#InvestEUresearch

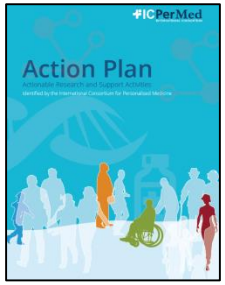
Horizon 2020 Work Programme for Research & Innovation 2018-2020

The EU Experience in Assembling Cohorts of Cohorts

Dr Philippe Cupers
Strategy Unit
Health Directorate
Directorate-General Research and Innovation
European Commission

Research and Innovation

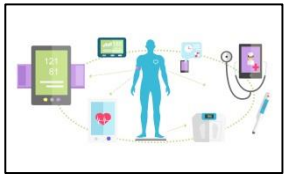
EU Horizon 2020: 7 priorities for collaborative health research



1. Personalised medicine

2. Innovative health and care industry

3. Infectious diseases and improving global health



4. Innovative health, and care systems – Integration of care

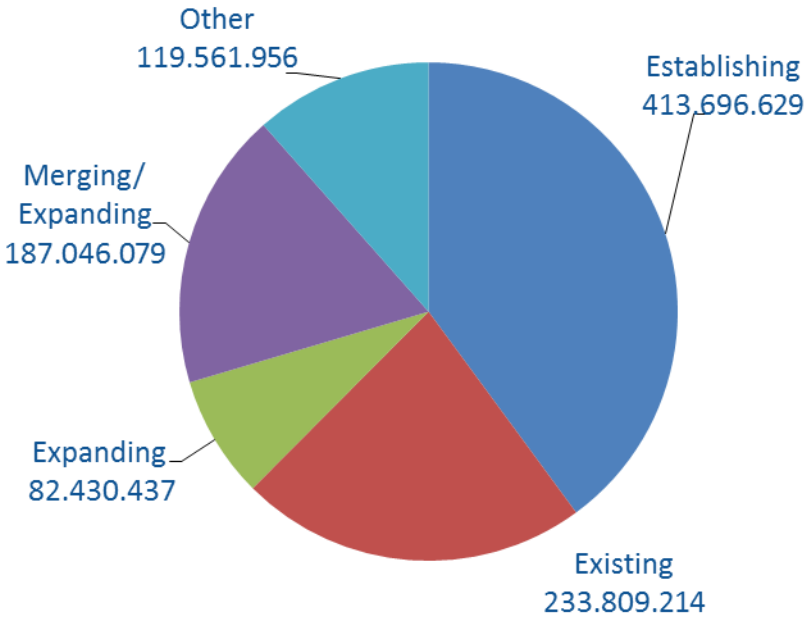
5. Decoding the role of the environment for health and well-being

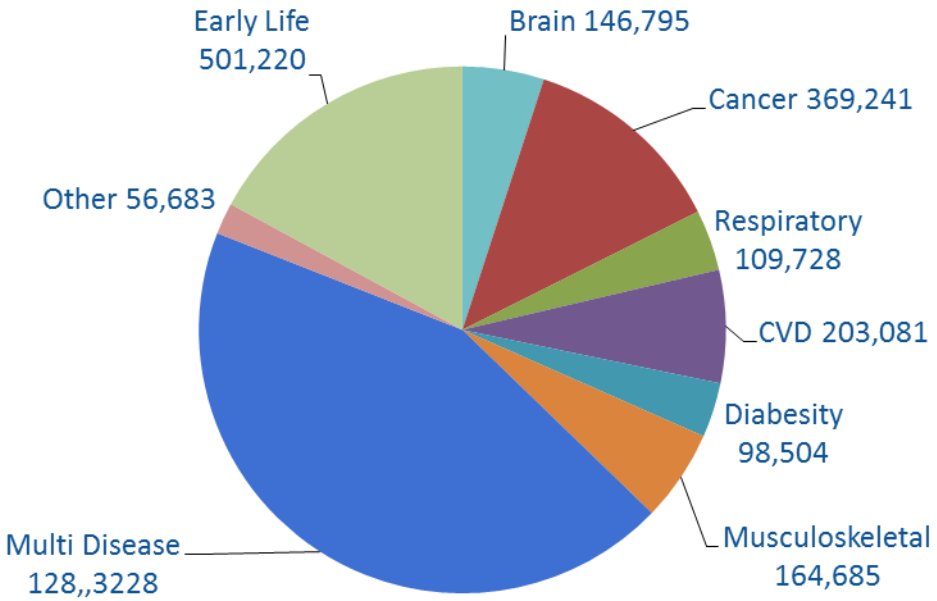
6. Digital transformation in Health and Care

7. Trusted Big Data solutions and Cybersecurity for Health and Care

EU FP7 supported cohorts (2007-2013)

