



**Karolinska
Institutet**

Institutionen för Neurobiologi, Vårdvetenskap och Samhälle,

Enheten för Klinisk Geriatrik

The Aging Frontal Lobe in Health and Disease

A structural magnetic resonance imaging study

AKADEMISK AVHANDLING

Av

Olof Lindberg

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Huvudhandledare:

Professor Lars-Olof Wahlund
Karolinska Institutet
Institutionen för Neurobiologi,
Vårdvetenskap och Samhälle
Enheten för Klinisk Geriatrik

Bihandledare:

Mussie Msghina MD, PhD
Karolinska Institutet
Institutionen för klinisk
neurovetenskap

Per Julin MD, PhD
Dandryds sjukhus.
Institutionen för klinisk
vetenskap, Dandryds sjukhus.

Fakultetsopponent:

Peter Nestor MD PhD.
Division of Cognitive
Neurology. University of
Cambridge.

Betygsnämnd:

Professor Boo Johansson.
Psykologiska institutionen,
Göteborgs universitet.

**Professor Elna-Marie
Larsson.** Enheten för
radiologi, Uppsala universitet.

Professor Per Allard.
Avdelningen för psykiatri,
Umeå universitet.

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ABSTRACT

Cortical and subcortical regions of the brain decrease in volume in normal as well as pathological aging. Previous studies indicate that certain parts of the brain, like the prefrontal cortex, may be particularly vulnerable to age-related processes which are manifested by significant volume loss in this region. Cortical volume loss may be further enhanced by different kinds of pathology in the brain.

The purpose of this study was to further investigate regional volumetric changes of the frontal lobe in normal aging and in aging patients with dementia.

In study I-III patients with frontotemporal lobar degeneration (FTLD), Alzheimer's disease (AD) and healthy controls are investigated. Cortical atrophy is related to clinical symptoms (study I), discussed in relation to gross morphology and cytoarchitecture (study II), and compared with the atrophy in the hippocampus (study III).

In study IV a large number of normal elderly participants are investigated. Age-related volume loss in the limbic system (the dorsal anterior cingulate cortex and the hippocampus) is compared with atrophy of a region of the prefrontal cortex (the orbitofrontal cortex).

Volumetric data of frontal and temporal cortical regions and the hippocampus was acquired by manual delineation on structural magnetic resonance images.

Results of study I and III reveal that the clinical symptoms displayed by the subtypes of FTLD are commonly reflected in a specific pattern of atrophy in frontotemporal cortices as well as in the hippocampus. Study II suggests that the surface morphology of sulci and gyri may be unreliable landmarks for cyto-architectonic regions of the frontal cortex. Study IV finally indicates that a common characteristic of limbic regions may be that age-related volume loss is delayed in comparison to regions of the prefrontal cortex. Results also suggest that the dorsal anterior cingulate is more resistant to age-related volume loss than hippocampus, which implies that age-related volume loss occurs at different rates for different regions also within the limbic system.