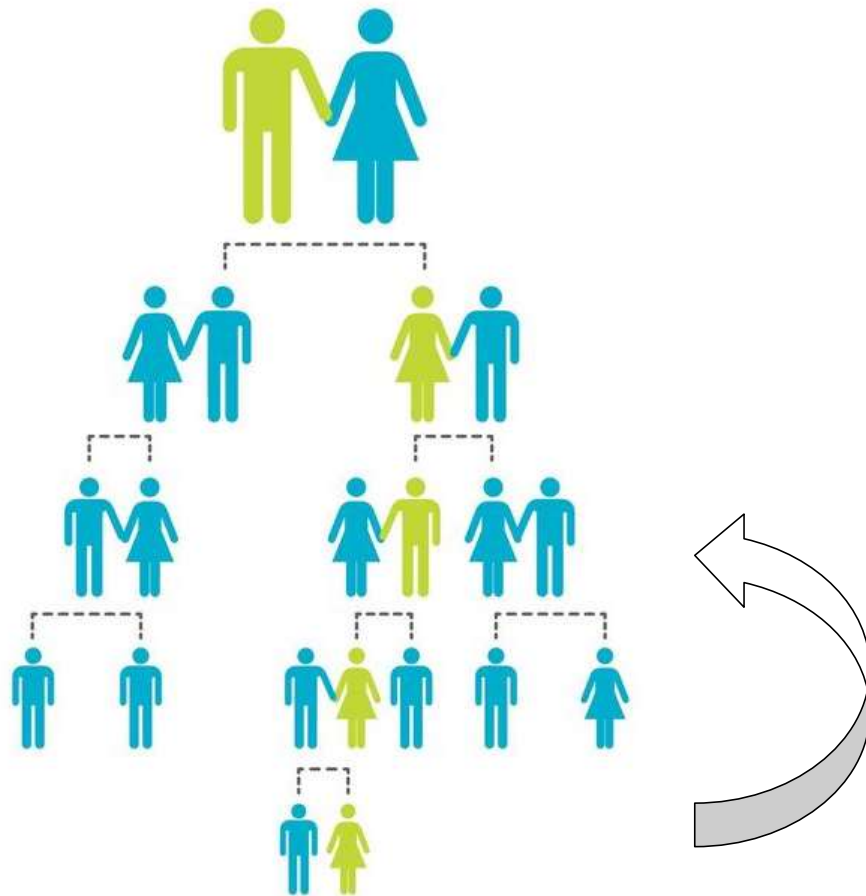
*PCSK9*



Vroni-Studie  
**PRAXISALLTAG  
MIT VRONI!**

„Screening für uns Kinder  
im Alter von 5-14 Jahren!“





## Genetic Online-Counselling

- Reverse cascade screening
- Identification of affected family members

since 02/2024



## ➤ Vroni im Norden

RS Dr. Rolf M. Schwiete Stiftung

Deutsche  
Herzstiftung



**DGK.**

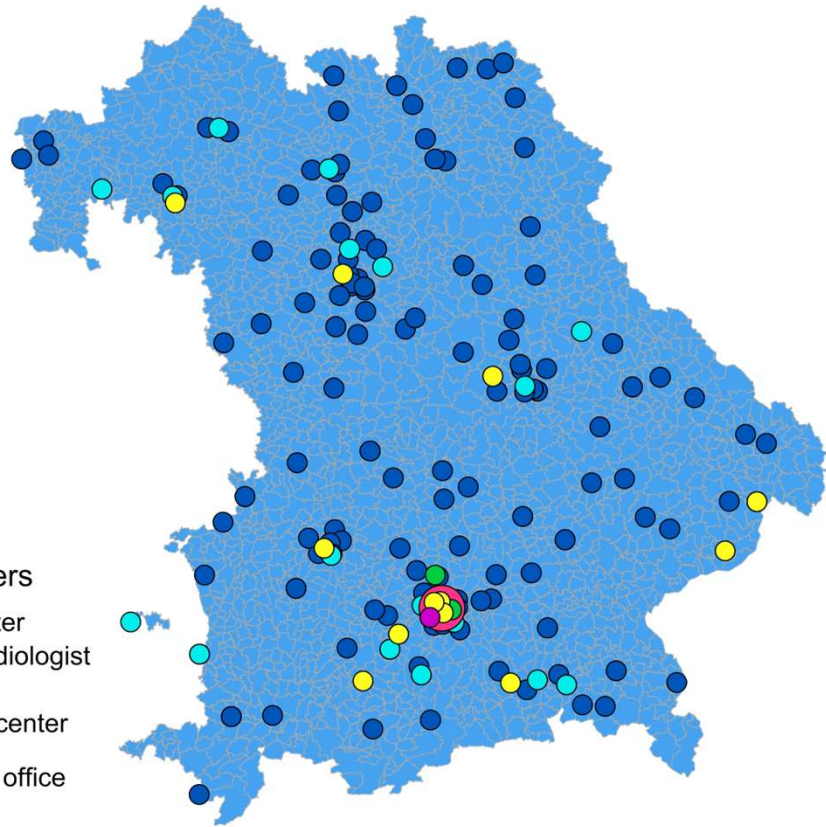
Deutsche Gesellschaft für Kardiologie – Herz- und Kreislaufforschung e.V.  
German Cardiac Society