266 projects, > € 1 billion
55 collaborative projects ~ 3 million subjects



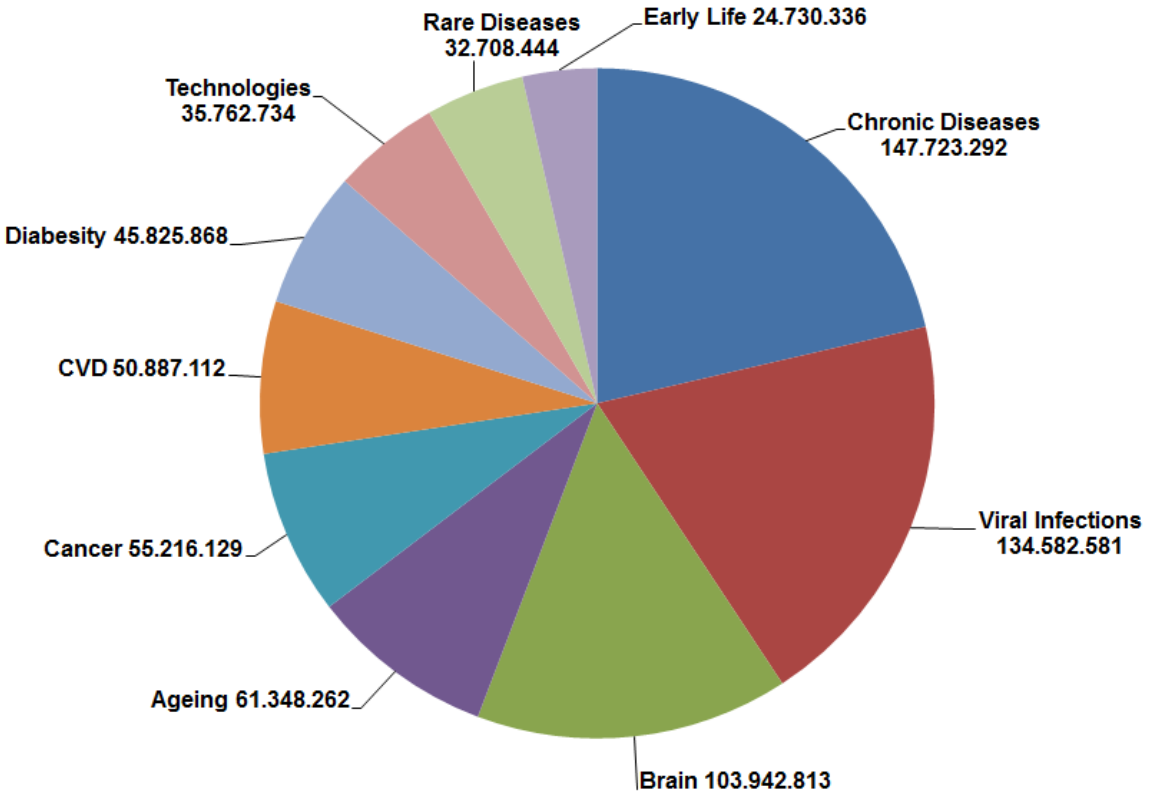


FP7: Health Programme
Number of subjects in 55 projects

European Commission

EU Horizon 2020 supported cohorts (2013-2020)

87 collaborative Health projects: > € 690 million



European Commission

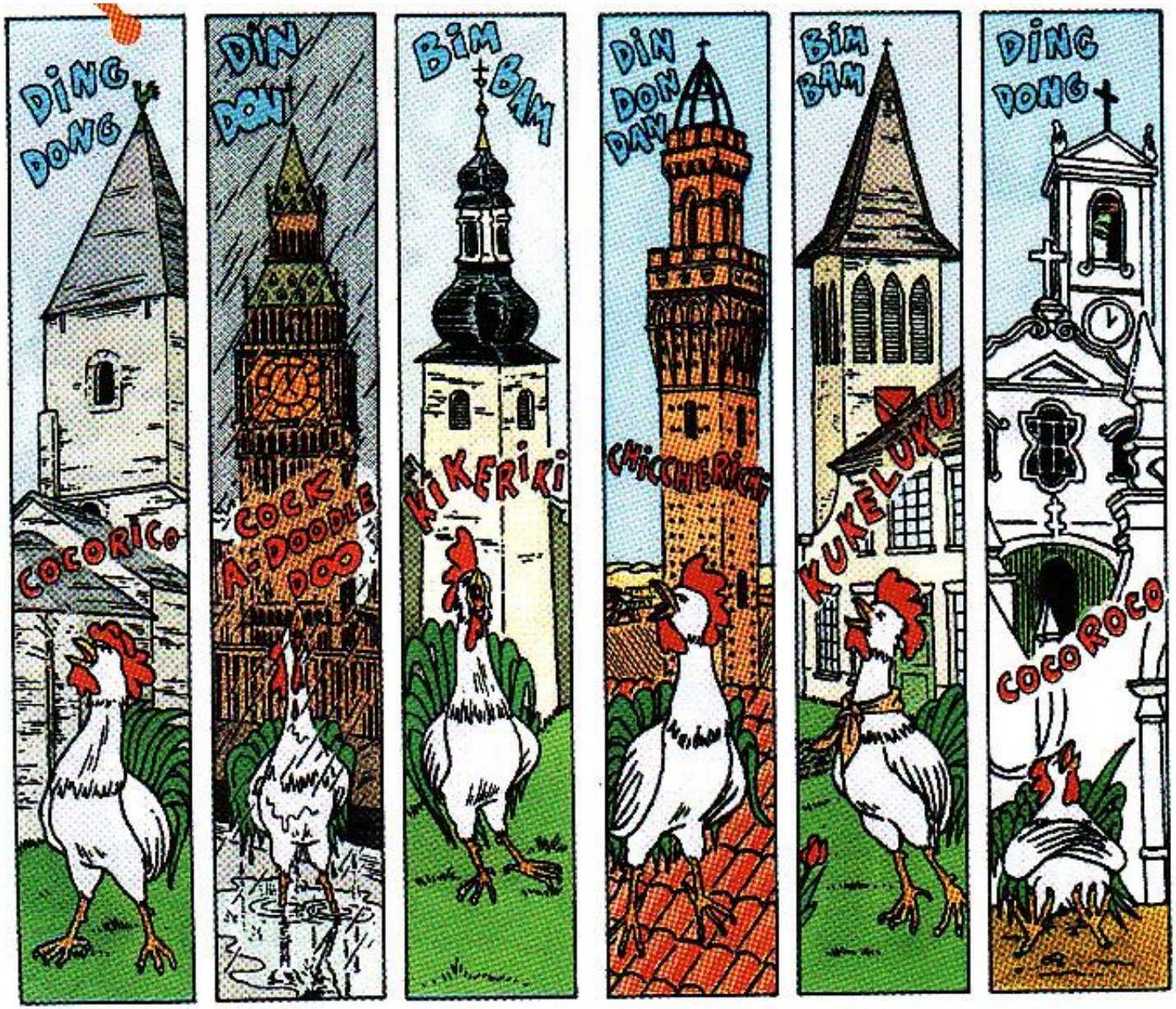
H2020 data presented are from 13/09/2017

Next step: supporting cohorts of cohorts

(Horizon 2020) SC1-PM-04-2016: Networking and optimising the use of population and patient cohorts at EU level

Scope

- Maximizing the exploitation of cohorts by bringing together national and/or European cohorts with common scientific interests (e.g. across diseases, children, mothers, elderly, birth, gender, etc.)
- Taking advantage of new technologies (e.g. ICT, social platforms, etc.) and new type of data (e.g. geographical, genetic, eHealth records, etc.)
- To facilitate hypothesis-driven research, data sharing, harmonisation and analysis, to deliver expanded resources and knowledge on health and disease determinants, onset and course of diseases



Source : A. Rosenthal, P. Gay, Cris d'Europe, le Seuil, 1992

Examples of EU-supported cohorts of cohorts (FP7 and Horizon 2020)

