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Chemotherapy Cancer Treatment and Cognitive Dysfunction

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Abstract

The prominence of cognitive dysfunction because of cancer treatment, referred to as “chemo brain” is increasing due to the number of cancer survivors. Research on chemotherapy related cognitive dysfunction has been focused on breast cancer survivors. The purpose of this study was to establish if a connection between chemotherapy cancer treatment and cognitive dysfunction exists. This evaluation of literature explored PubMed, DynaMed, Psychiatry Online, and Cochrane which compared cognitive abilities before and after chemotherapy cancer treatment. This paper examined the research over the last 10 years, of women ages 18-70 and the connection between chemotherapy treatment and cognitive dysfunction. Jansen et al. (2011) found significant decreases in cognitive impairment after receiving chemotherapy, followed by improvements 6 months after the completion of chemotherapy in the cognitive domains of visuospatial skill ($p<0.001$), attention ($p=0.022$), delayed memory ($p=0.006$), and motor function ($p=0.043$). Results from a study by Lindner et al. (2014) indicated that cognitive impairments were found in the cross-sectional studies including immediate free recall ($p=0.03$), delayed memory ($p=0.02$), verbal memory ($p<0.001$), delayed recognition memory ($p=0.02$), selective attention ($p=0.02$), and attention capacity ($p<0.001$). This paper has shown that a positive connection between chemotherapy cancer treatment and cognitive dysfunction exists and that the degree of cognitive dysfunction is highly variable for each individual. The results indicated that chemotherapy related cognitive dysfunction should be discussed as a debilitating side effect before chemotherapy cancer treatment is initiated. Survivor support should also be increased in order to accommodate cancer survivors affected by chemotherapy related cognitive dysfunction.

Introduction

Cancer treatments including chemotherapy and radiation therapy have exponentially increased the survival rate of those affected by malignancy. Therefore, the prominence of cognitive dysfunction as a result of cancer treatment, referred to as “chemo brain” or chemotherapy induced cognitive dysfunction is also increasing due to the number of cancer survivors.

Chemotherapy induced cognitive dysfunction can have a negative effect on the individual’s quality of life, increase in the cost of care for cancer survivors and encumbrance on their caregivers. The purpose of this study is to establish if a connection exists between chemotherapy cancer treatment and cognitive dysfunction.