# Vroni network

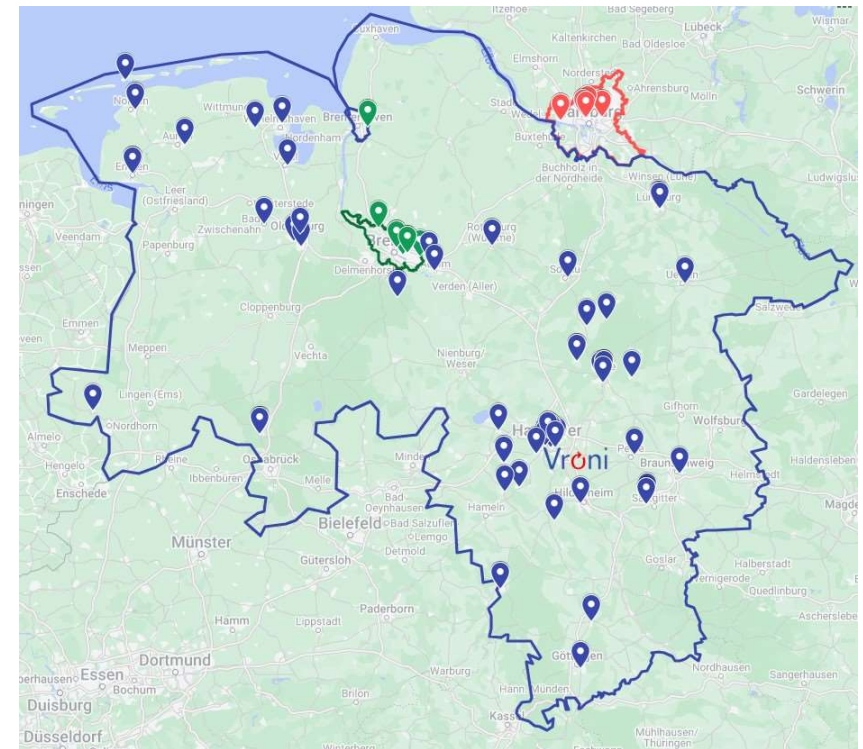


>700 pediatricians in Bavaria



- Contributing centers
- Lifestyle center
  - Pediatric cardiologist
  - Pediatrician
  - Sequencing center
  - VRONI main office
  - VroniPlus