ATHLOS

chicos

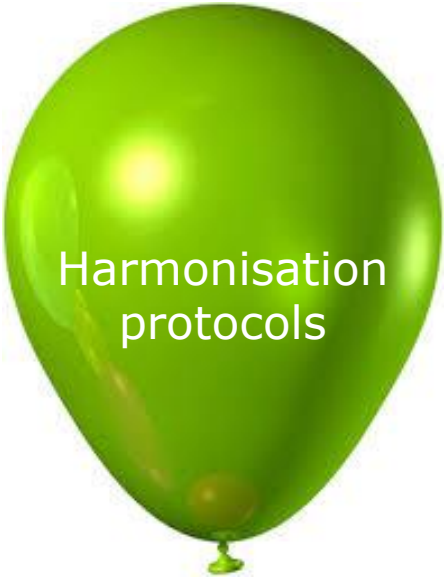
ESCAPE

Lifepath
HEALTHY AGEING FOR ALL

eurolinkcat
Establishing a linked European Cohort of Children with Congenital Anomalies

ENGAGE
European Network of Genomic and Genetic Epidemiology

Some difficulties encountered in integrating cohorts



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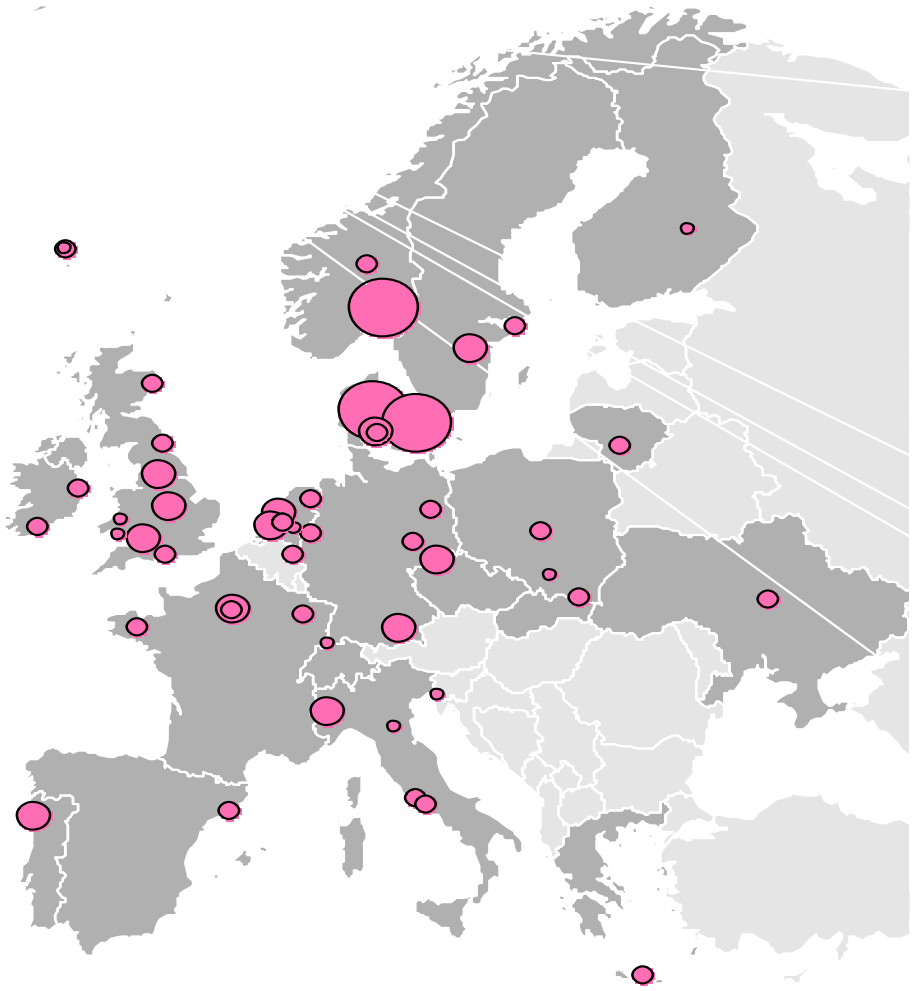
Name	N° of Cohorts/ Studies	Purpose	Coordinator	Number of subjects	Countries
Developing a **Child Cohort** Research Strategy for Europe	76	Recruitment of 76 birth cohorts from 21 countries with more than 500,000 mothers, fathers and children being studied	Barcelona Institute for Global Health, Spain	500,000	21 European

SEVENTH FRAMEWORK PROGRAMME

European Commission

- **More than 70 cohorts, following more than 500,000 children and parents**
- **Inventory: www.birthcohorts.net**



chicos

enrieco

Sample size (N of children)

- <1000 (N=12)
- 1000-4999 (N=28)
- 5000-19,999 (N=13)
- 20,000-100,000 (N=3)

Larsen, et al. Paediatr Perinat Epidemiol 2013 (CHICOS)

Vrijheid, et al, EHP 2011 (ENRIECO)

European Birth Cohorts Coordination

2009-2011

Environmental Health Risks in European Birth Cohorts

- Construction of an inventory of birth cohorts
- Meetings
- Case studies pooling data of different cohorts
- Reviews of available data
- Recommendations

2010-2013

Developing a Child Cohort Research Strategy for Europe

2017-2021

Early-life stressors and LifeCycle health

- Analytical platform for analyses
- Collaborative research projects
- Methods for causal inference and life course trajectory analyses

SEVENTH FRAMEWORK PROGRAMME

HORIZON 2020

Data pooling/combination studies

	N Cohorts	N Subjects	Ref
Socioeconomic inequalities in preterm delivery	12	>200,000	Poulsen et al. PPE 2015
Fish consumption and child growth	15	26,000	Stratakis et al. JAMA Paed 2016
Fish consumption and fetal growth	20	152,000	Leventakou et al. AJCN 2013
Early infant growth and childhood asthma	31	147,000	Sonnenschein et al. JACI 2014
Maternal obesity, diabetes, preeclampsia and childhood wheezing	14	85,000	Zugna et al. IJE 2015
Caesarian section and asthma	9	68,000	Rusconi et al. AJE 2016
POPs and fetal growth	15	9,000	Govarts et al EHP 2011
POPs and respiratory health	9	4,600	Gascon et al. Epidemiology 2014
Maternal occupational EDC exposure and fetal growth	12	130,000	Birks et al. EHP 2016
Air pollution and birth weight (ESCAPE)	12	75,000	Pedersen et al. Lancet Resp Med 2013

