

Big Data is coming for you!

Christian Erikstrup
Chair Professor, Consultant
Department of Clinical Immunology
Aarhus University Hospital
Department of Clinical Medicine
Aarhus University



...or: Big Data is coming to us!

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Chair Professor, Consultant
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Aarhus University



DISCLOSURES

Unrestricted research grant from Abbott Diagnostics

Unrestricted research grant from Novo Nordisk

No personal fees

BIG DATA DEFINITION

Data arriving in larger **V**olumes, at greater **V**elocity, with increased **V**ariation
= the three Vs

Big Data requires a multidisciplinary approach with the use of new methods to analyse the complex and large datasets

In health care research, Big Data is a part of the process in the optimization of patient treatment. Big Data is here but personalized medicine is still in its infancy

Globally, **119 million blood donations** take place annually (WHO).
With the donation of data as well as blood, blood donors can help produce new knowledge

MORE DATA: BLOOD DONOR COHORTS ARE SUITABLE FOR LARGE-SCALE POPULATION OR BIOMARKER STUDIES

—

We can use blood donor studies...

- to study the health impact of blood and plasma donation
- to identify donors who pose a risk to our patients
- to answer generic research questions not related to transfusion

Studies are facilitated by the blood bank infrastructure

- ✓ Access to participants
- ✓ Collection sites
- ✓ Educated staff
- ✓ Transport
- ✓ Laboratories
- ✓ Storage Facilities



STUDIES CAN BE ENRICHED BY DATA FROM HEALTH REGISTERS WHERE POSSIBLE

Example – Danish health registers:

National Patient Register:

Hospital contacts (admission or outpatient visit) registered with ICD-10 diagnosis code, date in, date out

Prescription Register:

Redeemed drugs registered with ATC-codes, dose, packing size, date

Socioeconomic registers:

Education level, income level, area of home address, the car you own...

Recipient registers:

All the above apply also to recipients



RECIPIENT EPIDEMIOLOGY AND DONOR EVALUATION STUDY (REDS) PROGRAM – INITIATED IN 1989

Received: 5 December 2021 | Revised: 4 March 2022 | Accepted: 4 March 2022
DOI: 10.1111/trf.16869

TRANSFUSION MEDICINE

TRANSFUSION

The Recipient Epidemiology and Donor Evaluation Study-IV-Pediatric (REDS-IV-P): A research program striving to improve blood donor safety and optimize transfusion outcomes across the lifespan

Cassandra D. Josephson¹ | Simone Glynn² | Sunitha Mathew³ | Rebecca Birch³ | Sonia Bakkour⁴ | Lisa Baumann Kreuziger⁵ | Michael P. Busch⁴ | Kathleen Chapman³ | Carla Dinardo⁶ | Jeanne Hendrickson⁷ | Eldad A. Hod⁸ | Shannon Kelly⁹ | Naomi Luban¹⁰ | Alan Mast⁵ | Philip Norris⁴ | Brian Custer⁴ | Ester Sabino¹¹

Bruc
the
Don

July 12, 2000

Trends in Incidence and Prevalence of Major Transfusion-Transmissible Viral Infections in US Blood Donors, 1991 to 1996

Simone A. Glynn, MD, MSc, MPH; Steven H. Kleinman, MD; George B Schreiber, ScD; Michael P. Busch, MD, PhD; David J. Wright, PhD; James W. Smith, MD; Catharine C. Nass, PhD; Alan E. Williams, PhD; for the Retrovirus Epidemiology Donor Study (REDS)

» Author Affiliations

JAMA. 2000;284(2):229-235. doi:10.1001/jama.284.2.229

JCI insight

RESEARCH ARTICLE

2021

Blood donor exposome and impact of common drugs on red blood cell metabolism

Travis Nemkov,^{1,2} Davide Stefanoni,¹ Aarash Bordbar,³ Aaron Issaian,¹ Bernhard O. Palsson,⁴ Larry J. Dumont,⁵ Ariel Hay,⁶ Anren Song,⁷ Yang Xia,⁷ Jasmina S. Redzic,¹ Elan Z. Eisenmesser,¹ James C. Zimring,⁶ Steve Kleinman,⁸ Kirk C. Hansen,^{1,2} Michael P. Busch,⁹ Angelo D'Alessandro,^{1,2} and the Recipient Epidemiology and Donor Evaluation Study III Red Blood Cell-Omics (REDS-III RBC-Omics) Study¹⁰

RBCs may have targets for common drugs.

“As a proof of principle, here we show that the antacid ranitidine — though rarely detected in the blood donor population — has a strong effect on RBC markers of storage quality in vitro.”

Example of Big Data Study

The Danish Blood Donor Study

>160,000 blood donors have been included

>2.5 million plasma archive samples from every donation available for research

>400,000 questionnaires collected

Collaboration between The Blood Donor Study and deCODE Genetics, Iceland

>110,000 donors typed for 650,000 SNPs

Linkage to registers

V for Volume:

=> nearly 1 petabyte of data

Awaiting first data from 50,000 samples submitted to whole genome sequencing

Samples shipped for proteome analyses

The diagram at the top illustrates the data flow from a donor to multiple donations. A donor icon is labeled 'Donor' and 'Internal use'. Arrows point from the donor to 'Donation 1', 'Donation 2', and 'Donation X', each represented by a blood bag icon. Below this is a screenshot of the IAEA Cohort Profile for 'The Danish Blood Donor Study'. The IAEA logo is visible, along with the text 'International Epidemiological Association'. The profile lists the study title and a long list of authors, including Christian Erikstrup, Erik Sørensen, Kaspar R Nielsen, Mie T Bruun, Mikkel S Petersen, Klaus Rostgaard, Lise W Thørner, Margit Larsen, Susan Mikkelsen, Khoa M Dinh, Michael Schwinn, Andreas S Rigas, Maria Didriksen, Joseph Dowsett, Jakob H von Stemmann, Thorsten Brodersen, Isabella W Paulsen, Lotte Hindhede, Susanne G Sækmose, Kathrine A Kaspersen, Jens K Boldsen, Bertram Kjerulff, Thomas Werge, Søren Brunak, Karina Banasik, Thomas F Hansen, Henrik Ullum, and Ole B Pedersen. A red DNA double helix icon is positioned to the left of the author list. To the right of the screenshot, a building icon is labeled 'with system'.