>100 pediatricians in Niedersachsen, Hamburg und Bremen



Acceptance: App survey



## Data from 152 Families



**>96%** participate in the Vroni study

**>95%** are in favour of genetic diagnosis

**>90%** would treat their child with medication for FH



1- Verbesserung der Früherkennung bei Kindern und Jugendlichen

Cholesterin-Screening im Kindesalter

2- Gesundheitsuntersuchung in den Altersstufen 25, 40 und 50

3- Stärkung von Strukturierten Behandlungsprogrammen

neues DMP für hohes Herz-Kreislauf Risiko

4- Verordnungsfähigkeit von Statinen

5- Verbesserung Tabakentwöhnung und ernährungsspezifische Krankheitsprävention

6- Beratung zur Prävention und Früherkennung in Apotheken



# Early screening-lifelong impact!

Fotographs deleted for privacy reasons



Technische Universität München

HELMHOLTZ  
MUNICH



Bayerisches Staatsministerium für  
Gesundheit und Pflege

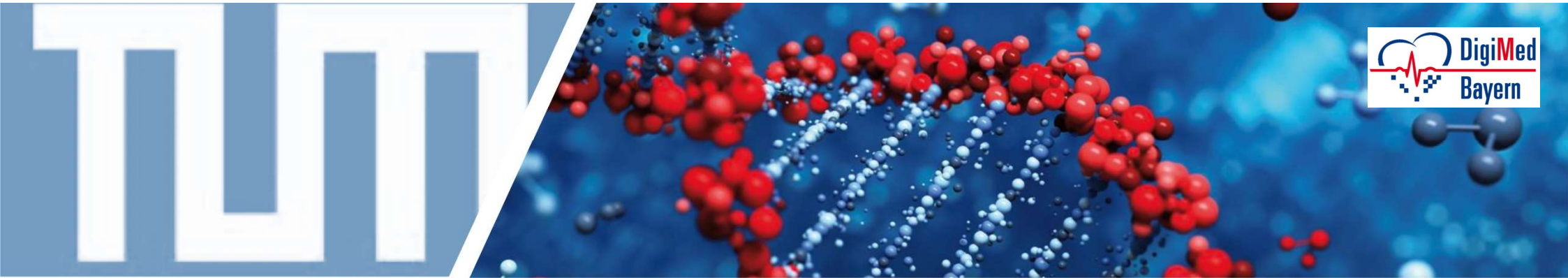


Klinikum rechts der Isar  
Technische Universität München



**Early screening- lifelong impact !!**





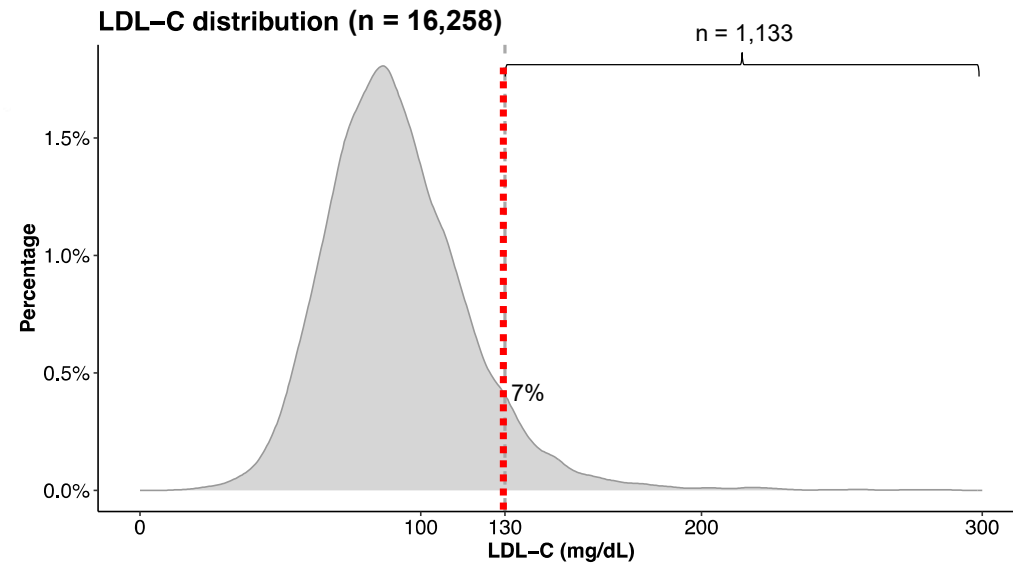
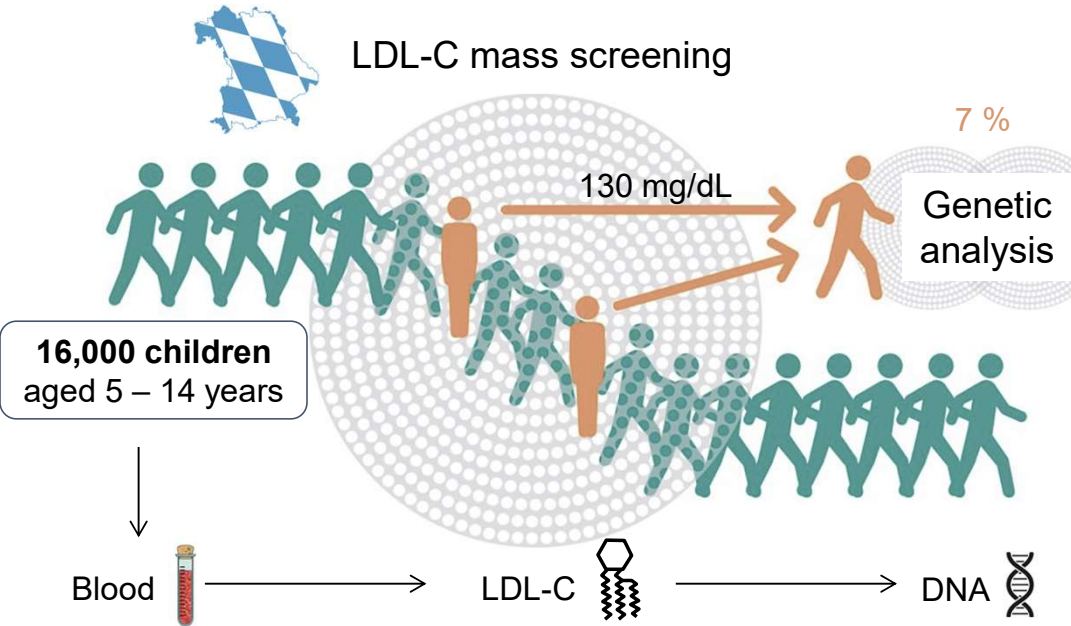
A vision with care:  
The VRONI study on familial hypercholesterinemia