Journal of Allergy and Clinical Immunology

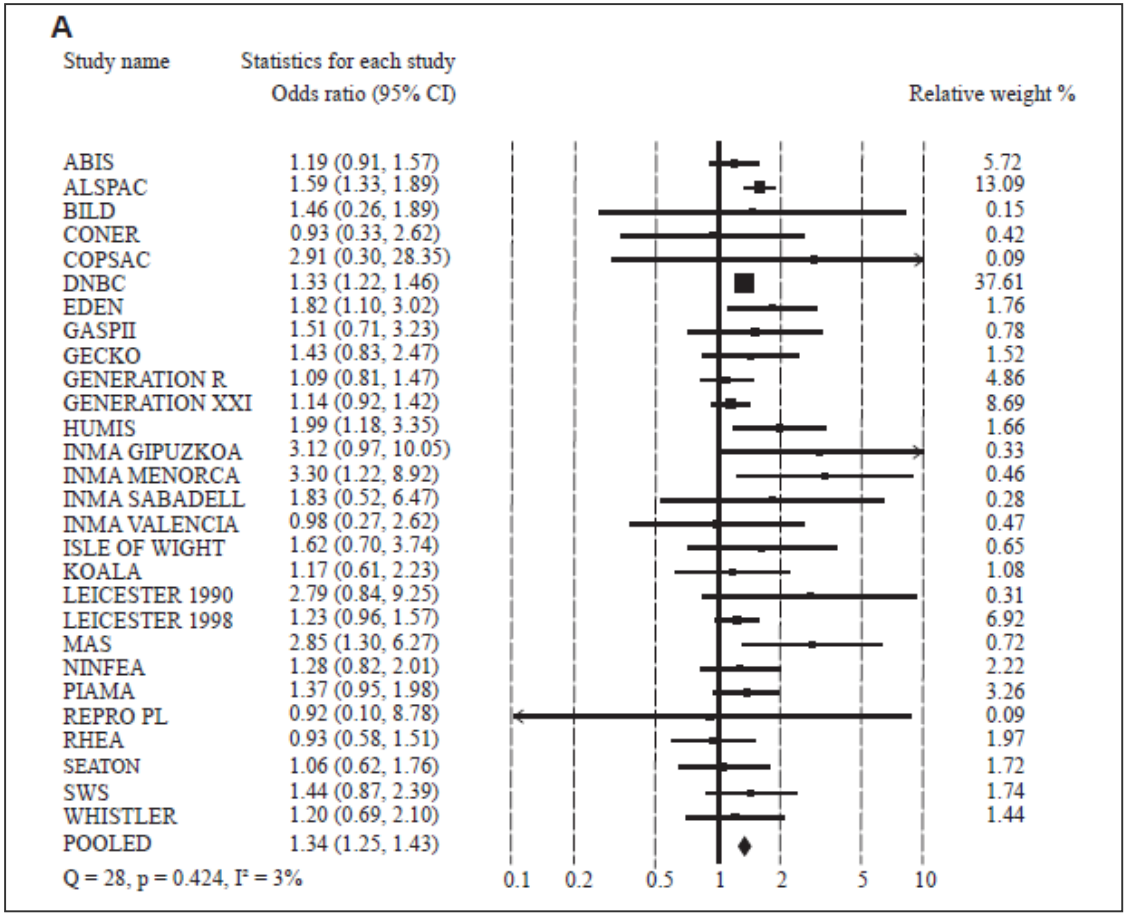
Volume 133, Issue 5, May 2014, Pages 1317–1329

Asthma and lower airway disease

Preterm birth, infant weight gain, and childhood asthma risk: A meta-analysis of 147,000 European children

Agnes M.M. Sonnenschein-van der Voort, PhD[a, b, c], Lidia R. Arends, PhD[d, e, f], Johan C. de Jongste, MD,

Including 147,000 children from 31 birth cohort studies



European Journal of Epidemiology
September 2017, Volume 32, Issue 9, pp 751–764 | Cite as

Association of light-to-moderate alcohol drinking in pregnancy with
elucidating bia
cohorts

American Journal of Epidemiology

Vol. 185, No. 6
DOI: 10.1093/aje/kwx021
Advance Access publication:
February 22, 2017

Cohorts

Published in final edited form as:
JAMA Pediatr. 2016 April ; 170(4): 381–390. doi:10.1001/jamapediatrics.2015.4430.

Fish Intake in Pregnancy and Child Growth:

A Pooled Analysis of 15 European and US Birth Cohorts

Nikos Stratakis, MSc, Theano Roumeliotaki, MPH, Emily Oken, MD, Henrique Barros, PhD, Mikel Basterrechea, Marie-Aline Charles, MD, Merete Eggesbø, PhD, Francesco Forastiere, PhD, Romy Gaillard, PhD, Ulrike Gehring, PhD, Eva Govarts, MSc, Wojciech Hanke, PhD

