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Cancer Treatment Related Cognitive Impairment (CTRCI) and the Role of the Speech-Language Pathologist

Presenter: Connie Carson, Ph.D., SLP-CCC
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Moderated by:
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A Webinar on CTRCI:

Cancer Treatment Related Cognitive Impairment and the Role of the Speech–Language Pathologist

Connie Carson, Ph.D., SLP–CCC
Healthcare Consultant
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Feistyfitfemales.org
A bit of background on me ~

- In 1992, I started the first in-patient cancer rehabilitation program in Denver, at a rehab hospital now called Spalding.
- In 2000, I authored the book, Oncology Rehabilitation: An Oxymoron?
- During my 14-year tenure as a healthcare consultant and website content author to the oncology division of Nashville-based HCA, I ...
  - authored ten books published by HCA Press,
  - made numerous presentations on the importance of exercise as a cancer treatment option, and
  - wrote several chapters in oncology nursing management textbooks, one of which received the American Journal of Nursing Book of the Year Award in the Nursing Management and Leadership Category.

- I’ve been a speech–language pathologist for over forty years and have worked at many of the rehabilitation centers in the Denver–metro area.
- Recently, the second edition of my book, Fitness for Cancer Patients was published. A complimentary copy will be available upon request. Simply send an email to concarson@aol.com and I will mail you a copy of my book.
- Please note that this presentation and a digital copy of my book are available on my website at feistyfitfemales.org References not cited directly in this presentation are also posted on my website.

Ode to My Cancer

“I really don’t like this disease
I think I would rather have fleas;
Fleas they will tease you,
And greatly displease you,
But they won’t bring you down to your knees.”

Susan Karlen Mayer,
breast cancer survivor —
diagnosed June 1997
 Patients complain of many side effects of cancer treatment: hair loss, joint pain, insomnia, fatigue, nausea and vomiting, anemia, infection, dysphagia, diarrhea and constipation, flu-like symptoms … to name a few...

Cognitive problems following a diagnosis of cancer is one of these side effects …

IT IS IMPERATIVE TO NOTE THAT THE PRESENTERS OF THIS WEBINAR ARE NOT INFERRING THAT CANCER TREATMENTS SHOULD BE AVOIDED BECAUSE OF THESE SIDE EFFECTS.

The treatments are life-saving, but some do “bring you down to your knees.”

Following this presentation, hopefully, you will be able to

- After this course, participants will be able to list five symptoms that may be evident in patients who complain of CTRCI.
- After this course, participants will be able to identify three treatment modalities that are applicable to this patient population.
- After this course, participants will be able to explain the chemo-toxic dynamic that contributes to this side effect.

An example of CTRCI…..

- Halfway through her treatment, Susan began to feel as though a cloud had rolled over her brain. A highly successful professional in her 50s, she suddenly had trouble remembering names … and simple details, like her phone number or the day of the month. “Everything takes longer to accomplish, whether it’s getting dressed in the morning, organizing my daily calendar, even following a simple recipe. I have major issues with directions and my own sense of space. I get disoriented easily, even while driving in my own neighborhood, and I find myself lost in a mall that I had shopped at for years. I’m frightened when I think of how this is affecting my work performance.”

- Unfortunately, the problems didn’t go away when she finished treatment, and persist today .... Five years later.
The Cancer Network stated that

Cancer Treatment Related Cognitive Impairment (CTRCI) “includes subjectively reported and objectively measured problems with cognition” following a diagnosis of cancer.

Mayo Clinic defined it as

"a common term used by cancer survivors to describe thinking and memory problems that can occur after cancer treatment."

Patients call it “chemobrain"

But chemotherapy is not the sole culprit.

Cognitive impairments do not occur solely as a result of chemotherapy.

CTRCI has been noted in people who have been treated with surgery, radiation, or other standard cancer treatments... even without chemotherapy.
More formal definition:

- CTRCI is a well-documented side effect of a cancer diagnosis. The incidence rate ranges from 14 to 85%. (1)
- It has been documented in patients with non-Hodgkin lymphoma (2), breast (3), colorectal (4), lung (5), testicular (6), and prostate cancer (7).
- Deficits include memory impairments, “feeling in a fog”, poor concentration, forgetfulness, word finding problems, high level language deficits and impaired executive functioning skills. All problems that we as speech-language pathologists are competent in addressing.