Holger Prokisch

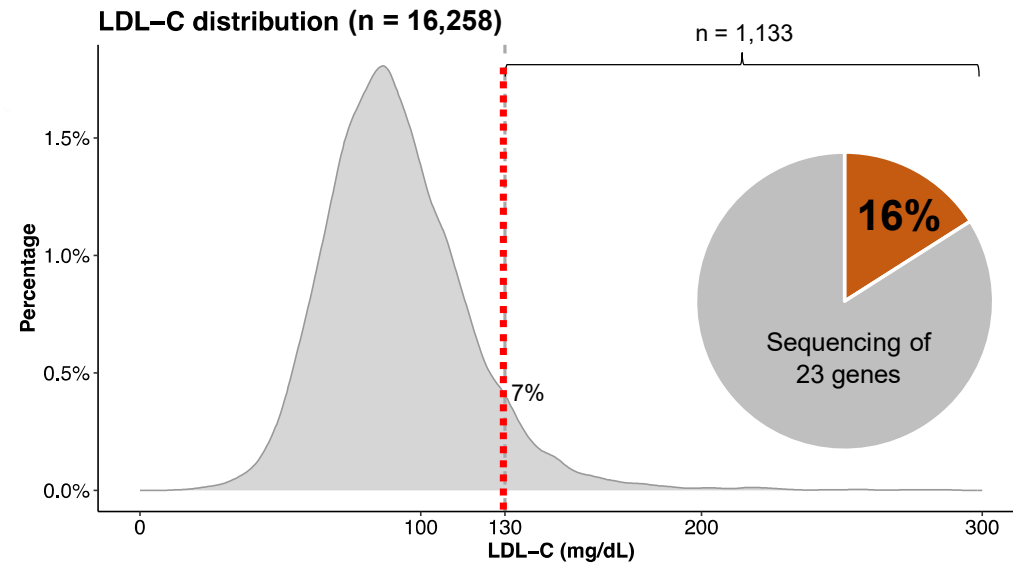
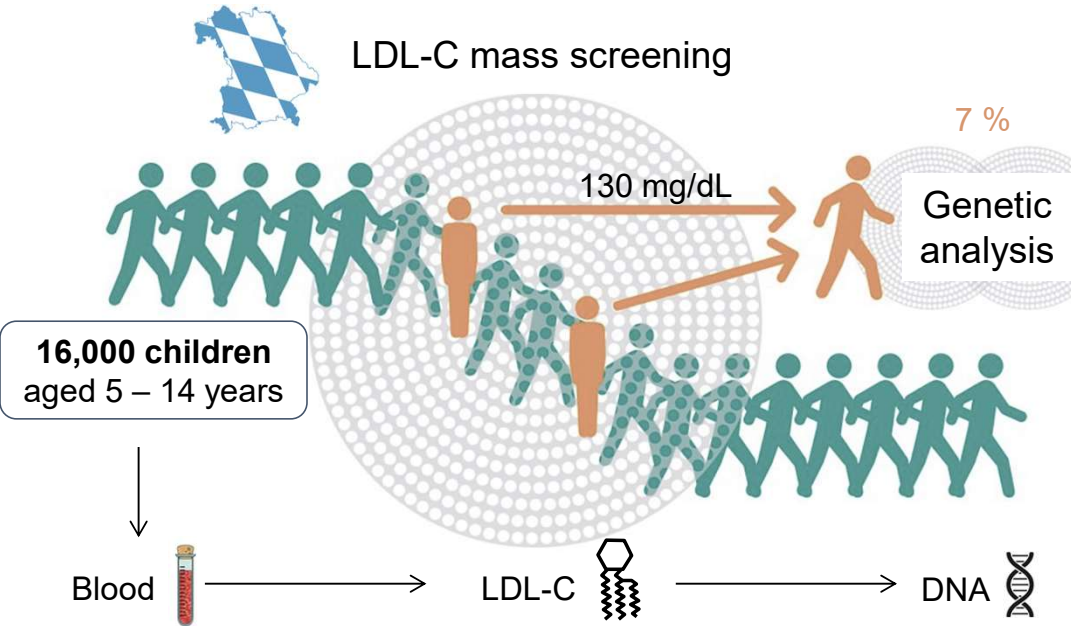
TUM University Hospital | Helmholtz Center Munich