Donor

Internal use

Donation 1

Donation 2

Donation X

International Journal of Epidemiology, 2022, 1–10
<https://doi.org/10.1093/ije/dyac194>
Cohort Profile

IEA
International Epidemiological Association

Cohort Profile

Cohort Profile: The Danish Blood Donor Study

Christian Erikstrup ,^{1,2*} Erik Sørensen,³ Kaspar R Nielsen,⁴ Mie T Bruun,⁵ Mikkel S Petersen,¹ Klaus Rostgaard,^{6,7} Lise W Thørner,³ Margit Larsen,³ Susan Mikkelsen,¹ Khoa M Dinh ,¹ Michael Schwinn,³ Andreas S Rigas,³ Maria Didriksen ,³ Joseph Dowsett,³ Jakob H von Stemmann,³ Thorsten Brodersen,⁸ Isabella W Paulsen,⁸ Lotte Hindhede,¹ Susanne G Sækmose,⁸ Kathrine A Kaspersen,^{1,9} Jens K Boldsen,^{1,9} Bertram Kjerulff,^{1,9} Thomas Werge,^{10,11,12,13} Søren Brunak ,¹⁴ Karina Banasik ,¹⁴ Thomas F Hansen,^{14,15} Henrik Ullum ,¹⁶ H Ole B Pedersen^{8,13†}



FROM REGISTER-BASED STUDY TO DONOR BIOBANK

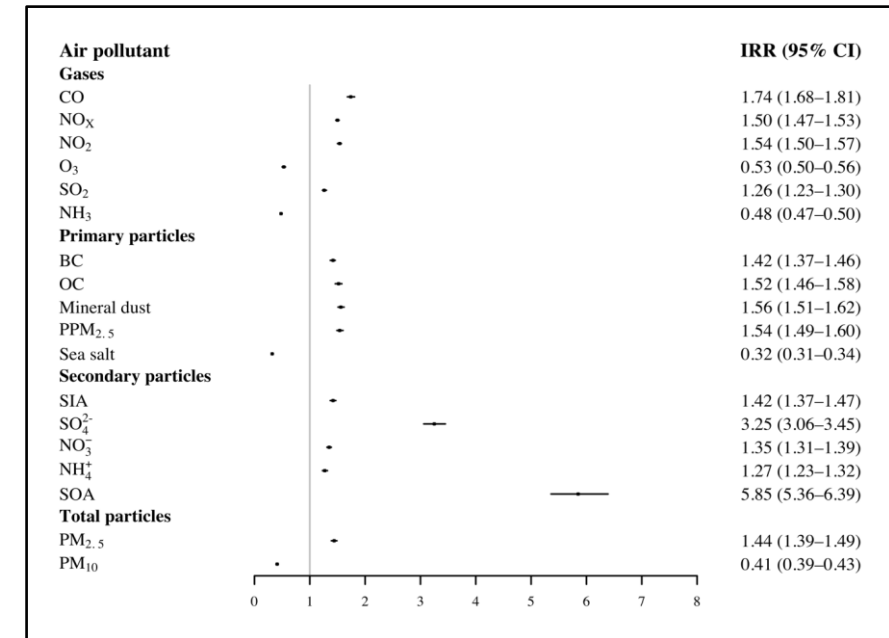
AIR POLLUTION AND RISK OF AIRWAY INFECTION

Outcome:
hospitalization for respiratory tract infections.

Exposure:
average concentration of 18 air pollutants modelled
at the individual's residential address during a three-month exposure
window before an event. Adjustments for socioeconomic variables

Population:
3,653,490 citizens, 18–64 years old.

Conclusion:
Pollutants from combustion processes are associated with higher risk
of infection.