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ent,

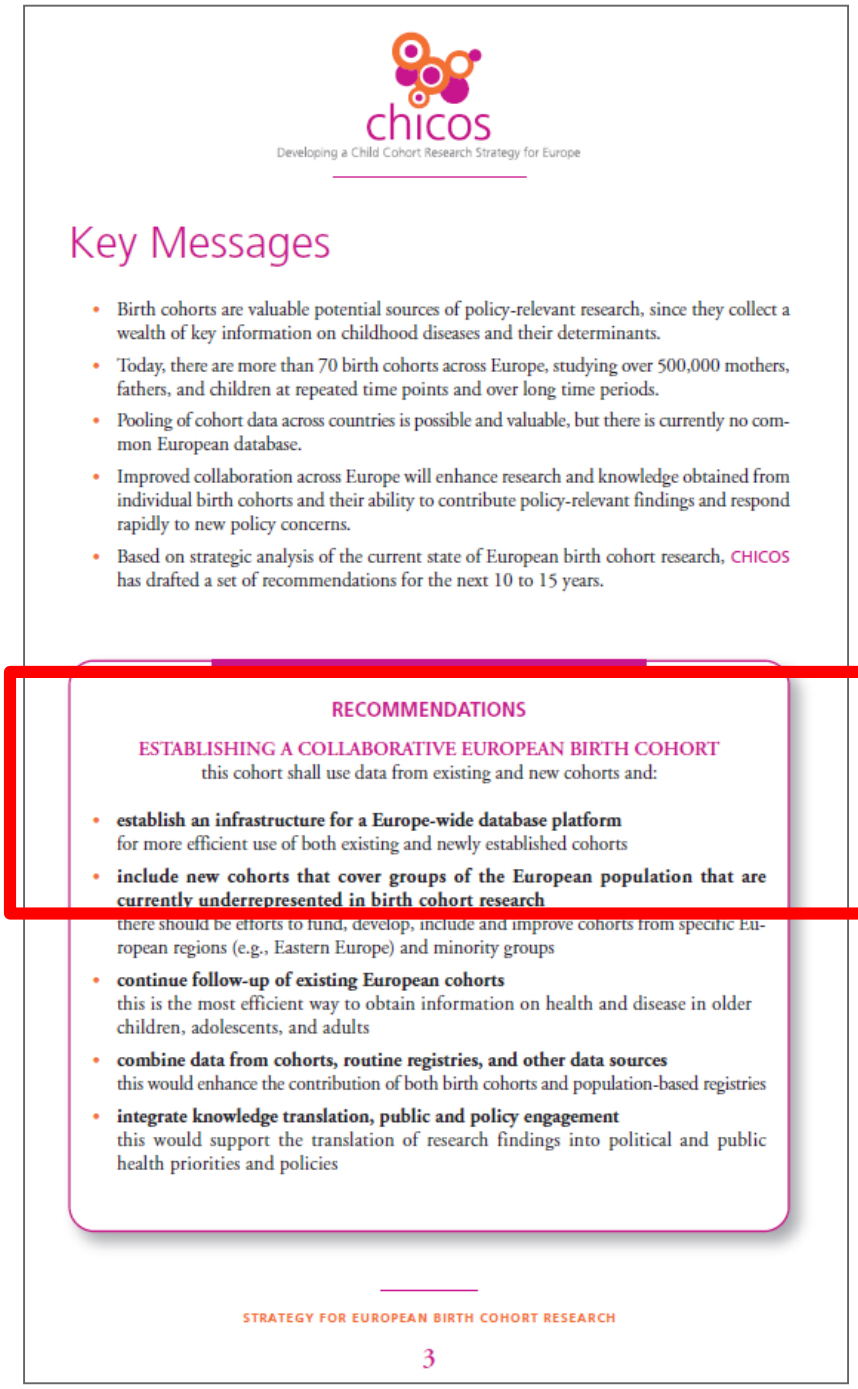
Occupational Exposure to Endocrine-Disrupting Chemicals and Birth Weight and Length of Gestation: A European Meta-Analysis

Laura Birks,[1,2,3] Maribel Casas,[1,2,3] Ana M. Garcia,[2,4,5] Jan Alexander,[6] Henrique Barros,[7] Anna Bergström,[8] Jens Peter Bonde,[9] Alex Burdorf,[10] Nathalie Costet,[11] Asta Danileviciute,[12] Merete Eggesbø,[6] Mariana F. Fernández,[2,13] M. Carmen González-Galarzo,[4] Regina Gražulevičienė,[12] Wojciech Hanke,[14] Vincent Jaddoe,[15] Manolis Kogevinas,[1,2,16,17] Inger Kull,[18,19] Aitana Lertxundi,[20,21] Vasiliki Melaki,[22] Anne-Marie Nybo Andersen,[23] Nicolás Olea,[2,13] Kinga Polanska,[14] Franca Rusconi,[24] Loreto Santa-Marina,[2,23,25] Ana Cristina Santos,[8] Tanja Vrijkotte,[26] Daniela Zugna,[27] Mark Nieuwenhuijsen,[1,2,3] Sylvaine Cordier,[11] and Martine Vrijheid[1,2,3]

[1]ISGlobal, Center for Research in Environmental Epidemiology, Barcelona, Spain; [2]Consorcio de Investigación Biomédica de Epidemiología y Salud Pública, Spain; [3]Universitat Pompeu Fabra, Barcelona, Spain; [4]Department of Preventive Medicine and Public Health, University of Valencia, Valencia, Spain; [5]Center for Research in Occupational Health, Barcelona, Spain; [6]Norwegian Institute of Public Health, Oslo, Norway; [7]Department of Clinical Epidemiology, Predictive Medicine and Public Health, University of Porto Medical School, Porto, Portugal; [8]Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; [9]Department of Occupational and Environmental Medicine, Copenhagen University Hospital Bispebjerg, Copenhagen, Denmark; [10]Department of Public Health, Erasmus

Strategic document highlighted the importance of a more structured platform:

Strategy and recommendations for a continued birth cohort study in Europe



chicos

Developing a Child Cohort Research Strategy for Europe

Key Messages

- Birth cohorts are valuable potential sources of policy-relevant research, since they collect a wealth of key information on childhood diseases and their determinants.
- Today, there are more than 70 birth cohorts across Europe, studying over 500,000 mothers, fathers, and children at repeated time points and over long time periods.
- Pooling of cohort data across countries is possible and valuable, but there is currently no common European database.
- Improved collaboration across Europe will enhance research and knowledge obtained from individual birth cohorts and their ability to contribute policy-relevant findings and respond rapidly to new policy concerns.
- Based on strategic analysis of the current state of European birth cohort research, CHICOS has drafted a set of recommendations for the next 10 to 15 years.

RECOMMENDATIONS

ESTABLISHING A COLLABORATIVE EUROPEAN BIRTH COHORT

this cohort shall use data from existing and new cohorts and:

- **establish an infrastructure for a Europe-wide database platform**
  for more efficient use of both existing and newly established cohorts
- **include new cohorts that cover groups of the European population that are currently underrepresented in birth cohort research**
  there should be efforts to fund, develop, include and improve cohorts from specific European regions (e.g., Eastern Europe) and minority groups
- **continue follow-up of existing European cohorts**
  this is the most efficient way to obtain information on health and disease in older children, adolescents, and adults
- **combine data from cohorts, routine registries, and other data sources**
  this would enhance the contribution of both birth cohorts and population-based registries
- **integrate knowledge translation, public and policy engagement**
  this would support the translation of research findings into political and public health priorities and policies

Name	N° of Cohorts/ Studies	Purpose	Coordinator	Number of subjects	Countries
Consortium on **Health and Ageing**: Network of cohorts in Europe and the United States	15	To combine and integrate on-going studies in order to produce evidence on ageing-related health characteristics and determinants in Europe Development of statistical and analytical methods to analyse co-morbidity factors affecting ageing	Hellenic Health Foundation, Greece	> 900,000	Intercontinental - 23 European, 3-non European