# VRONI study design



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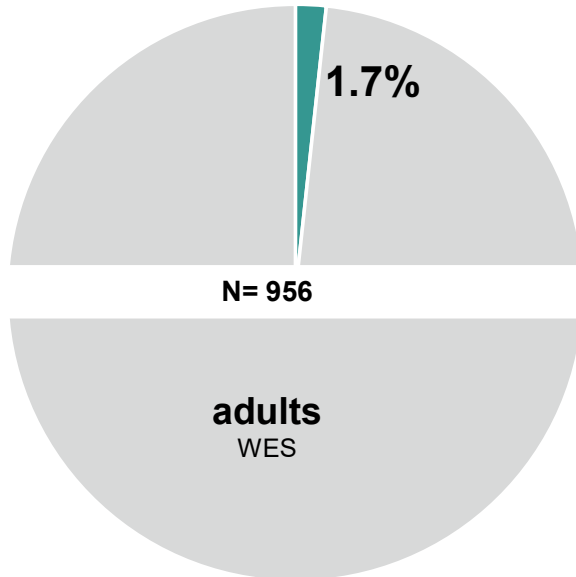


# VRONI study design: High diagnostic yield by sequencing in children



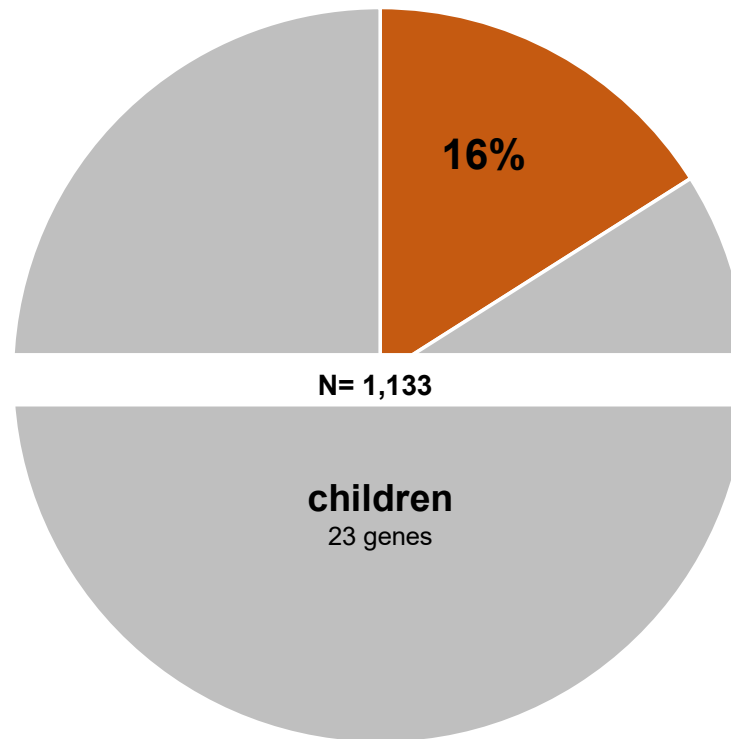
## CHARGE (Khera et al. 2017)