SMOKING AND RISK OF ALL-CAUSE INFECTION

Analysis on 120,246 blood donors using the patient and prescription registers



Contents lists available at ScienceDirect

Clinical Microbiology and Infection

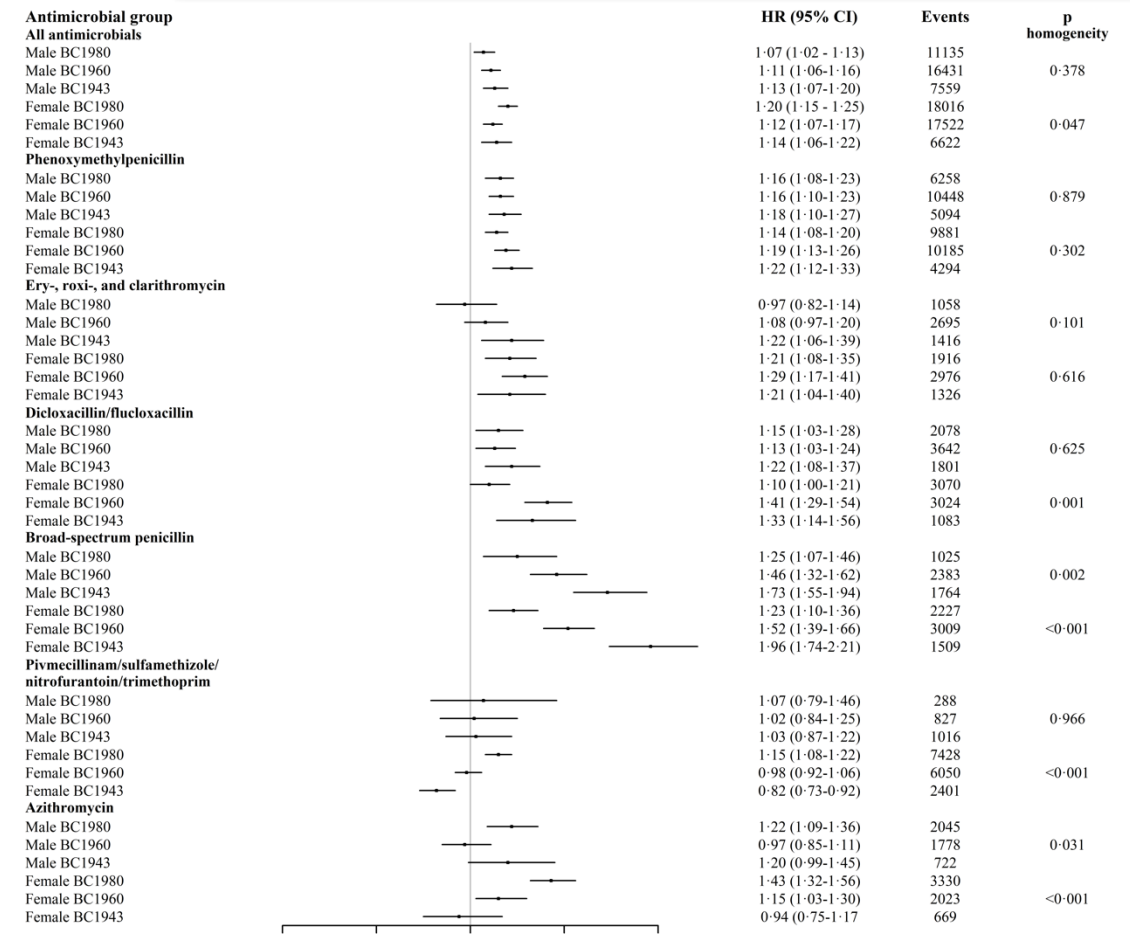
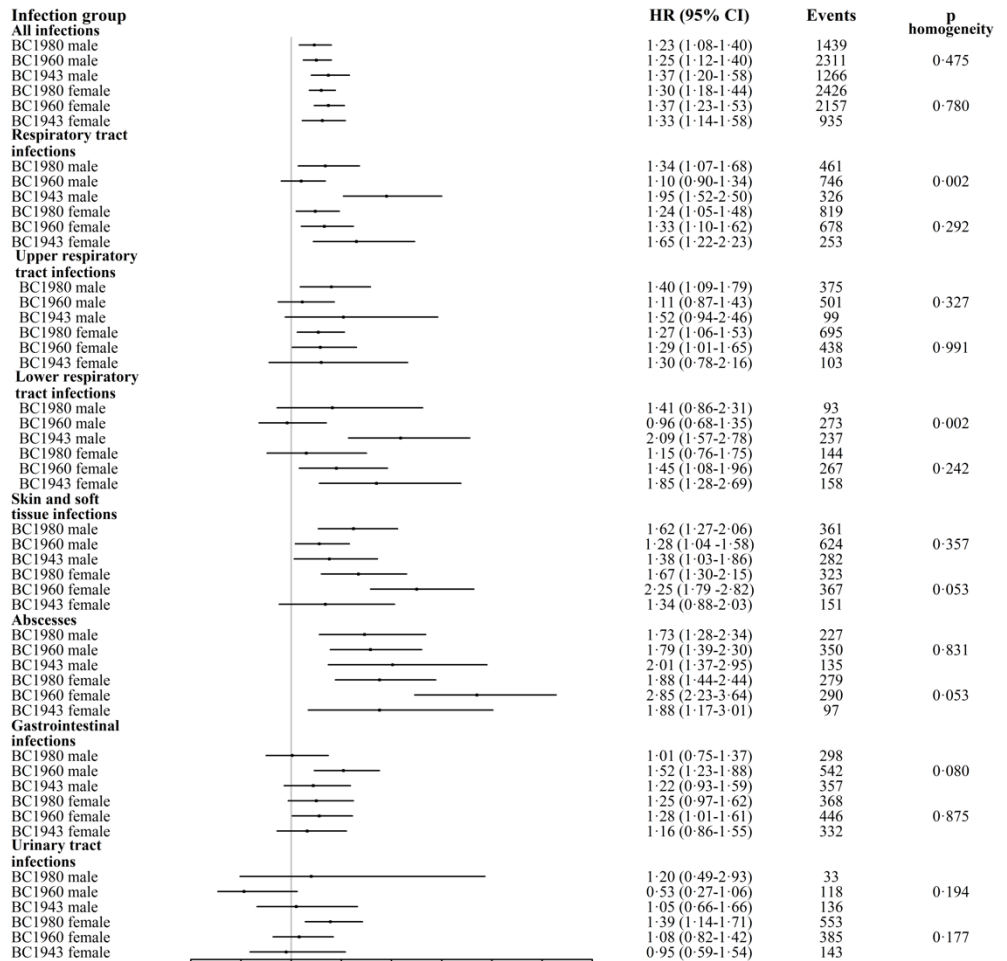
journal homepage: www.clinicalmicrobiologyandinfection.com



Original article

Smoking is associated with infection risk in healthy blood donors

Bertram Kjerulff^{1,2,3,*}, Kathrine A. Kaspersen^{1,2}, Khoa M. Dinh^{1,4}, Jens Boldsen^{1,2}, Susan Mikkelsen¹, Lise T. Erikstrup⁴, Erik Sørensen⁵, Kaspar R. Nielsen⁶, Mie T. Bruun⁷, Henrik Hjalgrim^{8,9,10,11}, Ole B. Pedersen¹², Lise W. Thørner⁵, Henrik Ullum^{5,13}, Sisse R. Ostrowski^{5,11}, Klaus Rostgaard^{8,9}, Carsten B. Pedersen^{2,14}, Torben Sigsgaard^{2,15}, Christian Erikstrup^{1,2,3}