Hundreds of articles have been published...

- Numerous articles from other countries including Korea (10), China (11), Netherlands (12), Denmark (13), Singapore (14), Ireland (15), Australia (16), Japan (17), Germany (18), Italy (19), and Sweden (20).
- But nothing by speech-language pathologists, qualified to treat this syndrome.

So.... Who has been doing the research on CTRCI?

- Oncology Nurse Specialists
- Neuropsychologists
- Psychologists

- These professionals may be qualified to diagnose these deficits but they cannot, under our current reimbursement model, receive remuneration for their services.
In 2004, CTRCI was the second most common dissertation topic in oncology nursing (11).

For more than a decade, the oncological community has stressed the importance of therapy for these patients; yet, speech-language pathologists have been silent in addressing this need.

With cancer survivors now numbering over **13 million in the United States**, it is important to consider the needs of this growing population.

If we are to look at the lower number (even 13%), the potential number of individuals who could benefit from our services is simply overwhelming.....

The problem has been around for a very long time

Breast cancer survivors first reported this phenomenon over thirty-five years ago when they complained of changes in memory, fluency, and other cognitive abilities that impeded their ability to function.

Treatments were geared toward:

- Finding relief of accompanying symptoms (sleep deprivation, sadness, fatigue, etc.)
- Studying the possibility of pharmaceutical cocktails that would adequately treat the cancer without the accompanying cognitive problems.
- In all fairness, many felt that chemo agents could not by-pass the blood-brain barrier and therefore, the symptoms had to be related to factors other than neurological implications.

Harvard Health Watch in 2002 stated that we only had theories to explain this side-effect. They attributed symptoms to:

- Early Menopause
- Multiple drugs interfacing - like the elderly
- Chemo agents, especially at high doses
- Stress
- Anemia
- Infection
- Nutritional Deficiencies
- Inherited susceptibility to chemo brain

Other Complicating Factors:

- Sleep Disorders
- Depression
- Anxiety
- Metastatic Disease
- Sadness
- Advancing Age
- Lack of Exercise
- Fear
- Fatigue
This article published last month included 2289 adults. Those with insomnia were 16 times as likely to have self-reported memory problems.

What comes first? The insomnia, which leads to decline in cognitive status? Or the cognitive problems which keeps the person awake at night?

Over 80% of the nurses surveyed stated their patients commonly complained of memory and concentration problems.

47% stated they felt chemo agents could cause brain injury.

41% felt exercise could be beneficial in coping with the symptoms of chemobrain.

Less than 5% had considered the possibility of a referral to a speech-language pathologist.

145 Oncology Nurses were surveyed at a national ONS convention over a decade ago.

Grooks, Piet Hein, 1905–1996

“Do you know that weary feeling when your mind is strangely strangled. And your head is like a ball of wool that’s very, very tangled; And the tempo of your thinking must be lenient and mild, As though you were explaining to a very little child.”
The following was written by a practicing oncology nurse who complained of chemobrain symptoms.

In your own words, please describe your cognitive linguistic problems.


Google Chemobrain for items:


Resources are available
A “symptom cluster” is a group of symptoms that occur together and are interrelated.

People with chemobrain symptoms may also share other psychoneurological symptoms:
- Depression
- Fatigue
- Sleep disturbances
- Pain

Cognitive impairment directly affects women’s personal and professional lives.

Information showed that it is the most troublesome post-treatment symptom for many, resulting in diminished quality of life.

A study in 2004 documented the fact that patients who received chemotherapy, with and without tamoxifen, performed worse on cognitive tests than those treated by surgery alone.

They found no relationship between subjective cognitive complaints and objective performance on neuropsych or neurological tests.
Today, neuropsych tests may not always confirm a relationship between cognitive complaints and performance on diagnostics; however, extensive PET scans and neural imaging tests are confirming these deficits.