LDL-C  $\geq$  190 mg/dL: 92<sup>th</sup> percentile



## VRONI

LDL-C  $\geq$  130 mg/dL: 93<sup>th</sup> percentile

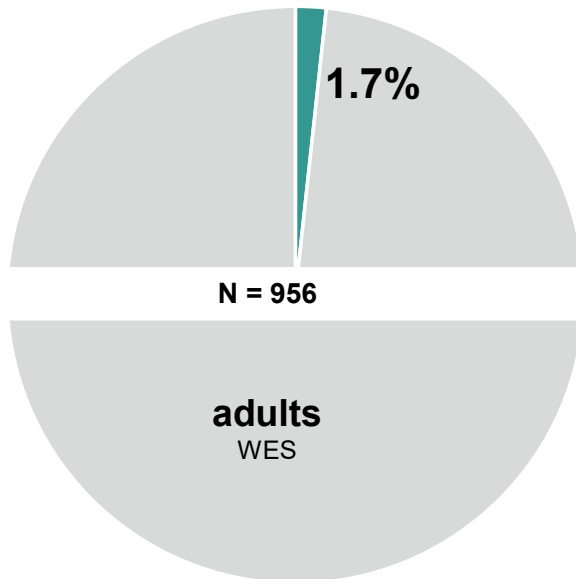


FH Prevalence:

# VRONI study design: High diagnostic yield by sequencing in children

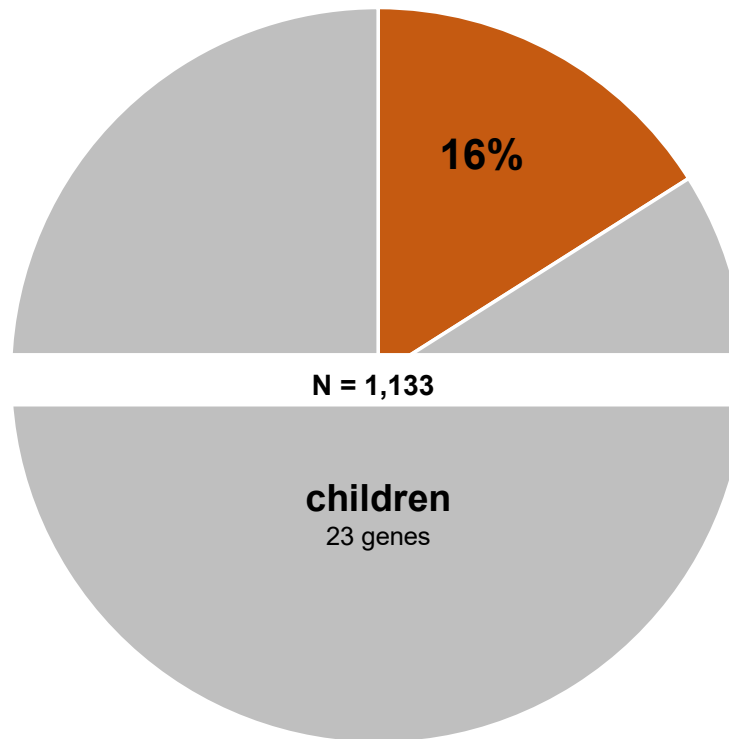
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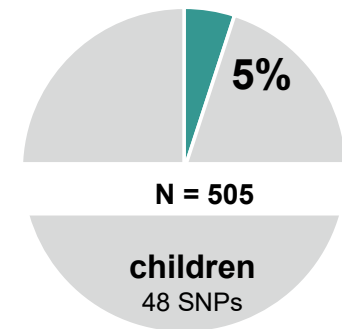
## VRONI

LDL-C  $\geq$  130 mg/dL: 93<sup>th</sup> percentile



## Wald et al. (2016)

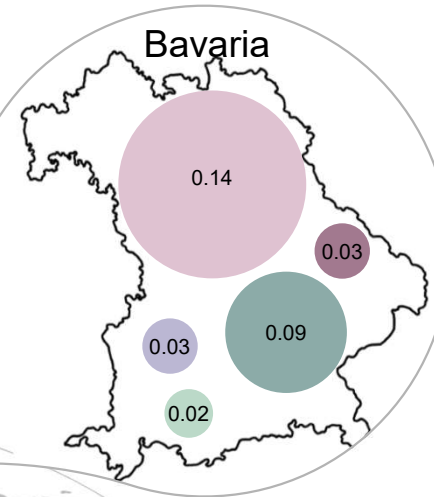
LDL-C  $\geq$  130 mg/dL: 95<sup>th</sup> percentile