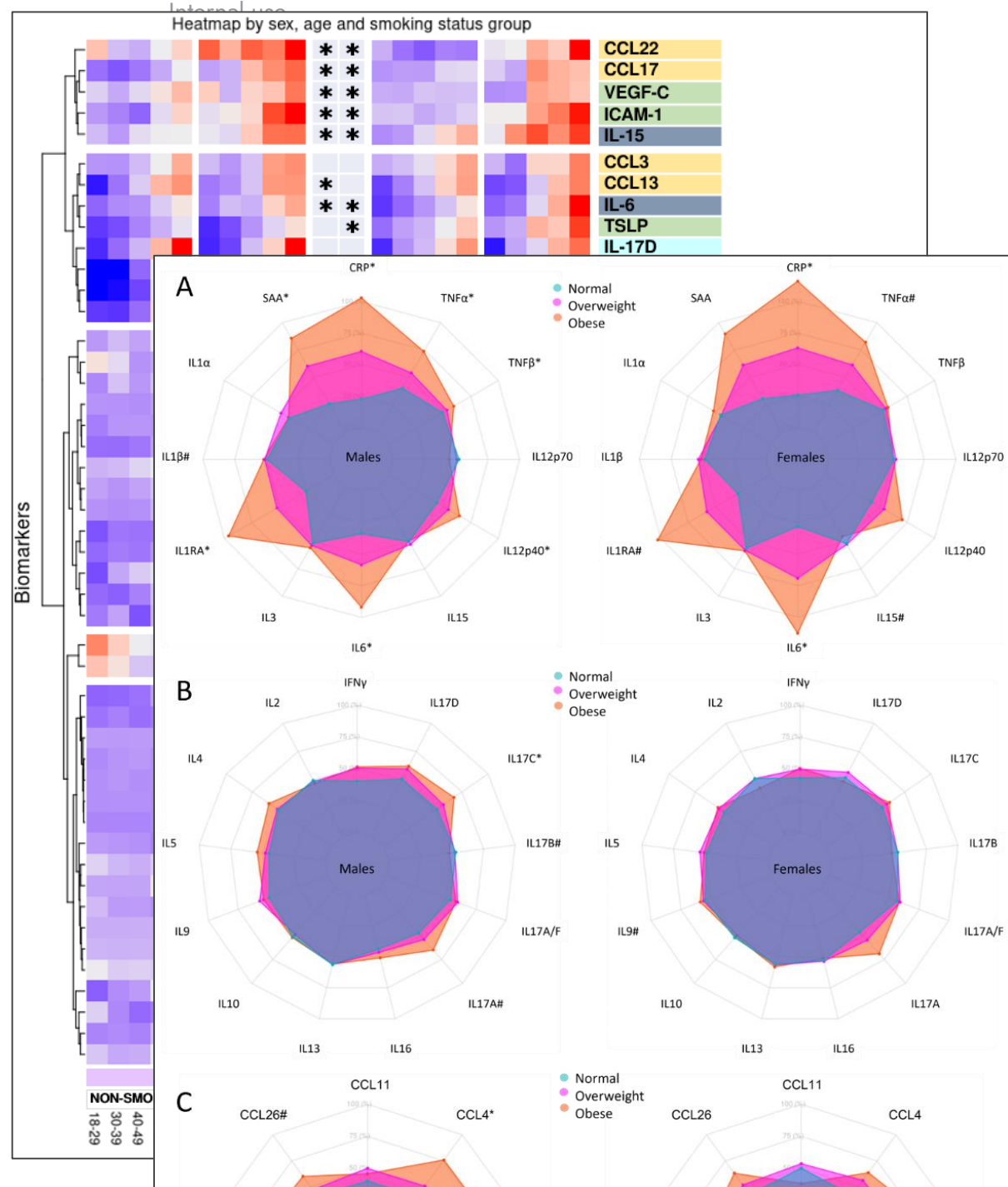
The DBDS biomarker cohort

47 inflammation and vascular biomarker measurements among 10,000 blood donors using the Meso Scale platform

Basic demographic analyses:
Increased inflammation with age, BMI, and smoking

Patterns instead of single inflammation markers

AI



FROM REGISTER-BASED STUDY TO DONOR BIOBANK

EXAMPLE: AIR POLLUTION, INFECTION, AND BIOMARKERS

V FOR VARIATION – NEW COMBINATIONS OF DATASETS

Research question:

How does Next questions - transfusion medicine:
biomarker

Since last year: frequently updated data from recipients as well

Research questions:

Donor traits:

Research c
How does
12,000 nas
How does air pollution affect risk of asthma/allergy?

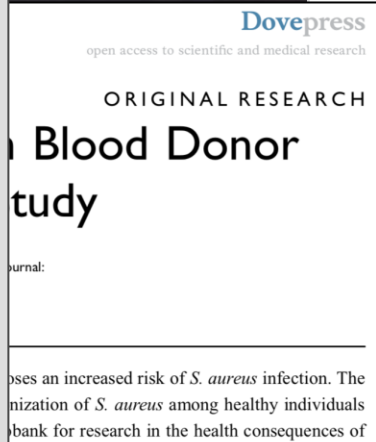
S. aureus (other bacteria) carriage
antimicrobial use shortly before/after donation
inflammation biomarkers
smoking
allergy with or without IgE
proteomics

Recipient outcome

Robert Leo Skov³
Kathrine Agergård
Kaspersen²
Kaspar René Nielsen⁵
Svend Ellermann-Eriksen¹
Christian Erikstrup²

colonization.

Population and methods: The Danish Blood Donor *S. aureus* Carriage Study (DBDSaCS) was established in 2014. So far, a total of 6082 healthy participants have been included with nasal swabs and repeated swabs are performed at subsequent donations. Samples from the first 2217 participants were cultured using a two-step method to evaluate the effect of using enrichment broth. Furthermore, 262 participants were sampled from both the nares and the throat. All participants completed a questionnaire with self-reported health, anthropometric



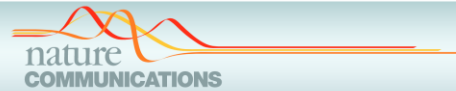
Dyslipidemia, inflammation, calcification, and adiposity in aortic stenosis: a genome-wide study

Hao Yu Chen^{1,2}, Christian Dina³, Aeron M. Small⁶, Christian M. Shaffer⁷, Rebecca T. Levinson⁷, Anna Helgadóttir⁸, Romain Capoulade⁹, Hans Markus Munter⁹, Andreas Martinsson^{10,36}, Benjamin J. Cairns¹¹, Linea C. Trudse²⁰, Mary Hoekstra^{1,2}, Hannah A. Burr^{1,2}, Thomas W. Marsh^{2,37}, Scott M. Damrauer¹², Line Dufresne², Solena Le Scouarnec³, David Messika-Zeitoun^{4,5}, Dilrini K. Ranatunga¹³, Rachel A. Whitmer¹⁴, Amélie Bonnefond^{15,16}, Garðar Sveinbjörnsson⁸, Ragnar Danielsen¹⁷, David O. Arnar^{8,17,18}, Gudmundur Thorgeirsson^{8,18}, Unnur Thorsteinsdóttir^{8,18}, Daniel F. Gudbjartsson^{8,19}, Hilma Hólm⁸, Jonas Ghouse²⁰, Morten Salling Olesen²⁰, Alex H. Christensen^{20,21}, Susan Mikkelsen²², Rikke Louise Jacobsen²³, Joseph Dowsett²³, Ole Birger Vesterager Pedersen²⁵, Christian Erikstrup^{22,26}, Sisse R. Ostrowski^{23,24}, Regeneron Genetics Center²⁷, Christopher J. O'Donnell²⁸, Matthew J. Budoff²⁹, Vilundur Gudnason³⁰, Wendy S. Post³¹, Jerome I. Rotter³², Mark Lathrop^{9,37}, Henning Bundgaard³³, Bengt Johansson³⁴, Johan Ljungberg³⁴, Ulf Näslund³⁴, Thierry Le Tourneau³, J. Gustav Smith^{10,35,36}, Quinn S. Wells³, Stefan Söderberg³⁴, Kári Stefánsson^{8,18}, Jean-Jacques Schott³, Daniel J. Rader³⁸, Robert Clarke¹¹, James C. Engert^{1,2,37,41}, and George Thanassoulis^{1,2,41}, on behalf of the Therapeutic targets for Aortic stenosis using GENEtics (TARGET) Consortium