The first prospective longitudinal neuroimaging study of breast cancer patients recently reported decreased gray matter density one month after chemotherapy completion, particularly in frontal regions. These findings helped confirm a neural basis for previously reported cognitive symptoms, which most commonly involve executive and memory processes in which the frontal lobes are a critical component of underlying neural circuitry.

It was previously believed that the reported chemo–toxic damage leading to CTRCI, in the short term, would terminate with the completion of treatment.

Studies now show that the long–term limitations continue for years, if not decades (9).
These Harvard scholars acknowledged that CNS toxicity from chemotherapy has only recently been acknowledged. Clinical studies suggest that the most frequent neurotoxic adverse effects associated with chemotherapy include memory and learning deficits, alterations of attention, concentration, processing speed and executive function.

Preclinical studies have started to shed light on how chemotherapy targets the CNS both on cellular and molecular levels to disrupt neural function and brain plasticity. Potential mechanisms include direct cellular toxicity, alterations in cellular metabolism, oxidative stress, and induction of pro-inflammatory processes with subsequent disruption of normal cellular and neurological function.

Damage to neural progenitor cell populations within germinal zones of the adult CNS has been identified as one of the key mechanisms by which chemotherapy might exert long-lasting and progressive neurotoxic effects.

A study conducted in 2006 showed that chemotherapy can cause a change in the brain’s metabolism and blood flow that can last as long as 10 years.

People with chemobrain often can't focus, remember things, or multitask the way they did before chemotherapy.

This speculative but testable hypothesis should help to gain a comprehensive understanding of the mechanism underlying cognitive dysfunction in cancer patients.
They summarized

- Such knowledge is critical to identify pharmaceutical targets with the potential to prevent and treat cancer-treatment related cognitive dysfunction and similar disorders.
- But no mention of treating the symptoms through speech-language therapy.


- In 2011, Fardell reported that there are no proven treatments.
- The authors summarized that emerging results suggest that both pharmacological and behavioral approaches may offer patients some benefits; however, research in this area has been limited.


- This Land-mark article provides a comprehensive critical review and summary of the evidence regarding interventions addressing cognitive impairment for cancer survivors.
- It examined the effectiveness of interventions focused on cancer and cancer treatment-related cognitive impairment, made recommendations for practice, and identified gaps in knowledge and areas for further research.
This evidence-based review, published in 2015, reviewed hundreds of articles that assessed thousands of cancer patients. It explored the effectiveness of individual and group cognitive training, Qigong, Vitamin E, pharmacologic approaches, exercise, and meditation.

They noted that as many as 75% of US cancer survivors have reported issues with memory, attention, or feelings of mental slowness.

They reported that cognitive deficits in memory, attention, processing speed, and executive functioning have been documented on neuropsychological examination and functional magnetic resonance imaging.

Twenty four studies met inclusion criteria and were added to the level of evidence for each interventional strategy, resulting in 51 empirical studies, one literature review, and one meta-analysis.

Only group and individual cognitive retraining and exercise were found to be effective.

They summarized that “nurses may need to refer survivors with significant cognitive impairments that affects everyday functioning to a specialist…”

but the article never mentioned the possibility of a referral to a speech-language pathologist.
The researchers of this article, published by the Archives of Physical Medicine and Rehabilitation, searched 5 databases (PubMed, Embase, Cochrane CENTRAL, PsycINFO, CINAHL), with no date or language restrictions and identified 1701 unique results. Search terms included breast cancer, chemotherapy, chemobrain, chemofog, and terms on cognition and language deficits.

They included only peer-reviewed journal articles that described therapies for cognitive dysfunction in women undergoing, or who had undergone, chemotherapy for breast cancer and provided objective measurements of cognition or language.

They concluded that cognitive therapy protocols delivered after chemotherapy and aimed at improving verbal memory, attention, and processing speed hold the most promise.

They acknowledged that future research is needed to clarify whether computerized cognitive training can be effective in treating this population and to identify objective assessment tools that are sensitive to this disorder.

