

Change of corticoreticulospinal tract with aging on diffusion tensor tractography in the human brain

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Objectives

The corticoreticulospinal tract (CRT) is mainly involved in gait function in human brain. We investigated the change of the CRT with aging, using diffusion tensor tractography (DTT).

Methods

Sixty one healthy subjects aged from the 20s to the 70s were recruited. The CRT was reconstructed, and values of fractional anisotropy (FA), mean diffusivity (MD), and fiber number (FN) of CRT were measured. We classified the DTT findings as follows: no transcallosal fiber (TCF) from the CRT (type A), TCF ended within the corpus callosum or descended below the corpus callosum in the opposite hemisphere (type B), TCF ascended to the cerebral cortex in the opposite hemisphere (type C), and type D indicates mixed TCF of type B and C.

Results

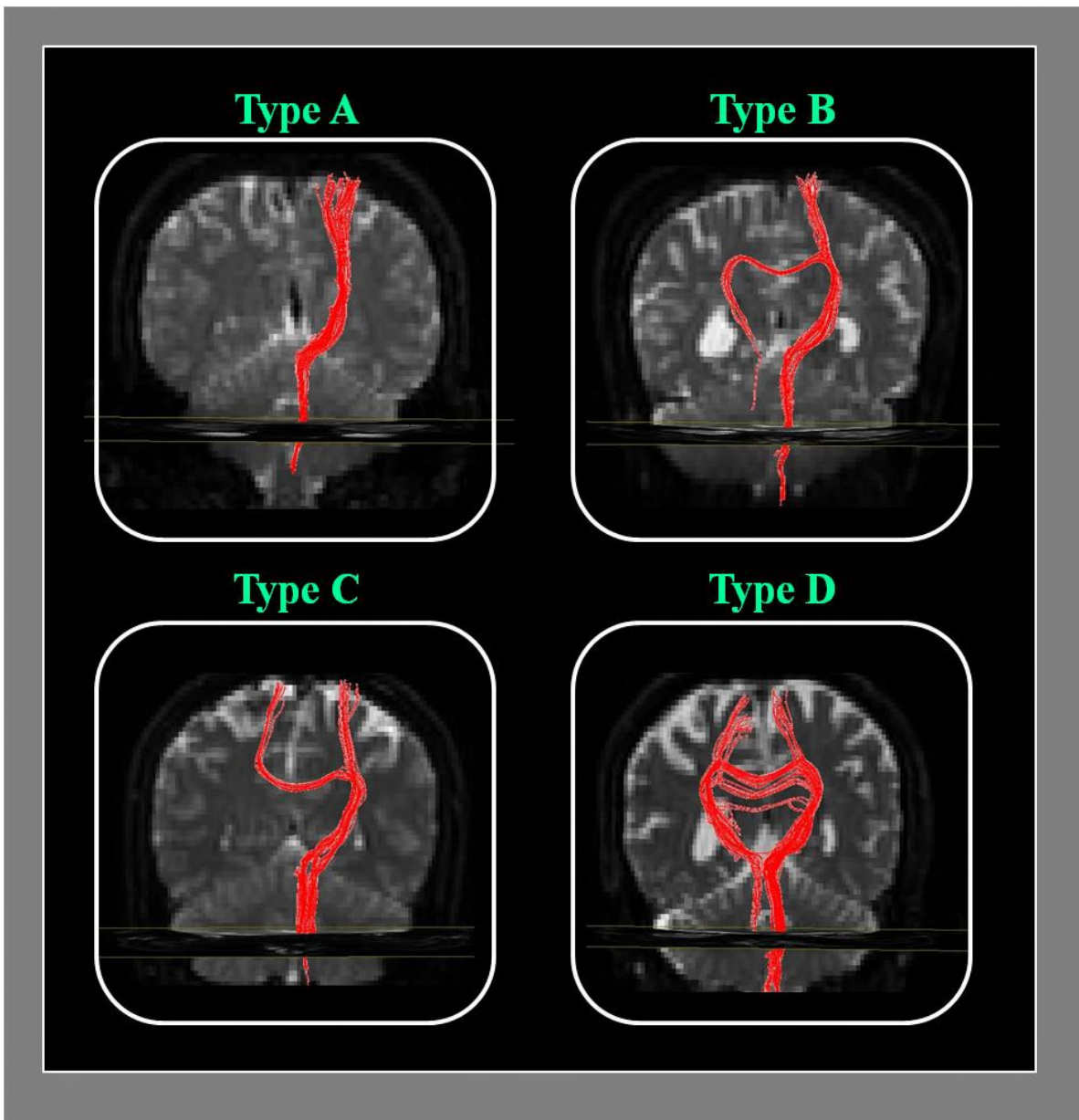
Significant differences in the value of MD were observed between 50s and 70s ($p < 0.05$). Regarding the value of FN, the significant differences were observed between 20s and 50s, 50s and 70s ($p < 0.05$). However, no significant difference in the value of FA was observed between age groups ($p > 0.05$). A weak correlation was observed between age group and MD ($r = 0.208$, $p < 0.05$). We found that the type A was most commonly observed until 50s whereas type D was most commonly observed from 60s.

Conclusion

We demonstrated the aging process of the CRT in normal subjects using DTT and found the general critical age of the CRT was 60s in terms of DTT parameters and configuration. Our results would be helpful in understanding and prevention of aging process of gait in normal subjects.

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Classification of transcallosal fibers. Type A: no transcallosal fibers from the corticoreticulospinal tract; **Type B:** transcallosal fibers end in the corpus callosum or descend below the corpus callosum in the opposite hemisphere; **Type C:** transcallosal fibers ascend to the cerebral cortex in the opposite hemisphere; **Type D:** mixed type of Type B, and C.