Neuropsychological measurement in cancer patients: A validation study

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• 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, Hjermstad, 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

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 ≥ 40%
• age ≥ 18 years old
• ≥8 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, Potassium < 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 ≥ 24h)

Healthy people
Inclusion criteria
• age ≥ 18 years old
• ≥8 years of schooling
• fluent native language
• HADS < 8
• MMSE ≥ 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 ≥ 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

Hospital Anxiety and Depression Scale (HADS)
anxiety and depression

European Organization for Research and Treatment of Cancer Quality of Life–Cancer 30 (EORTC QLC-C30)
quality of life

Fatigue Pictogram
intensity and impact of fatigue

Neuropsychological assessment
1. Continuous Reaction Time - CRT

• Sustained attention (ability to attend and respond rapidly to external stimuli for an extended 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.

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.

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.

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.

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.
**Procedure**

**Patients**
- Written Consent
- Identification form
- Sleep/BPI
- CRT
- FTT
- DST
- TMT B
- MMSE
- HADS
- EORTC QLQ – C30

**Healthy subjects**
- Written Consent
- Identification form
- Sleep
- CRT
- FTT
- DST
- TMT B
- MMSE

**Test**
- 1st assessment
- 3 to 7 days

**Retest**
- 2nd assessment (same day period of 1st assessment)

**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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