

## The future of pediatric research: European perspective

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**P**ediatric research has resulted in improvements in child health and outcomes of healthcare. Moreover, improving the health and wellbeing has far reaching implications for adult health and reducing the growing burden of noncommunicable, chronic adult diseases. This Comment outlines how the future of pediatric research in Europe can be optimized by generalizing current good practice across Europe. A vibrant research environment requires funding and a number of other factors. Crucial to success are the involvement of pediatricians and other child health professionals, the support and engagement of children, young people, and their families, infrastructure that promotes collaboration, a regulatory framework that recognizes the needs of infants, children, and young people, and a cadre of child health academic leaders (1,2).

In Europe, the major pediatric societies espouse research as a core doctrine. However, to date their activities have generally been limited to disseminating research through conferences and a very limited role in research funding. The central importance of research about children to the future of Europe has been recognized in the 2016 Road Map of the European Strategic Forum of Research Infrastructure. The Road Map includes the European Paediatric Clinical Trials Research Infrastructure (ECPTRI), which is collaborating with the European Clinical Research Infrastructure Network to develop systems for the management of multinational clinical trials for children. This work has been awarded €3.3 million to help trials that have been awarded funding to open in multiple countries. Through the CORBEL project European Paediatric Clinical Trials Research Infrastructure will link the child health community to a number of other research infrastructures including preclinical (animal) expertise, biomarkers, and imaging.

Innovative Medicines initiative 2 (<https://www.imi.europa.eu/content/imi-2>) will launch a call for a pediatric clinical trials network in collaboration with industry. This will match, and share operating principles, with a similar network in the United States: the Institute for Advanced Clinical Trials for

Children (iACT for Children) (3). The European Commission has funded a significant amount of pediatric research. For example, 19 projects were funded under European Union (EU) 7th Framework Programme for Research and Technological Development (FP7) to support research into off-patent medicines (4). However, Horizon 2020 (H2020), The EU Framework Programme for Research and Innovation and other major funders require combined lobbying from a pediatric research alliance including all pediatric/child health societies and stakeholders to ensure children research is adequately funded. For example, the Royal College of Paediatric and Child Health, UK (RCPCH) has led the establishment of a UK Child Health Research Collaboration, providing a forum for children's research charities to come together to fund, advocate, or lobby. This and similar work by the pediatric oncology community needs to be generalized across all European countries, therapeutic areas and pediatric age groups. There are commonalities across the pediatric age groups that facilitate the development of a vibrant research community. The RICHE project is a response to a call to clearly identify gaps in European child health research, and to provide justified guidance on priorities for investments in research over the next decade (5).

Participatory research including parent and family groups in all areas of the research from inception to result publication is evolving and will increase the visibility and lobbying potential for Pediatric Research as exemplified in the RCPCH Children's Research Charter. The European Network of Young People's Advisory Groups has developed ways to present the voices of children and young people to other stakeholders at all stages of research. A number of countries have developed, or are developing, framework and infrastructural support for children's research. Recent advances on collaborative pediatric medicine for children such as the Global Research in Pediatrics—Network of Excellence (GRiP), have stimulated and facilitated the development and safe use of medicines in children (<http://www.grip-network.org/index.php/cms/en/Home>). The development of common standards

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and regulatory approaches is an urgent requirement. The International Neonatal Consortium is an exemplar of this (6,7). In addition, Global funding Bill and Melinda Gates has dramatically increased funding to children especially to neonates and this success may be a template for more private sponsoring of pediatric research.

Education and training about research is essential for the future development of child health. A number of initiatives have been developed. For example, the GRiP has developed an International Masters Degree in Pediatric Drug Development and Evaluation together with a 1- to 2-d roadshow about the study of medicines in children. The RCPCH is introducing training in generic research competencies into training for all pediatricians (8).

The future of pediatric research depends on concerted action to develop research infrastructure and true engagement with children, young people, and families. This needs support from policymakers (who need to be lobbied), educators, and the broad child health community. Then, the creativity and energy of child health professionals will be harnessed effectively to the needs of babies, children, and young people.

Action points:

- Develop a pan-European forum for discussion among learned societies and other groups about priorities and key messages
- Lobby European Commission and national governments about the priorities and key messages
- Respond to the consultation on the 10-y review of the Pediatric Regulation to ensure that children's needs continue to be met

- Focus on medicines research as an easy to justify activity but generalize lessons learnt to other aspects of child health

#### REFERENCES

1. Modi N, Clark H, Wolfe I, et al.; writing group of the Royal College of Paediatrics and Child Health Commission on Child Health Research. A healthy nation: strengthening child health research in the UK. *Lancet* 2013;381:73–87.
2. Gitterman DP, Hay WW Jr. That sinking feeling again? The state of the National institutes of health pediatric research funding, fiscal ear 1992–2010. *Pediatr Res* 2008;64:4632–69.
3. Bogue C, DiMeglio LA, Maldonado S, Portman RJ, Smith PB, Sullivan JE, Thompson C, Woo H, Flinn S. HYPERLINK “<https://www.ncbi.nlm.nih.gov/pubmed/26650344>”Special article: 2014 Pediatric Clinical Trials Forum. *Pediatr Res*. 2016 Apr;79(4):662–9.
4. Ruggieri L, Giannuzzi V, Baiardi P, Bonifazi F, Davies EH, Giaquinto C, Bonifazi D, Felisi M, Chiron C, Pressler R, Rabe H, Whitaker MJ, Neubert A, Jacqz-Aigrain E, Eichler I, Turner MA, Ceci A; on behalf of the GRiP Consortium. Successful private-public funding of paediatric medicines research: lessons from the EU programme to fund research into off-patent medicines. *Eur J Pediatr*. 2014 Sep 23.
5. RICHE: Research Inventory of Child Health:A Report on Roadmaps for the Future of Child Health Research in Europe A European Commission Framework 7 Project 2010 - 2013 ([www.childhealthresearch.eu](http://www.childhealthresearch.eu)).
6. Turner MA, Davis JM, McCune S, Bax R, Portman RJ, Hudson LD. The International Neonatal Consortium: collaborating to advance regulatory science for neonates *Pediatr Res*. 2016 Oct;80(4):462–4.
7. Ward RM, Benjamin D, Barrett JS et al.; the International Neonatal Consortium (INC). Safety, Dosing, and Pharmaceutical Quality for Studies that Evaluate Medicinal Products (including Biological Products) in Neonates. *Pediatr Res* doi:10.1038/pr.2016.221.
8. Menon G, Turner MA, Ogilvy-Stuart AL, Greenough A. Training in research competencies: a strategy for neonatology. *Arch Dis Child Educ Pract Ed*. 2016 Jul 22. pii: edpract-2015-309926. doi: 10.1136/archdis-child-2015-309926. (Epub ahead of print).