Christian Erikstrup^{7,8}, Søren Brunak⁹, Sisse Ry Gudmar Thorleifsson¹, Frosti Jonsson¹, Pall M. Hilma Holm¹, Hreinn Stefánsson¹, Jóna Saemundsdóttir¹, Magnússon¹, Gisli Masson¹, Unnur Th. Hakon Jonsson¹, Patrick Sulem¹ & Kari Stefánsson¹

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Bic

<https://doi.org/10.1093/eurheartj/ehad142>
Received
Accepted
Published
Open access
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ARTICLE

<https://doi.org/10.1038/s41467-022-29133-7> OPEN

A genome-wide meta-analysis identifies 50 genetic loci associated with carpal tunnel syndrome

Astros Th. Skuladottir^{1,2,3}, Gyda Björnsdóttir¹, Egil Ferkingstad¹, Gudmundur Einarsson¹, Lilja Stefánsdóttir¹, Muhammad Sulaman Nawaz^{1,2}, Asmundur Oddsson¹, Thorunn A. Olafsdóttir¹, Saedis Saevarsdóttir^{1,2,3}, G. Bragi Walters^{1,2}, Sigurdur H. Magnússon¹, Anna Björnsdóttir⁴, Olafur A. Sveinsson², Arnor Víkingsson³, Thomas Folkmann Hansen^{5,6}, Rikke Louise Jacobsen⁷, Christian Erikstrup⁸, Michael Schwinn⁷, Søren Brunak⁹, Karina Banasik⁶, Sisse Rye Ostrowski^{7,9}, Anders Troelsen¹⁰, Cecilie Henkel¹¹, Ole Birger Pedersen^{12,23}, DBDS Genetic Consortium⁴, Ingileif Jónsdóttir^{1,2}, Daniel F. Gudbjartsson^{1,13}, Patrick Sulem¹, Thorgeir E. Thorgeirsson¹, Hreinn Stefánsson¹ & Kari Stefánsson^{1,2,23}

Check for updates

GENETIC STUDIES

Genetic effects on the timing of parturition and links to fetal birth weight

8 July 2022

S. Moore¹, Hannes Hauswedell¹, Joni M. Martein T. Hardarson^{1,2}, and S. Thorgeirsson^{1,2}

Genetics

JCI The Journal of Clinical Investigation

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Research In-Press Preview Cardiology Open Access | [10.1172/JCI158788](https://doi.org/10.1172/JCI158788)

Clinical, genetic, and experimental increase in soluble urokinase plasminogen activator receptor levels promotes atherosclerosis

<https://doi.org/10.1038/s41588-023-01343-9>

Article

Genetic effects on the timing of parturition and links to fetal birth weight

Received: 4 May 2022

Accepted: 22 February 2023

Published online: 3 April 2023

A list of authors and their affiliations appears at the end of the paper

The timing of parturition is crucial for neonatal survival and infant health. Yet, its genetic basis remains largely unresolved. We present a maternal

ARTICLE

<https://doi.org/10.1038/s41588-022-01199-5>

Rare SL disc disc patholo

Gyda Björnsdóttir¹, Egil Ferkingstad¹, G. Bragi Walters¹, Gisli H. Halldors¹, Unnur Styrkarsdóttir¹, Thomas Werge¹, Christian Erikstrup¹, Ingileif Jónsdóttir¹, Arnor Víkingsson¹, Søren Brunak¹, Sisse R. Ostrowski¹, Henrik Ullum¹, Unnur Thorsteinsdóttir¹, and Kari Stefánsson¹

nature genetics

Article

<https://doi.org/10.1038/s41588-022-01286-7>

Genome-wide meta-analysis identifies 93 risk loci and enables risk prediction equivalent to monogenic forms of venous thromboembolism

Received: 9 August 2022

Accepted: 13 December 2022

Published online: 19 January 2023

A list of authors and their affiliations appears at the end of the paper

We report a genome-wide association study of venous thromboembolism (VTE) in 11,199 cases and 149,621 controls from six

ARTICLES

<https://doi.org/10.1038/s41588-021-00990-0>

nature genetics

Check for updates

OPEN

Genome-wide analysis of 102,084 migraine cases identifies 123 risk loci and subtype-specific risk alleles

Heidi Hautakangas¹, Bendik S. Winsvold^{2,3,4}, Sanni E. Ruotsalainen⁵, Gyda Björnsdóttir¹, Laurent F. Thomas^{3,9,10,11}, Raymond Noordam¹², Karina Banasik¹⁵, Anna Björnsdóttir¹⁶, Offer Sölvsten Burgdorf¹⁸, Julie E. Buring^{19,20}, Dichgans^{21,22}, Christian Erikstrup²³, Mohsen Ghanbari²⁴, Knut Hagen^{25,26}, Hrafnaldottir²⁷, Kristian Hveem^{3,28}, Ben S. Kristoffersen^{30,32,33}, Tobias Kurth³⁴, Magnusson⁵, Rainer Malik²¹, W. J. H. Penninx^{37,38}, Caroline Ran³⁹, Sigurdardottir¹⁶, Anne Heidi Skogholt³, Henrik Ullum¹⁸, Lisanne S. Vijfhuizen⁷, International Headache Genetics Consortium¹, Genomic Cohort¹, Arpo Aromaa⁴², Arfan Ikram²⁴, Marjo-Riitta Järvelin^{45,46,47,48}, Lallela¹⁴, Maija Wessman^{1,52}, Skogholt⁵³, Hreinn Stefánsson⁵, Kari Stefánsson⁵, Mann Hansen^{8,15}, Samuli Ripatti^{1,54,55}, Matti Pirinen^{1,55,58}

