

Neuropsychological measurement in cancer patients:

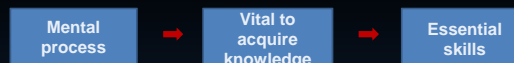
A validation study

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Cognitive function



Memory, attention/concentration, psychomotor coordination, intelligence, perception, linguistic skills, etc.

Interference in social interaction, work, leisure activities, personal care, compliance to the treatment, symptom relief and quality of life.

Prevalences of delirium in palliative care are 28%-85% and dementia 11% (Minagawa et al 1996, Hjermsstad, Loge, Kaasa 2004, Leonard et al 2008).

Mild cognitive dysfunction is more difficult to detect, understand and treat, but still harmful to patients.

Nurses and physicians seldom detect cognitive alterations (Pisani et al. 2003, Inouye et al. 2003).

Lack of adequate assessment instruments

Kurita GP, Lundorff L, Pimenta CAM, Sjøgren P. The cognitive effects of opioids in cancer: a systematic review. *Supp Care Cancer* 2009; 17(1):11-21.

▪Several tests are used to measure cognitive function, but there is no consensus on which neuropsychological domains are most relevant to measure and which tests are most clinical relevant and feasible to use

▪Most of the tests have not cut off points based on specificity and sensitivity

▪Many tests may not be useful in a clinical context.

Aim

To assess validity and reliability of five cognitive tests in patients with cancer:

1. Continuous Reaction Time (CRT),
2. Finger Tapping Test (FTT),
3. Digit Span Test (DST),
4. Trail Making Test (TMT), and
5. Mini-Mental State Examination (MMSE)

Methods

Design cross-sectional study, two groups composed by cancer patients and healthy people.

Local study is being performed in Brazil (Cancer Institute of Sao Paulo) and Denmark (Rigshospitalet and Herning Hospitals)

Period data collection started in Jun 2010

Sample 150 cancer outpatients/homecare patients in palliative care and 150 healthy people - patient companion: relatives or caregivers. (Power of 0.80 and a type I error of 0.05).

Cancer patients

Inclusion criteria

- cancer disease
- Karnofsky Index \geq 40%
- age \geq 18 years old
- \geq 6 years of schooling
- fluent native language
- stable medications for 4 days prior to the first assessment and next week

Exclusion criteria

- brain tumor/metastases
- hemoglobin $<$ 6,0 mmol/l, Creatinine $>$ 150 mmol/l, Kalium $<$ 3,0 or $>$ 5,2 mmol/l and Ionised Calcium $>$ 1,30 mmol/l
- significant hepatic dysfunction, psychiatric diseases
- Visual/ hearing/expression/physical impairment
- misuse of drugs/alcohol (last alcohol intake \geq 24h)

Healthy people

Inclusion criteria

- age \geq 18 years old
- \geq 6 years of schooling
- fluent native language
- HADS $<$ 8
- MMSE \geq 25

Exclusion criteria

- cancer disease
- history of mental and physical diseases or other chronic disease that can interfere on cognitive function
- Visual/ hearing/expression/physical impairment
- misuse of drugs or alcohol (last alcohol intake \geq 24h)

Assessment

Identification form sociodemographics, cancer, functional performance, current cancer treatment and analgesic therapy

Sleep rest sensation and hours of sleep

Brief Pain Inventory (BPI) pain now 0-10
Cleeland, Syrjala 1992, Jacobsen 2009

Hospital Anxiety and Depression Scale (HADS) anxiety and depression
Zigmond, Snaith 1983


European Organization for Research and Treatment of Cancer Quality of Life- Cancer 30 (EORTC QLC-C30) quality of life
EORTC Study Group; Fayers and Bottomley 2002

Fatigue Pictogram intensity and impact of fatigue
Fitch et al 2003

Neuropsychological assessment

1. Continuous Reaction Time - CRT

- Sustained attention (ability to attend and respond rapidly to external stimuli for an extend period of time).
- Computer test - headphones, 100 auditory signals (500 Hz, 90 dB) delivered at random intervals (2-5 sec) over a period of 10 min.
- Scores are summarized using 10th, 50th and 90th percentiles.



Elass P. Continuous reaction times in cerebral dysfunction. Acta Neurol Scand 1986;73:1-22.

2. Finger Tapping Test - FTT

- Psychomotor speed which can indicate cerebral dysfunction and lesions of motor structures of cerebral hemispheres.
- Tapping a key as fast as possible. The key is attached to a device for recording the number of taps. The second finger of each hand should make five 10 sec trials with brief resting periods between the trials.
- Score is calculated by the numbers of taps.



