Down syndrome: Bridging Genes, Brain and Cognition
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Brain structural analysis

Typical Down Syndrome phenotype includes different trajectories of neuroanatomy development. Analysis of these differences will give insight into genotype, phenotype, behavioral relationships and influence of genetics on brain development.

Analysis performed on 13 Down syndromes (DS) and 12 healthy subjects (HC):
=> Average lobar tissue volumes show significant group differences.
=> Average subcortical structures volumes show significant group differences.

White matter integrity analysis

Down syndrome subjects show cognitive differences that can be characterized in the white matter integrity of specific brain connectivity pathways. Brain white matter analysis can highlight relationship of genotype and brain connectivity analysis.

=> Most portions of analyzed tracts show highly significant group differences (lower fractional anisotropy in DS group).

Motor tract: associated with motor functions
Arcuate tract: associated with language

Conclusion

Structural volumetric analysis demonstrates significant differences of the trajectories of brain anatomy development in DS subjects => Refined exploration of localized volume and shape differences will help define new biomarkers of disease.

White matter integrity analysis reflects the observed cognitive differences between Down syndrome and control groups => White matter tract analysis might serve as a biomarker of specific aspects of cognitive development.