nature genetics

Article

<https://doi.org/10.1038/s41588-022-01199-5>

Multomics study of nonalcoholic fatty liver disease

December 2021

September 2022

24 October 2022

updates

Gardar Sveinbjörnsson^{1,20}, Magnus O. Ulfarsson^{1,2,20}, Rosa B. Thorlfsdóttir¹, Benedikt A. Jonsson¹, Eythor Einarsson¹, Gylfi Gunnlaugsson¹, Solvi Rognvaldsson¹, David O. Arnar^{1,3,4}, Magnus Baldvinsson⁵, Ragnar G. Bjarnason^{3,6}, DBDS Genomic consortium¹, Thjodbjorg Eiriksdoottir¹, Christian Erikstrup⁷, Egil Ferkingstad¹, Gisli H. Halldorsson¹, Hannes Helgason¹, Anna Helgadóttir¹, Lotte Hindhede⁷, Grimur Hjorleifsson¹, David Jones⁸, Kirk U. Knowlton⁹, Sigrun H. Lund¹, Pall Melsted¹⁰, Kristjan Norland¹, Isleifur Olafsson¹¹, Sigurdur Olafsson⁴, Gudjon R. Oskarsson¹, Sisse Rye Ostrowski^{12,13}, Ole Birger Pedersen^{13,14}, Audunn S. Snaebjarnarson¹, Emil Sigurdsson¹⁵, Valgerdur Steinthorsdottir¹, Michael Schwinn¹², Gudmundur Thorgeirsson^{1,4}, Gudmar Thorleifsson¹, Ingileif Jonsdottir^{1,3}, Henning Bundgaard^{13,17}, Lincoln Nadauld⁸, Einar S. Bjornsson^{3,4}, Ingrid C. Rulifson¹⁸, Thorunn Rafnar¹, Gudmundur L. Norddahl¹, Unnur Thorsteinsdottir^{1,3}, Patrick Sulem¹, Daniel F. Gudbjartsson^{1,2,19}, Hilma Holm¹ and Kari Stefánsson^{1,3,23}

CHALLENGES WITH BIG DATA STUDIES: INCIDENTAL FINDINGS

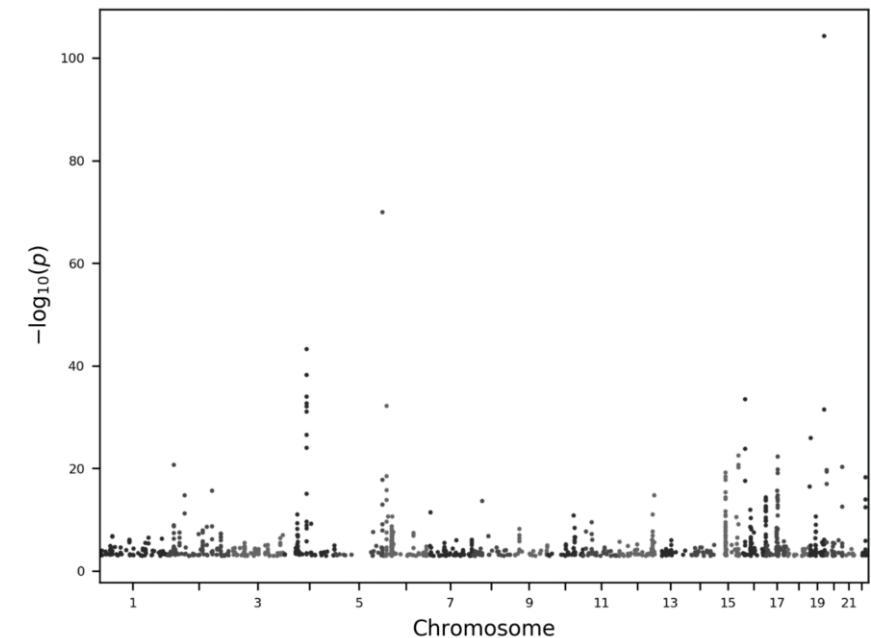
Incidental findings: previously undiagnosed conditions discovered unintentionally

First example from The Danish Blood Donor Study:
We have identified rare variants tightly associated with familial hypercholesterolemia

Treatment: statin, lifestyle changes

Five carriers of a gene variant have been informed

The next 50 carriers of another gene variant are to be informed now



INFECTION SURVEILLANCE

JAMA | Original Investigation

Estimated US Infection- and Vaccine-Induced SARS-CoV-2 Seroprevalence Based on Blood Donations, July 2020-May 2021

Jefferson M. Jones, MD, MPH; Mars Stone, PhD; Hasan Sulaeman, MS; Rebecca V. Fink, MPH; Honey Dave, MS; Matthew E. Levy, PhD; Clara Di Germanio, PhD; Valerie Green, MS; Edward Notari, MPH; Paula Saa, PhD; Brad J. Biggerstaff, PhD; Donna Strauss, MS; Debra Kessler, MS; Ralph Vassallo, MD; Rita Reik, MS; Susan Rossmann, MD, PhD; Mark Destree, MBA, MS; Kim-Anh Nguyen, MD, PhD; Merlyn Sayers, MBBCh, PhD; Chris Lough, MD; Daniel W. Bougie, PhD; Megan Ritter, MD; Gerardo Latoni, MD; Billy Weales; Stacy Sime, MS; Jed Gorlin, MD, MBA; Nicole E. Brown, PhD; Carolyn V. Gould, MD, MSCR; Kevin Berney, BA; Tina J. Benoit, MPH; Maureen J. Miller, MD, MPH; Dane Freeman, PhD; Deeksha Kartik; Alicia M. Fry, MD, MPH; Eduardo Azziz-Baumgartner, MD; Aron J. Hall, DVM, MSPH; Adam MacNeil, PhD; Adi V. Gundlapalli, MD, PhD; Sridhar V. Basavaraju, MD; Susan I. Gerber, MD; Monica E. Patton, MD; Brian Custer, PhD, MPH; Phillip Williamson, PhD; Graham Simmons, PhD; Natalie J. Thornburg, PhD; Steven Kleinman, MD; Susan L. Stramer, PhD, MS; Jean Opsomer, PhD, MBA; Michael P. Busch, MD, PhD

BMJ Open Cohort profile: A Québec-based plasma donor biobank to study COVID-19 immunity (PlasCoV)

2023

Marc Germain, Antoine Lewin , Renée Bazin, Mélanie Dieudé, Josée Perreault, Amélie Boivin, Yves Grégoire, Christian Renaud

The Journal of Infectious Diseases

MAJOR ARTICLE

 IDSA
Infectious Diseases Society of America

 hivma
hiv medicine association

OXFORD

Surveillance for Zika, Chikungunya, and Dengue Virus Incidence and RNAemia in Blood Donors at 4 Brazilian Blood Centers During 2016–2019