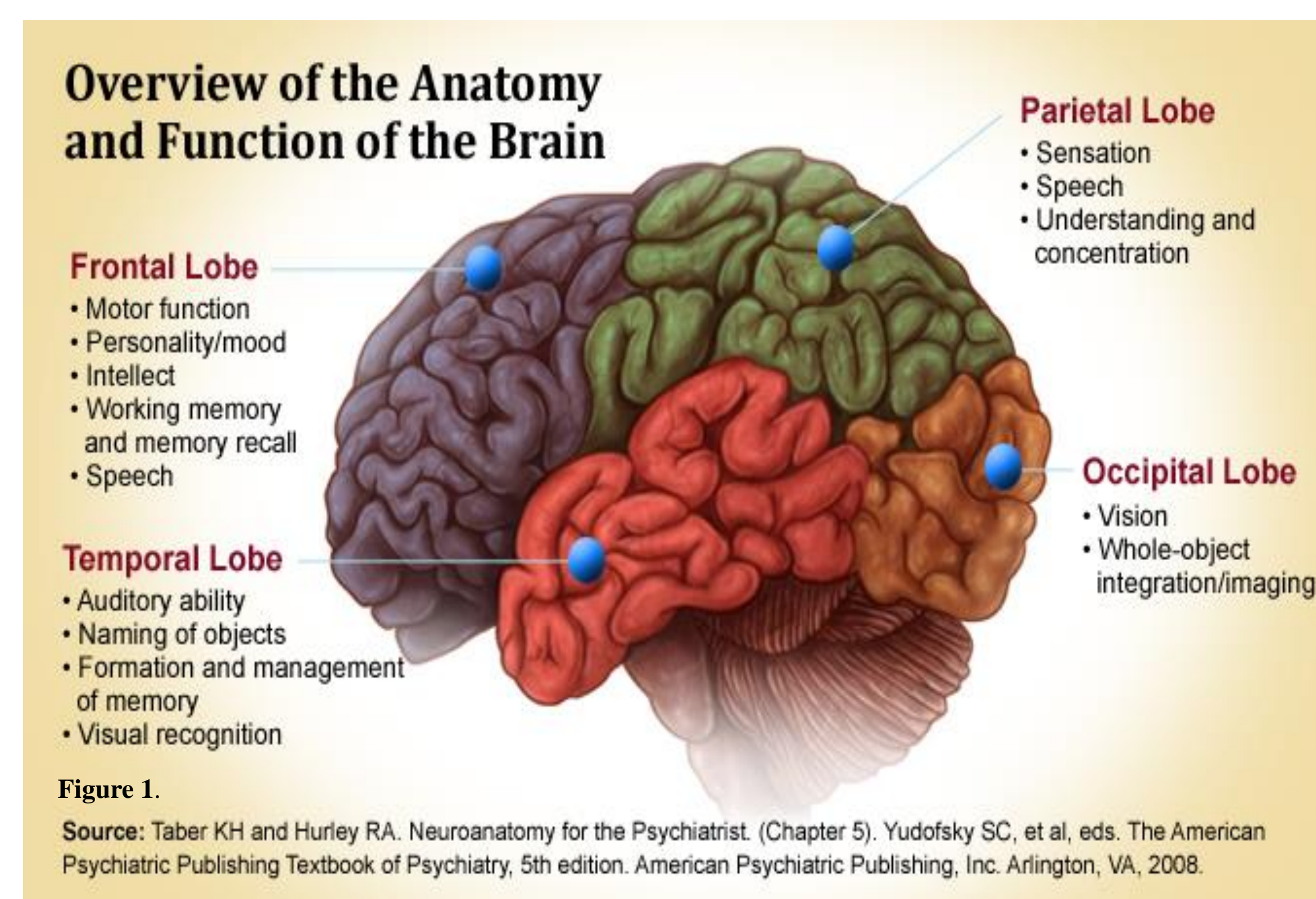
Statement of the Problem

With the increasing numbers of cancer survivors, studies are needed to show if there is a positive connection between chemotherapy treatment and cognitive dysfunction.

Research Questions

In cancer patients, does treatment with chemotherapy compared to patients who do not receive chemotherapy treatment result in an increase in cognitive dysfunction?

Is there a therapy available to treat post chemotherapy cancer treatment cognitive dysfunction for cancer survivors?



Literature Review

- Jansen et al. (2011) found significant decreases after receiving chemotherapy, followed by improvements six months after the completion of chemotherapy in the cognitive domains of visuospatial skill ($p<0.001$), attention ($p=0.022$), delayed memory ($p=0.006$), and motor function ($p=0.043$). These results suggest that chemotherapy related impairments appear to be acute rather than chronic.
- Lindner et al. (2014) indicated that cognitive impairments were found in the cross-sectional studies including immediate free recall ($p=0.03$), delayed memory ($p=0.02$), verbal memory ($p<0.001$), delayed recognition memory ($p=0.02$), selective attention ($p=0.02$), and attention capacity ($p<0.001$). This suggests that the impairments may be linked to both the frontal and medial temporal lobe dysfunction. Figure 1.
- Janelsins et al. (2013) determined that there were no overall mean differences in cognitive function. However, subject analysis revealed a 61% cognitive decline in learning, attention and processing speed. If the pre-treatment cognitive analysis had not been studied, 46% of those experiencing cognitive decline would have been missed as their post-treatment assessment scores continued to be within a normal range.

- Biglia et al. (2012) suggested that chemotherapy can induce cognitive dysfunction, especially involving the attention subdomain and that psychosocial health can play a role in this process. Figure 2.
- Henneghan (2015) failed to show a correlation between modifiable environmental factors as predisposing factors for cognitive dysfunction post chemotherapy. However, psychosocial factors such as stress, isolation and lack of support have been associated with decrease in immediate memory ($p<0.01$), delayed memory ($p<0.5$), verbal fluency ($p<0.05$) and attention ($p<0.01$)
- Mar Fan et al. (2007) showed no significant data to support the use of methylphenidate for the treatment of fatigue or quality of life and mood.
- Barton et al. (2012) found that Gingko Biloba at a dose of 120 mg/day does not present as a pharmacologic treatment option for women facing chemotherapy, in regard to preserving or enhancing cognitive function.