BUT .... Even the Archives of Physical Medicine and Rehabilitation May 2015 article didn’t mention the need for speech-language therapy.

May 2015 Archives of Physical Medicine article continued...

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BUT .... Even the Archives of Physical Medicine and Rehabilitation May 2015 article didn’t mention the need for speech-language therapy.

The only article published by an Occupational therapist stated that cognitive behavioral therapy and neuropsychological/cognitive training methods may ameliorate symptoms of CTRCI.

The most commonly-reported coping strategy is utilization of assistive technology and memory aids.

Further research is needed about efficacious rehabilitation techniques for this population.

"Coping with cancer-related cognitive dysfunction: a scoping review of the literature."

The only article published by an Occupational therapist stated that cognitive behavioral therapy and neuropsychological/cognitive training methods may ameliorate symptoms of CTRCI.

The most commonly-reported coping strategy is utilization of assistive technology and memory aids.

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The Functional Assessment of Cancer Therapy (FACT) has been under
development since 1987.

There are 50 different scales and symptom indexes, of which cognition is
one. It has been translated into 50 different languages, permitting cross-
cultural comparisons and acknowledging diverse backgrounds.

It has been significantly correlated with measures of depression, fatigue,
anxiety, and physical and mental well-being.

This self-assessment takes about 5-10 minutes to complete and can be
administered over the telephone. It has a 4th grade reading level.

Patients are able to identify the types of cognitive complaints they are
experiencing.

The FACT has been expanded to include other chronic
ilnesses. Visit FACIT.org for more information

Permission for use of one or more of the FACIT scales in
English can be obtained by completing a simple users
agreement by registering your project and agreeing to their
guidelines. Registering will also grant you access to the
scoring and interpretation materials.

Currently, there is no cost for use of any English version of
the questionnaires.

Translations will be emailed to you once you’ve registered
and indicated the language and questionnaire you’d like to
use.

FACT–Cognitive Function (Version 3)

Patients rate their performance on a 0–4
point scale

Areas assessed include:

- Perceived Cognitive Impairment
- Comments from Others
- Perceived Cognitive Abilities (strengths) ...and
- Impact on Quality of Life
Questions include practical items like...

- I have trouble forming thoughts
- My thinking has been slow
- I have had trouble concentrating
- I have had trouble remembering where I put things, like my keys or wallet
- I have had trouble remembering new information, like phone numbers or simple instructions

- I have had trouble saying what I mean in conversations with others
- I have had trouble finding the right word(s) to express myself
- I have had trouble recalling the name of an object while talking to someone
- I have had trouble finding the right word(s) to express myself
- I have used the wrong word when I referred to an object

Some questions ask how others respond

- My reactions in everyday situations have been slow
- Other people have told me I seemed to have trouble thinking clearly
- I have not been able to concentrate
- These problems have interfered with my work
- These problems have interfered with my ability to do the things I enjoy
- My memory is as good as it’s always been (strengths)
Other diagnostic's have included:

- The Trail-Making Test (A and B), subtests of the Halstead-Reitan Neuropsychological Test Battery that measures attention, sequencing, and cognitive flexibility
- Formal neuropsychological battery
- Mini-Mental

National Comprehensive Cancer Network (NCCN) developed 1-10 Pain Scale which has resulted in successful pain management in the US.

- "How is your pain on a scale of 0 to 10?"
- The system uses a score of 5 or higher as the indication to reassess pain medications or refer the patient for more expert management
- Pain has become the fifth vital sign, after pulse, respiration, blood pressure, and temperature, ensuring that it is evaluated as part of routine care.
- Many suggest that stress should be considered the sixth vital sign. A score of 5 or greater on the thermometer should trigger further evaluation and communication with the referring physician.
Doing Sudoku every day will not help you find your car in a parking lot!

Crossword puzzles will not help you remember your next appointment.

Therapeutic strategies are similar to those used routinely for patients with mild traumatic brain injury.

- Doing Sudoku every day will not help you find your car in a parking lot!
- Crossword puzzles will not help you remember your next appointment.