Brian Custer,^{1,2} Eduard Grebe,^{1,2,3} Renata Buccheri,¹ Sonia Bakkour,^{1,2} Mars Stone,^{1,2} Ligia Capuani,⁴ Cecilia Alencar,⁵ Luiz Amorim,⁶ Paula Loureiro,^{7,8} Anna Barbara Carneiro-Proietti,⁹ Alfredo Mendrone-Junior,¹⁰ Thelma González,¹ Kui Gao,¹¹ Kristin W. Livezey,¹¹ Jeffrey M. Linnen,¹¹ Don Brambilla,¹² Chris McClure,¹² Michael P. Busch,^{1,2} and Ester C. Sabino,⁴ for the Recipient Epidemiology and Donor Evaluation Study (REDS-III) International Component Brazil

 nature
COMMUNICATIONS

ARTICLE

 Check for updates

<https://doi.org/10.1038/s41467-020-19481-7>

OPEN

Low SARS-CoV-2 seroprevalence in blood donors in the early COVID-19 epidemic in the Netherlands

Ed Slot ^{1,2,12}, Boris M. Hogema ^{1,3,12}, Chantal B. E. M. Reusken ^{4,5}, Johan H. Reimerink ⁴, Michel Molier¹, Jan H. M. Karregat ⁶, Johan IJst ⁷, Véra M. J. Novotný ⁸, René A. W. van Lier ^{9,10} & Hans L. Zaaijer ^{1,3,11}

Clinical Infectious Diseases

MAJOR ARTICLE

 IDSA
Infectious Diseases Society of America

 hivma
hiv medicine association

OXFORD

Estimation of SARS-CoV-2 Infection Fatality Rate by Real-time Antibody Screening of Blood Donors

Christian Erikstrup,^{1,2} Christoffer Egeberg Hother,³ Ole Birger Vestager Pedersen,⁴ Kåre Mølbak,⁵ Robert Leo Skov,⁵ Dorte Kinggaard Holm,⁶ Susanne Gjørup Sækmose,⁴ Anna Christine Nilsson,⁶ Patrick Terrence Brooks,³ Jens Kjærgaard Boldsen,^{1,2} Christina Mikkelsen,^{3,7} Mikkel Gybel-Brask,³ Erik Sørensen,² Khoa Manh Dinh,^{1,2} Susan Mikkelsen,^{1,2} Bjarne Kuno Møller,^{1,2} Thure Haunstrup,⁸ Lene Harritshøj,³ Bitten Aagaard Jensen,⁸ Henrik Hjalgrim,⁹ Søren Thue Lillevang,⁶ and Henrik Ullum³



V FOR VELOCITY

Data is produced faster than earlier – and sometimes data must be processed faster than earlier as well

Last year, Omicron seroprevalence:

Sensitivity of anti-Nucleocapside assays was unknown among individuals with Omicron vaccine breakthrough infection.

Determine assay sensitivity:

Individual antibody measurements were transferred from blood centers and linked to the SARS-CoV-2 PCR register.



The Lancet Regional
Health - Europe
2022;21: 100479

Seroprevalence and infection fatality rate of the SARS-CoV-2 Omicron variant in Denmark: A nationwide serosurveillance study

Christian Erikstrup,^{a,b,c,*} Anna Damkjær Laksafoss,^d Josephine Gladov,^a Kathrine Agergård Kaspersen,^{a,b} Susan Mikkelsen,^a Lotte Hindhede,^a Jens Kjærgaard Boldsen,^{a,b} Signe Winther Jørgensen,^a Steen Ethelberg,^d Dorte Kinggaard Holm,^e Mie Topholm Bruun,^e Janna Nissen,^f Michael Schwinn,^f Thorsten Brodersen,^g Christina Mikkelsen,^{f,h} Susanne Gjørup Sækmose,^g Erik Sørensen,^f Lene Holm Harritshøj,^f Bitten Aagaard,ⁱ Khoa Manh Dinh,^a Michael P. Busch,^{j,k} Charlotte Sværke Jørgensen,ⁱ Tyra Grove Krause,^d Henrik Ullum,^d Sisse Rye Ostrowski,^{f,m,1} Laura Espenhain,^{d,1} and Ole Birger Vesterager Pedersen^{g,m,1}



FUTURE POSSIBILITIES?

THE EUROPEAN HEALTH DATA SPACE

Aim

The EHDS seeks to provide rules, common standards and practices, infrastructures and a governance framework for both primary use (using personal electronic health data to provide health services to an individual) and secondary use (using electronic health data for broader needs such as health research or public policy) of public health data. To that end, it (1) strengthens patient control over their data; (2) establishes rules for electronic health records (EHR) systems in order to promote reliability, security and interoperability; (3) establishes rules for secondary use of health data; and (4) establishes mandatory cross-border infrastructures, one for primary use and the other for secondary use.

Marcus et al. The European Health Data Space. SSRN Journal. 2022;
Available from: <https://www.ssrn.com/abstract=4300393>

Maybe this can open for large-scale donor and recipient studies in the EU

IMPACT

CH

How will big data and ai impact transfusion medicine? Please provide text suitable for one powerpoint slide.

EDICINE

- Personalized transfusion therapy
- Precise donor selection
- Improved blood inventory management
- Reduced transfusion errors
- Monitoring blood safety
- These



Title: Big Data and AI in Transfusion Medicine

- Personalized transfusion therapy: AI and big data analysis of patient data to determine optimal transfusion protocols for each patient
- Precise donor selection: AI and big data analysis to identify the most suitable donors based on blood type, antibody screening, and infectious disease testing
- Improved blood inventory management: Big data analysis to predict demand, reduce shortages, and optimize inventory
- Reduced transfusion errors: AI algorithms to provide decision support to clinicians and flag potential errors
- Monitoring blood safety: Big data analysis to monitor adverse reactions and infectious disease testing results

These advancements can ultimately lead to better patient outcomes in transfusion medicine.

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CONCLUSION

Blood banks have the infrastructure needed to establish large scale public health studies

Linkage to health registers increases our possibilities

European Health Dataspace may provide new possibilities

Linkage to recipient registers provides the opportunity to perform vein-to-vein studies

The bottleneck is not the volume of data (Big Data is here) but our skills to use it

New methods: AI?