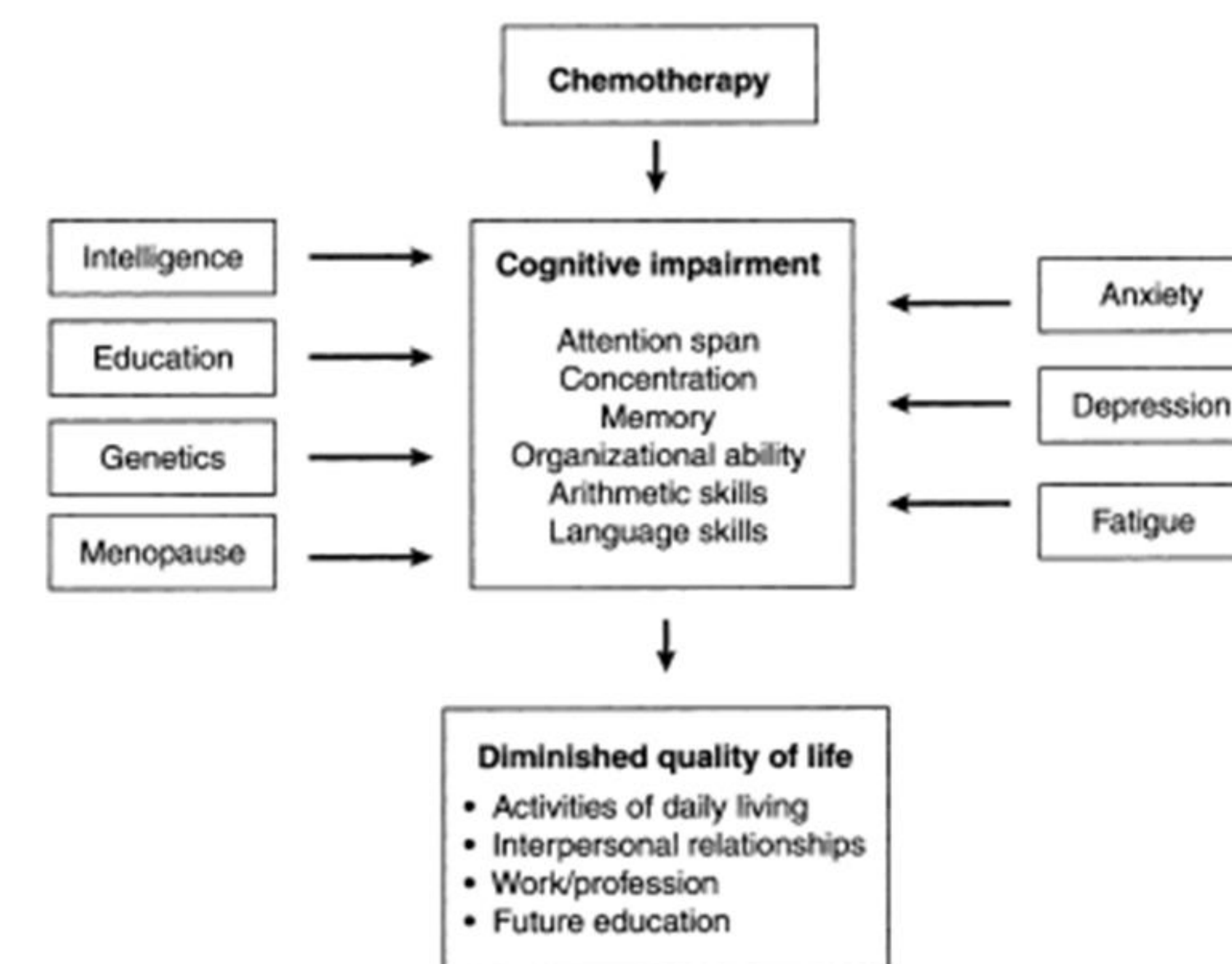


Figure 2. Effect of chemotherapy on cognitive function and quality of life. Oncology, New York, NY. 1

Discussion

In summary this study found

- Chemotherapy induced cognitive dysfunction is typically a short term rather than long term condition.**
- Cognitive functions most affected are attention, language, memory, judgement and free recall.**
- This suggests a link to frontal and medial temporal lobe dysfunction post chemotherapy treatment.**
- This study showed no significant data to support the use of methylphenidate as a treatment modality for chemotherapy induced cognitive dysfunction.**
- This study did not reveal any data to support the use of Gingko Biloba at 120 mg/day for the treatment or prevention of cognitive dysfunction post chemotherapy treatment.**

