Neural basis of socio-emotional impairment in frontotemporal degeneration

François-Laurent De Winter
Congres Ouderenpsychiatrie, Leuven 12-10-2017
What’s wrong with Grandpa?

Translation

Theoretical constructs
Brain structures
Functional networks

Behavioural approach
Treatment
Frontotemporal dementia

- Neurodegenerative disease (non-Alzheimer dementia)
- Relatively selective, progressive atrophy of frontal and/or temporal lobes
- Prevalence: 10-15 /100,000
- Second most prevalent cause of young-onset dementia
- Typical onset in 6th decade
- Memory and other aspects of general intellect well maintained initially
Clinical syndromes

• Behavioural variant FTD (bvFTD)
  • Semantic dementia (SD)
  • Progressive non-fluent aphasia (PNFA)

Diagnostic Criteria bvFTD

• A. Early behavioural disinhibition
  • A1 Socially inappropriate behaviour
  • A2 Loss of manners or decorum
  • A.3. Impulsive, rash or careless actions

• C. Early loss of sympathy or empathy
  • C.1. Diminished response to other people’s needs and feelings
  • C.2. Diminished social interest, interrelatedness or personal warm

Rascovksy et al. 2011 Brain
The ‘Social Brain’

- Emotion perception
- Emotion recognition
- Theory of Mind
- Empathy
- Moral reasoning

from Kennedy and Adolphs, Trends in Cognitive Sciences 2012
Face processing network

Emotion recognition in bvFTD

- **Generalised deficit** in **facial** emotion recognition

- **Negative emotions** most consistently impaired

- **Distributed network** including **amygdala**, orbitofrontal cortex, **temporal pole** and **insula/IFG**.
Functional correlates of facial emotion deficit

fMRI experiment

De Winter et al. Cortex 2016
fMRI experiment: stimuli

CHEWING  FEAR  SCRAMBLED
Neural activity in “face” regions

A.

B.

Chewing expression versus scrambled version
Fearful expression versus scrambled version

p < 0.05 (FWE-corrected)

** p < 0.01
bvFTD  N=19
Controls N=20

Amygdala (AAL atlas)

$p < 0.001$ (uncorrected)

$p < 0.05$ (FWE-corrected)
Emotion specific activation

Amygdala Left

Atrophic Amygdala Left

\[ r = 0.513 \]
\[ p = 0.012^* \]

\[ r = 0.549 \]
\[ p = 0.008^{**} \]
Bodily emotions in bvFTD

bvFTD  N=20
Controls N=20

CONTROL TASK

Van den stock et al. Neuropsychologia 2015
FACES VS BODIES

STATIC VS DYNAMIC

No disproportional impairment

PARTIAL CORRELATION
controlled for facial identity matching (in bvFTD)

\[ r = 0.670, p = 0.002 \]

Inferior frontal gyrus
Emotion detection and emotion categorisation

A

angry

happy

fearful

sad

10% 25% 50% 75% 90%

neutral emotional

B

Emotional?

Yes No

Which emotion?

Control task

Running?

Jastorff et al. HBM 2016
Emotion detection

Emotion discrimination

Control task

Emotion detection

Emotion Categorisation
Structural and functional neuroanatomy of emotion processing deficits in bvFTD

Distant effects
Contributors

Laboratory for Translational Neuropsychiatry
Mathieu Vandenbulcke
Jan Van den Stock
Jan Jastorff

Department of imaging and pathology
Radiology department UZ Leuven (MRI)
Stefan Sunaert
Ronald Peeters

Laboratory for Cognitive Neurology
Rik Vandenberghe