A common brain network links development, aging, and vulnerability to disease

ID 3183053
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Year 2014
Title A common brain network links development, aging, and vulnerability to disease
Journal Proceedings of the National Academy of Sciences of the United States of America
Volume 111
Number 49
Pages / **Article-Number** 17648-17653
Several theories link processes of development and aging in humans. In neuroscience, one model posits for instance that healthy age-related brain degeneration mirrors development, with the areas of the brain thought to develop later also degenerating earlier. However, intrinsic evidence for such a link between healthy aging and development in brain structure remains elusive. Here, we show that a data-driven analysis of brain structural variation across 484 healthy participants (8-85 y) reveals a largely–but not only–transmodal network whose lifespan pattern of age-related change intrinsically supports this model of mirroring development and aging. We further demonstrate that this network of brain regions, which develops relatively late during adolescence and shows accelerated degeneration in old age compared with the rest of the brain, characterizes areas of heightened vulnerability to unhealthy developmental and aging processes, as exemplified by schizophrenia and Alzheimer's disease, respectively. Specifically, this network, while derived solely from healthy subjects, spatially recapitulates the pattern of brain abnormalities observed in both schizophrenia and Alzheimer's disease. This network is further associated in our large-scale healthy population with intellectual ability and episodic memory, whose impairment contributes to key symptoms of schizophrenia and Alzheimer's disease. Taken together, our results suggest that the common spatial pattern of abnormalities observed in these two disorders, which emerge at opposite ends of the life spectrum, might be influenced by the timing of their separate and distinct pathological processes in disrupting healthy cerebral development and aging, respectively.
Publisher National Academy of Sciences
ISSN/ISBN 0027-8424 ; 1091-6490
URL https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4267352/
edoc-URL https://edoc.unibas.ch/66726/
Full Text on edoc No;
Digital Object Identifier DOI 10.1073/pnas.1410378111
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/25422429
ISI-Number WOS:000345921500067
Document type (ISI) Article