Peters M. Prolonged practice of a simple motor task by preferred and non-preferred hands. Percept Mot Skills 1976;42:447-450

3. Digit Span Test - DST

- Attention, concentration and working memory.
- 7 items of numbers with 2 trials each, in both forward (direct) and backward (reverse) order.
- Scores for each trial range from 0 to 14.

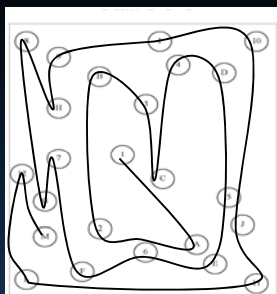
Digit Forward			
Item	Trail 1	Trail 2	Score
1	1-2-3	4-3-2-1	
2	4-4-3-2-1-0	7-3-2-1-0	
3	4-3-2-1-0-1	7-3-2-1-0-1	
4	4-3-2-1-0-1-2	3-2-1-0-1-2	
5	3-2-1-0-1-2-1-0	4-3-2-1-0-1-2	
6	3-2-1-0-1-2-1-0-1-2	4-3-2-1-0-1-2-1-0	
7	2-1-0-1-2-1-0-1-2-1-0	7-3-2-1-0-1-2-1-0-1	
Total			
Number of Responses (out of 14)			
Number of Errors (out of 14)			
Number of Omissions (out of 14)			

Digit Backward			
Item	Trail 1	Trail 2	Score
1	2-1-0	1-0-2	
2	4-3-2-1	1-0-1	
3	3-2-1-0-1	4-3-2-1	
4	3-2-1-0-1-2	4-3-2-1-0	
5	3-2-1-0-1-2-1	7-3-2-1-0-1-2	
6	4-3-2-1-0-1-2-1	4-3-2-1-0-1-2-1	
7	4-3-2-1-0-1-2-1-0	7-3-2-1-0-1-2-1-0	
Total			
Number of Responses (out of 14)			
Number of Errors (out of 14)			
Number of Omissions (out of 14)			

Wechsler D. Wechsler Adult Intelligence Scale - revised. New York: Psychological Corporation, 1981.

4. Trail Making Test (Part B) – TMT B

- Visual scanning speed, motor function, attention, and mental flexibility.
- There are 2 parts. In this study only Part B.
- In part B, numbers and letters must be connected in alternated sequence, in increasing order with pencil or pen.
- Scores are calculated by the time spent to correctly conclude each part and number of mistakes.



Reitan RM. Validity of the trail making test as an indicator of organic brain damage. Percept Mot Skills. 1958;8:271V276.

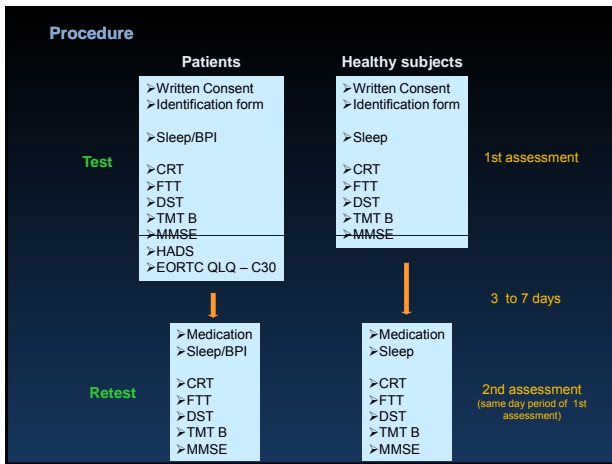
5. Mini-Mental State Examination - MMSE

- It has been used to track disease related cognitive impairment in follow-up examinations and to observe changes in cognitive status due to treatments.
- 30 questions
- Scores range from 0 to 30.

It measures:

- Orientation to time and place
- Registration of words
- Attention
- Calculation
- Word recall
- Language
- Visual construction.

Folstein MF, Folstein SE, McHugh PR. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12:189Y198.



Analysis

Reliability

- Test-retest of all cognitive instruments
- Internal consistency on Mini-Mental State Examination

Validity

- Construct validity (factor analysis of MMSE)
- Discriminant validity (comparison between patients and healthy subjects, sensitivity and specificity)
- Criterion validity (concurrent validity with convergent and divergent techniques - correlations between the results in the cognitive tests and the results on Karnofsky Performance Scale, sleep, HADS, EORTC and BPI)

Thank you for your attention.

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