SEVENTH FRAMEWORK PROGRAMME

European Commission

- Harmonizing data from 14 existing major longitudinal cohort studies for the elderly, 287 variables on health conditions and a variety of exposures, including biomarkers and genetic data
- Focus on studying four groups of chronic diseases and conditions:
  - ✓ Cancer
  - ✓ Cardiovascular diseases and diabetes
  - ✓ Osteoporosis and fractures
  - ✓ Cognitive function and psychiatric disorders
- Identify:
  - ✓ Prevalence, incidence and cause-specific mortality,
  - ✓ Lifestyle, socioeconomic, and genetic determinants and biomarkers

CHANCES

European Commission

- Detailed procedures to harmonize data and obtain the maximum information from the pooled data
- Procedures are contained in a series of wikipages, specific to the cohorts and data used in the project (general approach may be applicable to other projects?)
- Data harmonization represented a major challenge, in particular for complex exposures, e.g., diet
- Second major challenge: need for data transfer agreements between each institution involved in each subproject - heavy administrative burden

CHANCES

European Commission

CHANCES

American Journal of Epidemiology
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Vol. 180, No. 10
DOI: 10.1093/aje/kwu229
Advance Access publication: October 15, 2014

Original Contribution

Adherence to a Healthy Diet According to the World Health Organization Guidelines and All-Cause Mortality in Elderly Adults From Europe and the United States

Nicole Jankovic*, Anouk Geelen, Martinette T. Streppel, Lisette C. P. G. M. de Groot, Philippos Orfanos, Edith H. van den Hooven, Hynek Pikhart, Paolo Boffetta, Antonia Trichopoulou, n Bobak, H. B. Bueno-de-Mesquita, Frank Kee, Oscar H. Franco, Yikyung Park, n Hallmans, Anne Tjønneland, Anne M. May, Andrzej Pajak, Sofia Malyutina, na Kubinova, Pilar Amiano, Ellen Kampman, and Edith J. Feskens

spondence to Nicole Jankovic, Division of Human Nutrition, Wageningen University, P.O. Box 8129, 6700 EV Wageningen, the Netherlands : nicole.jankovic@wur.nl).

submitted April 2, 2014; accepted for publication July 31, 2014.

The World Health Organization (WHO) has formulated guidelines for a healthy diet to prevent chronic diseases and postpone death worldwide. Our objective was to investigate the association between the WHO guidelines, measured using the Healthy Diet Indicator (HDI), and all-cause mortality in elderly men and women from Europe and the United States. We a

BMJ

BMJ 2014;348:g3656 doi: 10.1136/bmj.g3656 (Published 17 June 2014)

RESEARCH

Vitamin D and mortality: meta-analysis of individual participant data from a large consortium of cohort studies from Europe and the United States

OPEN ACCESS

Ben Schöttker *postdoctoral scientist*[1], Rolf Jorde *professor*[2 3], Anne Peasey *postdoctoral scientist*[4], Barbara Thorand *senior researcher in epidemiology*[5], Eugène H J M Jansen *postdoctoral scientist*[6], Lisette de Groot *professor of nutrition and ageing*[7], Martinette Streppel *postdoctoral scientist*[7], Julian Gardiner *research associate*[4], José Manuèl Ordóñez-Mena *PhD candidate*[1 8], Laura Perna *postdoctoral scientist*[1], Tom Wilsgaard *professor*[9], Wolfgang Rathmann *senior researcher in epidemiology*[10], Edith Feskens *professor*[7], Ellen Kampman *professor*[7], Galatios Siganos *research associate*[9], Inger Njølstad *professor*[9], Ellisiv Bøgeberg Mathiesen *professor*[11], Růžena Kubínová *senior researcher*[12], Andrzej Pająk *professor*[13], Roman Topor-Madry *senior researcher*[13], Abdonas Tamosiunas *professor*[14], Maria Hughes *postdoctoral scientist*[15], Frank Kee *professor*[15], Martin Bobak *professor*[4], Antonia Trichopoulou *professor*[16 17], Paolo Boffetta *professor*[16 18], Hermann Brenner *professor*[1], on behalf of the Consortium on Health and Ageing: Network of Cohorts in Europe and the United States (CHANCES)

- Research covering a wide area of working hypotheses
- Scientific evidence on the determinants of healthy ageing in Europe, including modifiable behaviors, nutritional behaviors, nutritional factors, and/or other exposures, socioeconomic inequalities

ATHLOS

Name	N° of Cohorts/ Studies	Purpose	Coordinator	Number of subjects	Countries
Ageing Trajectories of Health: Longitudinal Opportunities and Synergies	20	To better understand ageing by identifying patterns of healthy ageing trajectories, the determinants of those patterns, the critical points in time when changes in trajectories are produced, and to propose timely clinical and public health interventions to optimize healthy ageing	Parc Sanitari Sant Joan De Deu, Spain	344,945	39 European

Horizon 2020

European Commission

- Harmonization process of datasets to ensure quality, reproducibility, and transparency: ATHLOS follows steps according to Maelstrom Research guidelines
- Codes of harmonization algorithms will be available to the research community under the General Public License – More studies and more new waves can be integrated by using these codes and enlarge the sample size
- Huge heterogeneity among studies with respect to basic data such as ‘education’ or ‘income’/’wealth’ – Standard definitions and standardization of such variables, as well as procedures to collect them in similar ways would be a huge step ahead

ATHLOS

European Commission

- ATHLOS is contributing to the development of a catalogue about epidemiological research networks and studies that allows users to:
  - ✓ Learn about existing research networks
  - ✓ Identify studies with targeted designs that collected information useful in answering specific research questions
  - ✓ Search for variables collected within and across studies
  - ✓ Obtain information about harmonization potential across studies and harmonized variables generated
- The ATHLOS catalogue, integrated within the Maelstrom Catalogue, provides free, user-friendly and web-based solutions for data discovery across the studies

https://www.maelstrom-research.org/mica/network/athlos

ATHLOS

European Commission

Lifepath
HEALTHY AGEING FOR ALL

Name	N° of Cohorts/ Studies	Purpose	Coordinator	Number of subjects	Countries
Lifecourse biological pathways underlying **social differences in healthy aging**	17	To investigate the biological pathways underlying socially-determined differences in healthy ageing of human populations	Imperial College London	1,700,000	Intercontinental – 7 European; Australian

European Commission

To show that healthy ageing is an achievable goal for society, as **it is already experienced by individuals of high socio-economic status (SES)**