Not much on TTIDs – but a start in the building of a framework for blood safety studies

Dept. of Clinical Immunology,
Aarhus University Hospital

Susan Mikkelsen

Khoa Manh Dinh

Kathrine Kaspersen

Jens Kjærgaard Boldsen

Lotte Hindhede

Bertram Kjerulf

Anne Karmisholt Grosen

Josephine Gladov

Line Nielsen

Dept. of Clinical Immunology
Næstved Sygehus:

Ole Birger Pedersen

Thorsten Brodersen

Dept. of Clinical Immunology,
Rigshospitalet:

Sisse Ostrowski

Erik Sørensen

Margit Anita Hørup Larsen

Maria Didriksen

Lise Wegner Thørner

Christina Mikkelsen

Joseph Dowsett

Danish Cancer Society

Henrik Hjalgrim

Klaus Rostgaard

Dept. of Clinical Microbiology,
Aarhus University Hospital

Lise Erikstrup

Dept. of Clinical Immunology,
Aalborg Universitetshospital

Bitten Aagaard

Dept. of Clinical Immunology
Odense Universitetshospital

Mie Topholm Bruun

Danish Blood Donor Assoc.

Bente Graversen

Flemming Bøgh-Sørensen

Statens Serum Institut

Henrik Ullum

Center for Protein Research, KU

Karina Banasik

Søren Brunak

David Westergaard

Bacteria, Parasites and Fungi,
Statens Serum Institut

Paal Skytt Andersen

Dept. Medical Epidemiology
and Biostatistics, Karolinska Institutet,
Sverige

Gustaf Edgren

Danish Headache Center,
Rigshospitalet

Thomas Folkmann Hansen

Thomas Werge

Biomedicine, Aalborg University
Mette Nyegaard

deCODE Genetics, Island

Kari Stefánsson

Hreinn Stefánsson

Unnur Þorsteinsdóttir

Ingileif Jónsdóttir



BIG DATA

Main Presentations:

SCANDAT Analysis of Amyloid Plaque Transmission by Transfusion - Gustaf Edgren

Big Data Donor Research - Emanuele Di Angelantonio

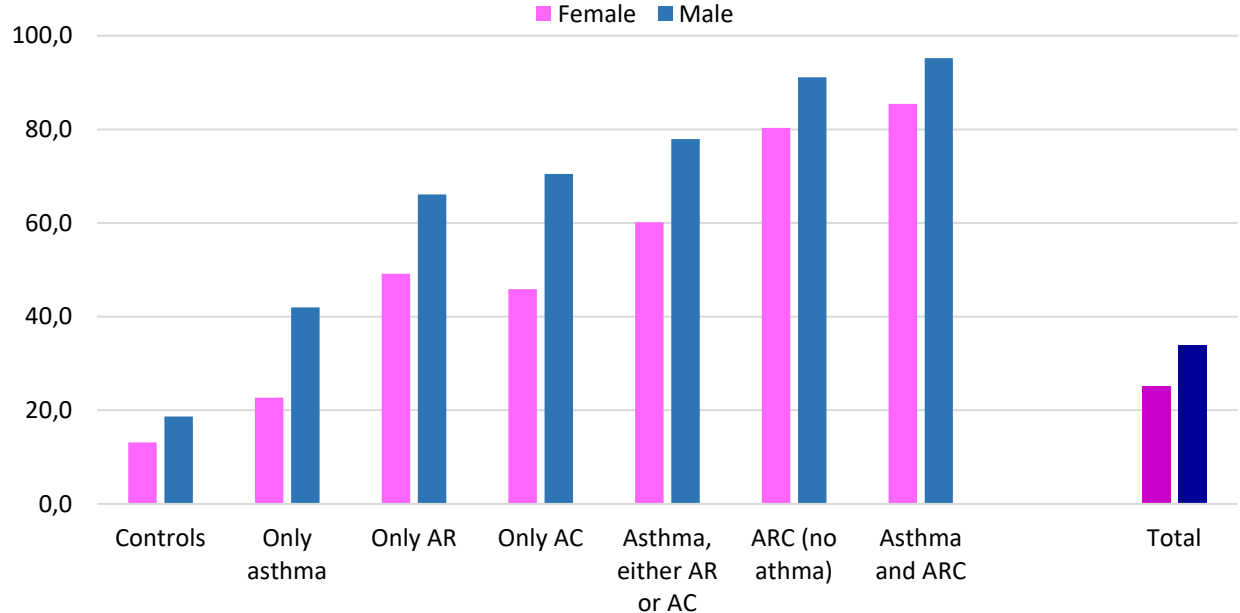
Panel discussion

How can we use Big Data for blood safety studies?

Combinations of self-reported rhinitis, conjunctivitis, and asthma predicts IgE sensitization in more than 25,000 Danes

Susan Mikkelsen¹ | Khoa Manh Dinh¹ | Jens Kjærgaard Boldsen^{1,2} | Ole Birger Pedersen³ | Gitte Juel Holst⁴ | Mikkel Steen Petersen¹ | Kathrine Agergård Kaspersen^{1,2} | Bjarne Kuno Møller¹ | Kaspar Rene Nielsen⁵ | Helene Martina Paarup⁶ | Klaus Rostgaard⁷ | Henrik Hjalgrim⁷ | Erik Sørensen⁸ | Linda Jenny Handgaard⁸ | Thomas Folkmann Hansen^{9,10} | Karina Banasik¹⁰ | Kristoffer Sølvsten Burgdorf⁸ | Henrik Ullum^{8,11} | Torben Sigsgaard^{2,12} | Christian Erikstrup^{1,2}

Prevalence of inhalant allergen IgE sensitization



The prevalence of IgE sensitization increased with increasing number of allergic morbidities.

AR: allergic rhinitis; AC: allergic conjunctivitis

Cohort description: The Danish Blood Donor *Staphylococcus aureus* Carriage Study

This article was published in the following Dove Press journal:
Clinical Epidemiology

Lise Tornvig Erikstrup^{1,*} | Khoa Manh Dinh^{2,*} | Paal Skytt Andersen^{3,4} | Robert Leo Skov³ | Kathrine Agergård Kaspersen² | Kaspar René Nielsen⁵ | Svend Ellermann-Eriksen¹ | Christian Erikstrup²

Purpose: *Staphylococcus aureus* carriage poses an increased risk of *S. aureus* infection. The aim of this study was to investigate the colonization of *S. aureus* among healthy individuals and to establish a prospective cohort and biobank for research in the health consequences of colonization.

Population and methods: The Danish Blood Donor *S. aureus* Carriage Study (DBDSaCS) was established in 2014. So far, a total of 6082 healthy participants have been included with nasal swabs and repeated swabs are performed at subsequent donations. Samples from the first 2217 participants were cultured using a two-step method to evaluate the effect of using enrichment broth. Furthermore, 262 participants were sampled from both the nares and the throat. All participants completed a questionnaire with self-reported health, anthropometric