Applicability to Clinical Practice

- This study should increase awareness of chemotherapy induced cognitive dysfunction and its affect on cancer survivors and their families.
- The most common areas of cognitive function affected by chemotherapy cancer treatment include language (verbal), memory, judgement and free recall.
- Educating patients of the possibility of cognitive dysfunction post chemotherapy cancer treatment can empower patients to select the best treatment options for themselves. Figure 3.
- Early recognition and validation of cognitive dysfunction can reassure and comfort patients.
- Strong emotional support system during chemotherapy cancer treatment has been shown to have physical benefits.

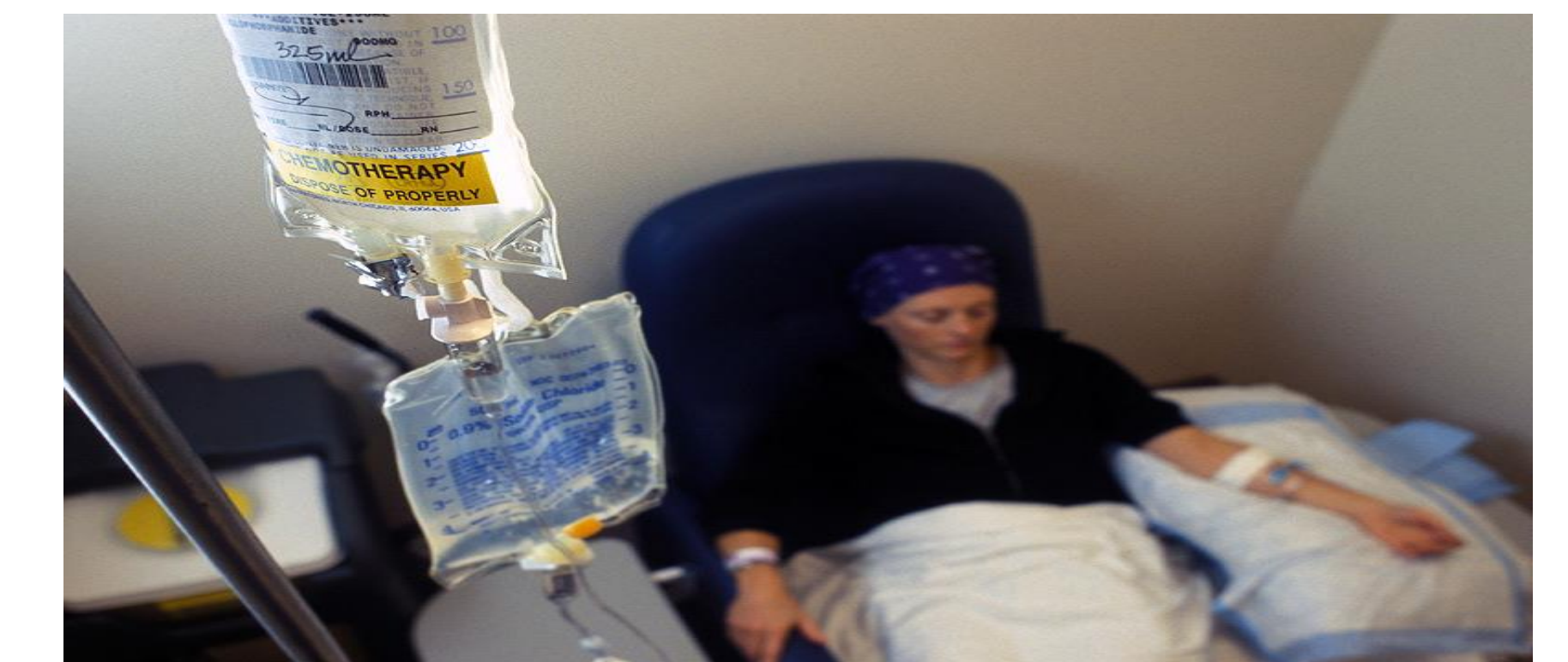


Figure 3 www.medscape.com (2016)

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