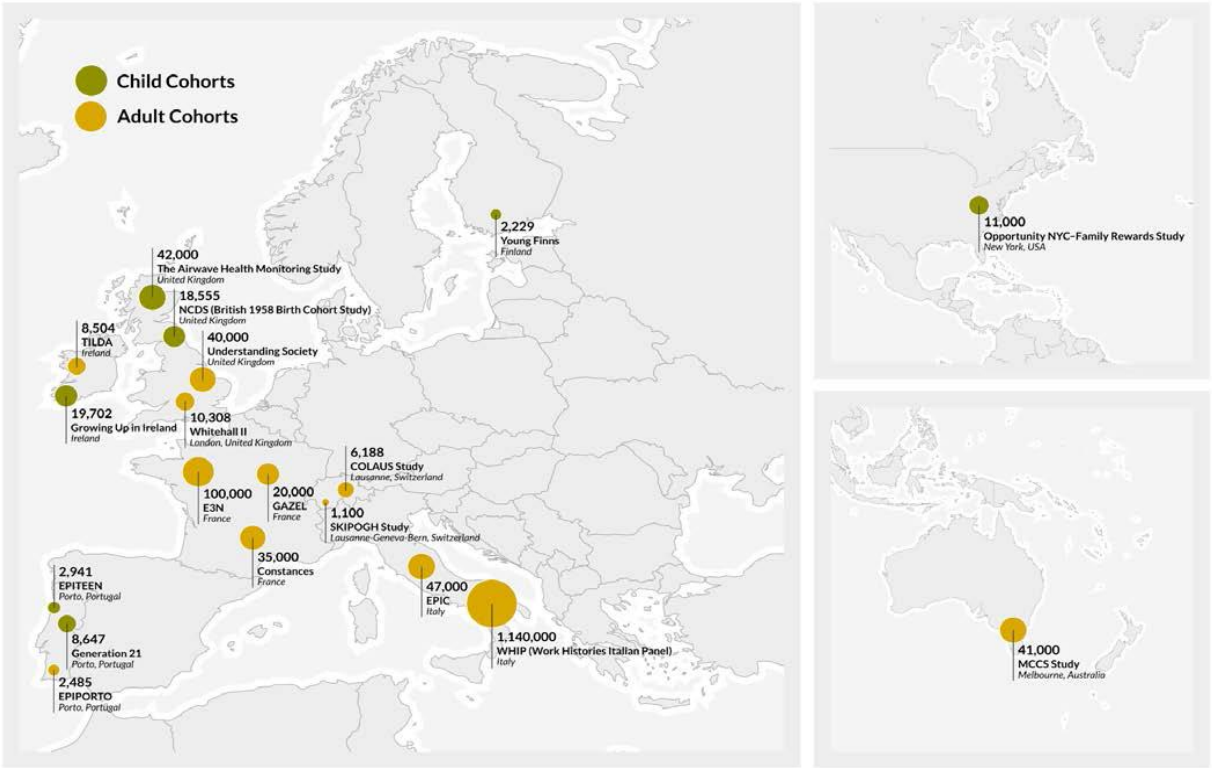
To improve the understanding of the mechanisms through which healthy ageing pathways diverge by SES, by investigating **life-course biological pathways using omic technologies**

To examine the consequences of the current **economic recession** on health and the biology of ageing (and the consequent increase in social inequalities)

To provide updated, relevant and innovative **evidence for healthy ageing policies** (particularly “health in all policies”)

Lifepath
HEALTHY AGEING FOR ALL

European Commission



Lifepath
HEALTHY AGEING FOR ALL

European Commission

What evidence from Lifepath shows so far:

Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1·7 million men and women

Silvia Stringhini, Cristian Carmeli*, Markus Jokela*, Mauricio Avendaño*, Peter Muennig, Florence Guida, Fulvio Ricceri, Angelo d'Errico, Henrique Barros, Murielle Bochud, Marc Chadeau-Hyam, Françoise Clavel-Chapelon, Giuseppe Costa, Cyrille Delpierre, Silvia Fraga, Marcel Goldberg, Graham G Giles, Vittorio Krogh, Michelle Kelly-Irving, Richard Layte, Aurélie M Lasserre, Michael G Marmot, Martin Preisig, Martin J Shipley, Peter Vollenweider, Marie Zins, Ichiro Kawachi, Andrew Steptoe, Johan P Mackenbach, Paolo Vineis†, Mika Kivimäki†, for the LIFEPATH consortium‡*

Summary

Background In 2011, WHO member states signed up to the 25×25 initiative, a plan to cut mortality due to non-communicable diseases by 25% by 2025. However, socioeconomic factors influencing non-communicable diseases have not been included in the plan. In this study, we aimed to compare the contribution of socioeconomic status to mortality and years-of-life-lost with that of the 25×25 conventional risk factors.

Methods We did a multicohort study and meta-analysis with individual-level data from 48 independent prospective cohort studies with information about socioeconomic status, indexed by occupational position, 25×25 risk factors (high alcohol intake, physical inactivity, current smoking, hypertension, diabetes, and obesity), and mortality, for a total population of 1751479 (54% women) from seven high-income WHO member countries. We estimated the association of socioeconomic status and the 25×25 risk factors with all-cause mortality and cause-specific mortality by calculating minimally adjusted and mutually adjusted hazard ratios [HR] and 95% CIs. We also estimated the population attributable fraction and the years of life lost due to suboptimal risk factors.

Findings During 26·6 million person-years at risk (mean follow-up 13·3 years [SD 6·4 years]), 310277 participants died. HR for the 25×25 risk factors and mortality varied between 1·04 (95% CI 0·98–1·11) for obesity in men and 2·17 (2·06–2·29) for current smoking in men. Participants with low socioeconomic status had greater mortality compared with those with high socioeconomic status (HR 1·42, 95% CI 1·38–1·45 for men; 1·34, 1·28–1·39 for women); this association remained significant in mutually adjusted models that included the 25×25 factors (HR 1·26, 1·21–1·32, men and women combined). The population attributable fraction was highest for smoking, followed by physical inactivity then socioeconomic status. Low socioeconomic status was associated with a 2·1-year reduction in life expectancy between ages 40 and 85 years, the corresponding years-of-life-lost were 0·5 years for high alcohol intake, 0·7 years for obesity, 3·9 years for diabetes, 1·6 years for hypertension, 2·4 years for physical inactivity, and 4·8 years for current smoking.