"Believe the patient!" Patricia Ganz, MD.

- Therapy should address situations and needs that the patient feels affect their lives most directly.
- Make sessions practical and relevant to the person’s home life, work world, and social environment.

Examples of two perspectives:

<table>
<thead>
<tr>
<th>Minimize one’s world</th>
<th>Expand one’s world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep all information in one book</td>
<td>Have post-a-notes scattered all over.</td>
</tr>
<tr>
<td>Simplify one’s life by reducing activities</td>
<td>Take classes, get involved in a new hobby.</td>
</tr>
<tr>
<td>Exercise to center in on what needs to be done today</td>
<td>Exercise to expand fun options in life</td>
</tr>
</tbody>
</table>
Treatment goals are similar to standard techniques used routinely with our patients ... Help them to:

- Be concise and not verbose
- Improve word finding deficits
- Increase time management skills
- Set reasonable goals, plan and organize their lives to achieve goals, and flexibly solve problems so that goals can be modified or accomplished
- Think abstractly and logically so that they can transfer skills from training to real life situations.
- Try to clear clutter

All might need to ....

- Journal their memory lapses
- Keep a positive attitude
- Exercise their mind with mental calisthenics, including crossword puzzles, bridge, hobbies, classes
- Develop a system of reminders either by writing things down, using post-a-notes or Day Timers, and establishing routine
- Take time to remember things
- Keep a list of medications and supplements
- Try to control their working environment

"Try to’s.....

- Get enough sleep
- Keep a positive attitude
- Take frequent breaks
- Exercise
- Be honest with themselves and others about their symptoms
- Learn relaxation techniques
- Don’t be too hard on oneself
Education!!!

› Provide educational information to the patient to assure them that this is a legitimate side-effect of treatment ...

› Stress to the family that the symptoms are real. Many feel that their family doesn’t understand the problems they face.

› Family education can be crucial in abetting the stress that a person experiences because of cognitive decline.

Don’t let this become another complicating factor

› Patients already are dealing with stress, anxiety, sleep problems, sadness ...

› If treatment adds to the list of concerns, it can become its own complicating factor.

› If they work too much on homework, they can become too tired and actually perform worse.

Billing

› The switch from ICD–9–CM (International Classification of Diseases, 9th Revision, Clinical Modification) to ICD–10–CM (10th Revision, Clinical Modification) will begin on October 1, 2015.

› The Health Insurance Portability and Accountability Act (HIPAA) requires ICD–10 to be used for health services billing and recordkeeping.

› Once implemented, ICD–10–CM will replace ICD–9–CM as the official system of assigning codes to diagnoses and procedures in the United States.
The ICD-9-CM is 30 years old, has outdated and obsolete terminology, and produces limited data. ICD-10-CM will allow for more codes and greater specificity and, thus, better data tracking of incidence and prevalence of disease.

As you hopefully know, all claims submitted to health insurance providers—including Medicare and Medicaid—for audiology and speech-language pathology services provided on or after October 1 will be returned unpaid if they do not contain ICD-10-CM codes.

ASHA has developed extensive resources to help speech-language pathologists prepare, including an online tool to map ICD-9-CM codes to ICD-10-CM codes, mapping spreadsheets, and lists of audiology- and speech-language-pathology-related ICD-10-CM codes.

There is also a checklist to help clinicians make an organized transition to ICD-10-CM.

The change to ICD-10-CM is a significant undertaking for the health care industry and affects any clinician whose services are submitted for health insurance reimbursement.

Prepare now to avoid claim denials in October and beyond.

**Codes Previously Used:**

- 799.52 attention
- 799.51 Cognitive/linguistic
- 799.53 Executive Function
ICD-10-CM Diagnosis Codes for Audiology and Speech-Language Pathology

ICD-9 to ICD-10 Mapping Tool for Audiologists and Speech-Language Pathologists

The ASHA Leader: “Get Ready for ICD–10”

The ASHA Leader: “Ready to Code and Bill ICD–10?”

