Human Hippocampal Neurogenesis Assessed by Object Pattern Recognition: In Which Clinical Conditions is the Dentate Gyrus Functioning Normally?

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BACKGROUND

NEUROGENESIS - THE NEW TARGET FOR DRUG DEVELOPMENT

The claim that neurogenesis occurs in the adult human hippocampus suggests that there could be new therapeutic opportunities for various conditions involving the dentate gyrus, but more research is needed to confirm this. Neurogenesis is the process by which new neurons are generated, and it has been found to occur in the human hippocampus, providing hope for the treatment of neurodegenerative diseases.

RESULTS

- The CDR System Picture Recognition task data gathered via the internet in 90,087 subjects aged 18-87 years
- First replication confirming pattern separation (a ability to reject closely similar pictures) to be impaired by normal ageing
- Further replication of findings with 93,087 potential preclinical AD subjects assessed via the internet

CONCLUSIONS

- ROLE OF OBJECT PATTERN SEPARATION TASKS IN DRUG DEVELOPMENT
- The CDR System task:
  - Can confirm compromised neurogenesis at the human level
  - Can serve as a proof of principle that a novel therapy is acting at the dentate gyrus & influencing neurogenesis
  - Also provide a therapeutic marker of response, i.e. can act as an outcome measure

EVIDENCE THAT HUMAN HIPPOCAMPAL NEUROGENESIS CAN BE ASSESSED BY PATTERN SEPARATION TASKS

CONCLUSIONS

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METHODS

THE CDR SYSTEM PICTURE RECOGNITION TASK: AN OBJECT PATTERN SEPARATION TASK

- Predictions from Stark & Yassa’s Work
- First study showing human pattern separation to be impaired by normal ageing
- Plus extension showing declines occur much earlier than 65+ years
- Healthy males and females aged from 18 to 87 years
- 74 patients with AD
- 93 patients fulfilling Petersen’s MCI
- 73 patients with PD
- 70 patients with Stroke & Vascular Dementia
- 56 adults aged 23 to 64 years

CONCLUSIONS

- The CDR System task:
  - Has already been extensively validated for such use
  - Takes a few minutes to administer (<4 mins)
  - Can be performed by virtually any clinical population
  - Has over 60 parallel versions (& language versions)
  - Can be administered via the internet