Lancet 2017; 389: 1229–37

Published Online
January 31, 2017
http://dx.doi.org/10.1016/S0140-6736(16)32380-7

This online publication has been corrected. The first corrected version first appeared at thelancet.com on February 27, 2017

See Comment page 1172

*These authors contributed equally to this work

†Joint last authors

‡Members are listed at end of paper

Institute of Social and Preventive Medicine and Departments of Psychiatry and Internal Medicine, Lausanne University Hospital, Lausanne, Switzerland (S Stringhini PhD, C Carmeli PhD, Prof M Bochud PhD, A M Lasserre M D, Prof M Preisig MD,

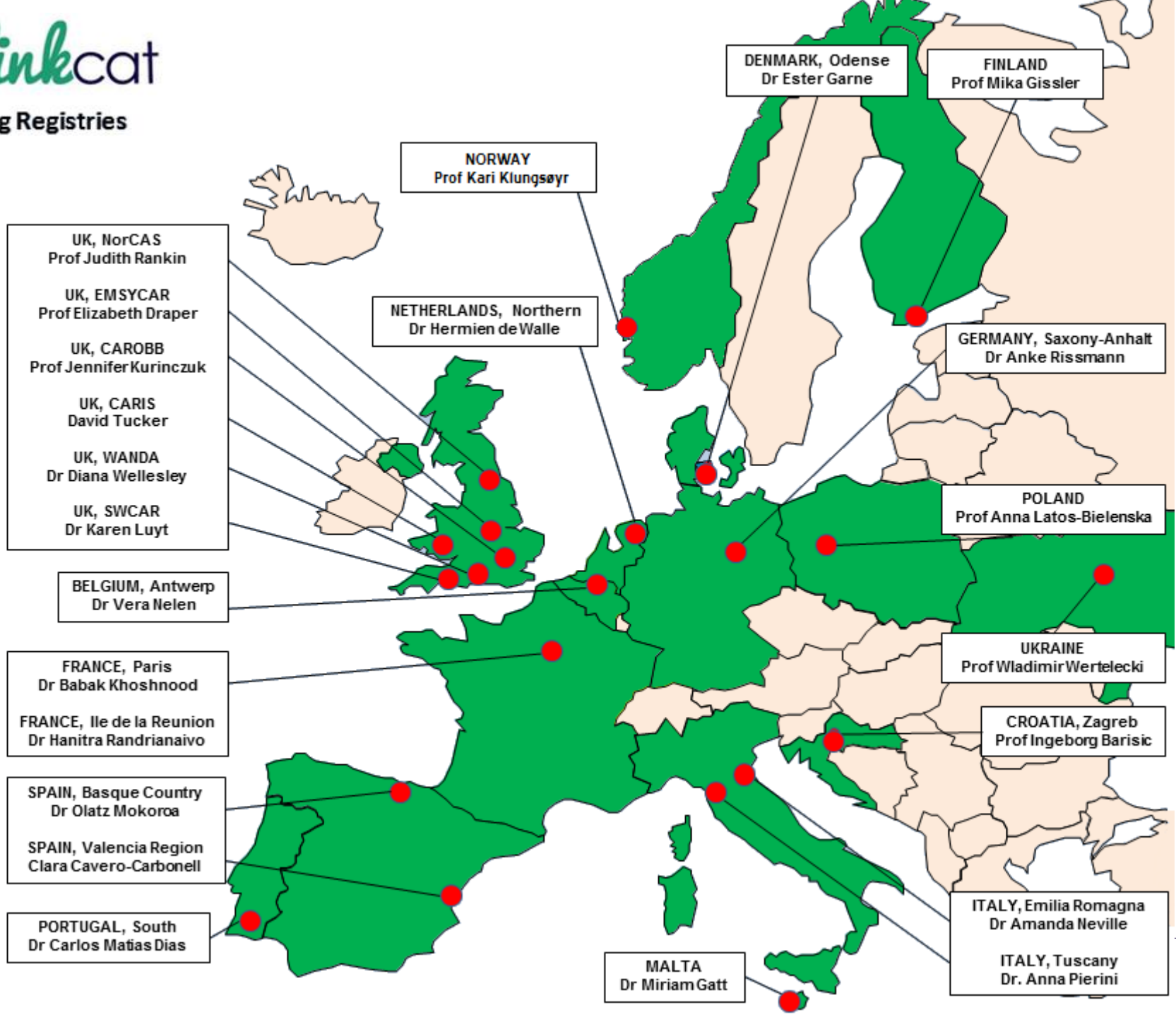
eurolinkcat

Establishing a linked European Cohort of Children with Congenital Anomalies

Name	N° of Cohorts/ Studies	Purpose	Coordinator	Number of subjects	Countries
Establishing a linked European **Cohort of Children with Congenital Anomalies**	22	To investigate the health and educational outcomes of children with congenital anomalies for the first 10 years of their lives. To facilitate the development of a more reciprocal relationship between families with children with congenital anomalies, health and social care professionals and researchers using "ConnectEpeople".	Queen Mary University of London	200,000	14 European

eurolinkcat

Participating Registries



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Establishing a linked European Cohort of Children with Congenital Anomalies

- Over 130,000 children born in Europe every year will have a congenital anomaly
- To investigate the health and educational outcomes of children with congenital anomalies for the first 10 years of their lives
- To facilitate the development of a more reciprocal relationship between families with children with congenital anomalies, health and social care professionals and researchers by developing an online forum: “ConnectEpeople”
- Linking data of congenital anomaly registries to electronic data from other sources such as government mortality statistics, hospital episode statistics, prescription databases

European Commission

What’s next ?

European Commission

Coordination for cohorts of cohorts

(Horizon 2020) SC1-HCO-09-2018: Building international efforts on population and patient cohorts

(deadline: 18 April)

Building **on existing cohorts** and in close alliance with **relevant research infrastructures**, proposals should establish **a strategy for the development of the next generation of integrated cohorts**, including:

1. **Map the cohort landscape in Europe and large international initiatives.** The mapping should include, for instance meta-data on purpose, coverage and measurements and any other relevant information

2. **Identify best strategies for cohorts' integration**, taking into account relevant ethical issues

European Commission

3. **Promote the harmonisation of past and future data collection** and provide **recommendations on standards** to improve future sample and data collection

4. **Foster the inclusion of data** emerging from **new technologies** (e.g. ICT, social platforms), **new type of data** (e.g. lifestyle, geographical, genetic, eHealth records) and **exposure**, including to new and emerging products (e.g. novel tobacco products, e-cigarettes, waterpipes)

5. **Promote best practises to optimise access** to existing and future cohorts

6. **Contribute to define an international strategic agenda** for better coordination of cohorts globally

Thank you!

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#EUHealthResearch

http://ec.europa.eu/research/health

http://ec.europa.eu/research/participants/portal

European Commission