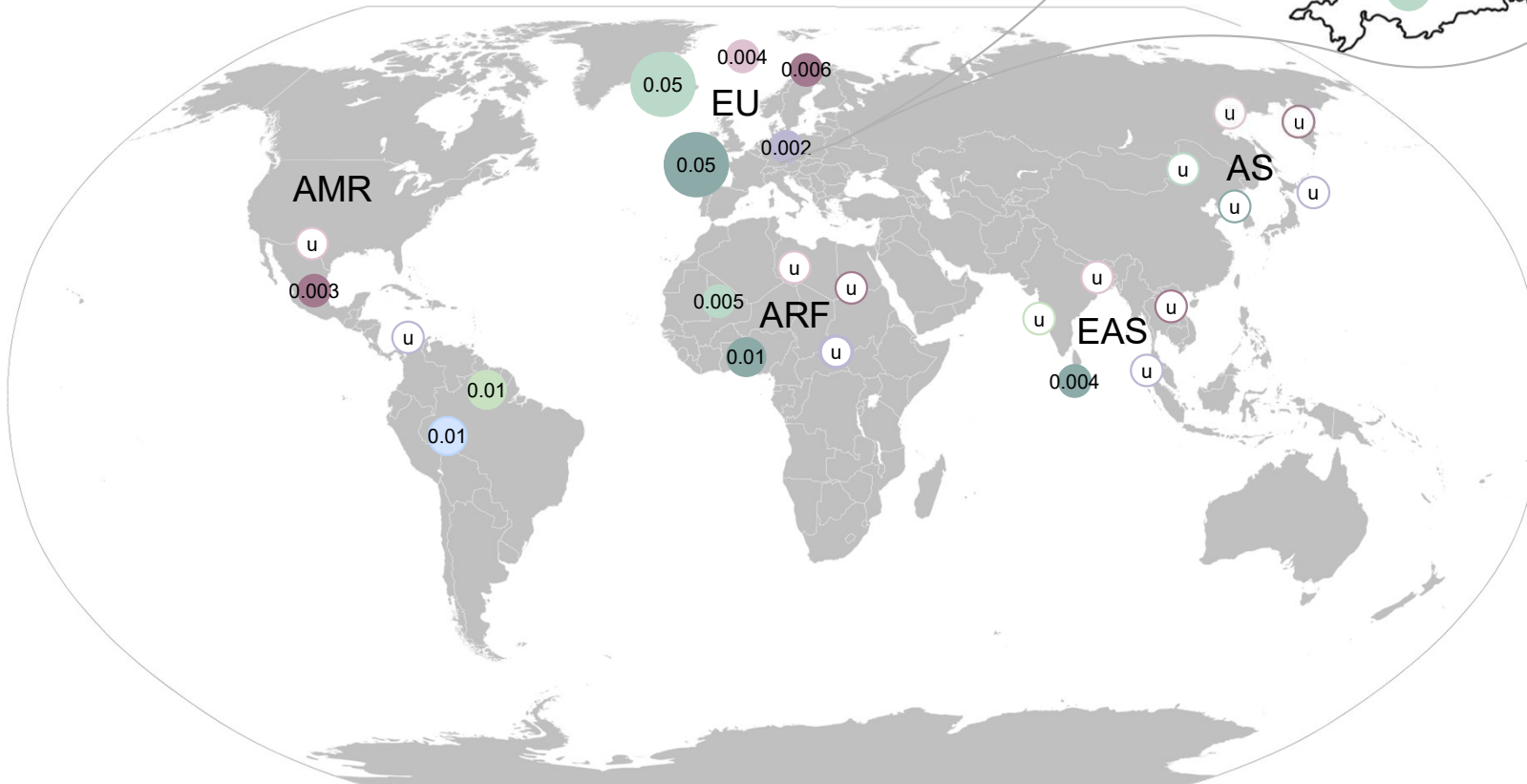


# A Bavarian founder increases prevalence

Bavarian founder mutation - p.Asp266Glu



**FH prevalence 1:150**



## LDLR

- p.Asp266Glu
- p.Gly592Glu
- p.Cys27Trp

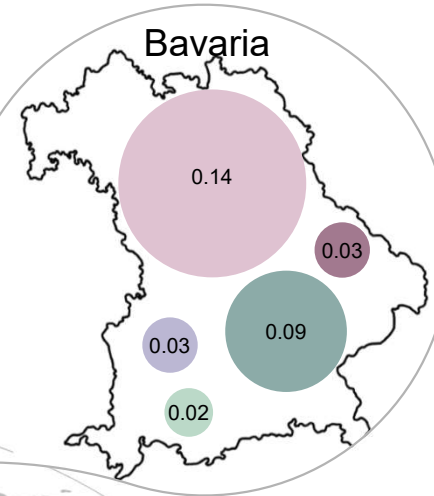
## APOB

- p.Arg3527Gln
- p.Gln4494del

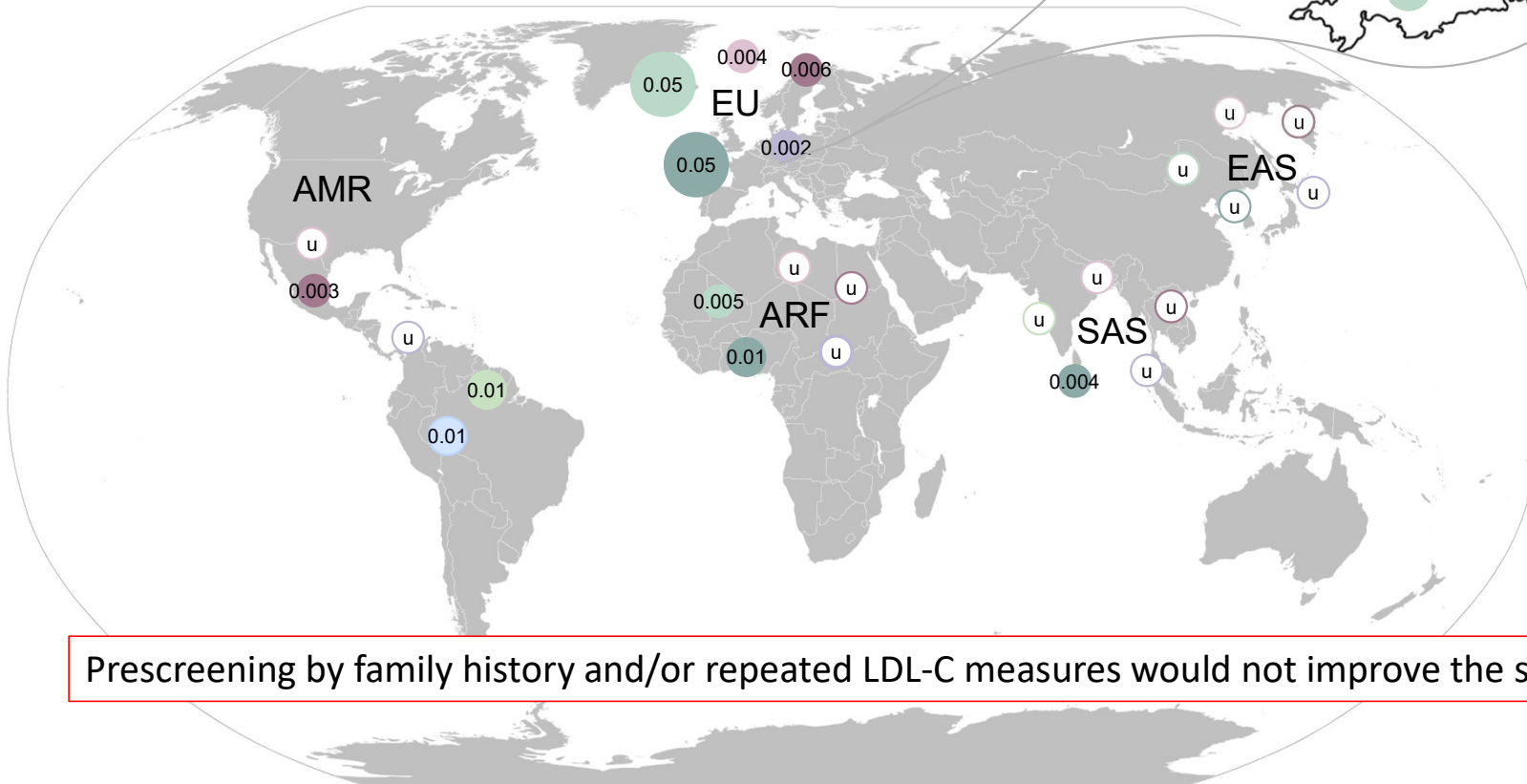
# A Bavarian founder increases prevalence

Bavarian founder mutation - p.Asp266Glu



World	Europe	Northern Germany	Bavaria
0.003%	0.004%	0.016%	0.14%





**FH prevalence 1:150**



## LDLR

-  p.Asp266Glu
-  p.Gly592Glu
-  p.Cys27Trp

## APOB

-  p.Arg3527Gln
-  p.Gln4494del

Prescreening by family history and/or repeated LDL-C measures would not improve the screening outcome

Thank you



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