ICD–10 Is Coming: Are You Ready? (For Sale, On-Demand Webinar)

Contact the health care economics and advocacy team at reimbursement@asha.org.
Unusual Options for the uninsured or under-insured

- Some speech-language pathologists in private practice are initiating a private-pay structure and not utilizing insurance.
- A very reasonable amount is charged the patient and insurance paperwork is not completed.
- If the patient opts to submit their bill to an insurance company, they may.

If you want to start treating these patients, a lot of marketing education will be needed. The success of your patients will be your best advocate.

- As they have very few treatment options, the medical community will very likely be delighted to have you as a resource....
- BUT... you have to get to know the referral sources.

Marketing ideas....

- Talk with the OTs and PTs in your system that are treating lymphedema. Ask them for their referral "champion". Ask them to introduce you to the professionals that give them the most referrals.
- Offer a group educational seminar on chemobrain. Put flyers up to advertise this one-time session. If you need a sample educational PowerPoint presentation, I will gladly email you one, that you can modify to meet your needs.
See if you can attend Tumor Boards, and even do a presentation on the new service you are offering to cancer patients.

Find the most visible non-profit organizations in your area that serve cancer patients, attend their functions, try to network with them.

All states have a Cancer Plan. Google your state and Cancer Plan to see if there are individuals you might be able to network with.

Ask your Marketing Department to help promote this new service.

Network with individuals providing complementary services to cancer patients.

Complementary Therapies include:
- Energy therapies, Reiki, healing touch
- Meditation, guided imagery, progressive relaxation, deep breathing exercises
- Yoga, Pilates, gong, tai chi
- Acupuncture
- Massage
- Nutrition
- Dietary supplements and probiotics
People who exercise are different from those who do not exercise.

- They have other good health habits.
- They tend to drink less alcohol, eat healthier diets, smoke less if at all, take more vitamin supplements, and take better overall care of their health.

The American Cancer Society recommends:

- Eat a variety of healthy foods, with an emphasis on plant sources
- Maintain a healthful weight throughout life
- If you drink alcoholic beverages, limit consumption
- Adopt a physically active lifestyle

AND....

- Engage in at least moderate activity for 30 minutes, five or more days a week ...
- that's a LOT, especially for people who have been deconditioned by treatment and disease.
The greatest benefit occurred in women who performed the equivalent of walking three to five hours per week at an average pace.

Additional hours of activity or an increased pace did not seem to significantly improve their survival rate.

But still, three to five hours a week is a lot!

In an comprehensive, formal literature review of 5,687 citations, Chlebowski and McTiernan found that women with breast cancer who are overweight or gain weight after diagnosis are at greater risk for breast cancer recurrence and death compared with lighter women.

This April 2015 study showed that overweight survivors who exercised frequently reported less perceived cognitive impairment than sedentary survivors.

Study results provide support for a relationship between Body Mass Index and perceived cognitive impairment in breast cancer survivors and exercise as a potential intervention for cognitive complaints.
The results of these researchers raised the probability that exercise may change the biology of some malignant tumors, potentially making them easier to treat.

Some tumors send out biochemical signals that prompt the creation of additional blood vessels that proliferate so wildly that they choke one another, reducing blood supply and oxygen to the tumor.

One would think this would be good; however, as the tumor becomes hypoxic, it can make the tumor relatively impervious to treatment. Chemotherapy drugs and radiation work better in conjunction with oxygen.

Duke study....

For years, these colleagues searched for ways to increase oxygen flow to tumors but the results of their efforts were fleeting; eventually the blood vessels leading to the tumor tended to overgrow again like untended vines and the hypoxia returned.

So ... they began to consider aerobic exercise, as it increases the flow of oxygen–rich blood to tissues.

They did this by surgically implanting breast cancer cells into female mice and randomly assigning them to one of two groups: either exercise by running on a wheel or remaining sedentary.

The cancer cells “took” in both groups but, tumor growth was significantly slower in the mice that exercised than growth in the sedentary mice.
Animals were then randomized to one of four groups to test whether exercise could improve the efficacy of the chemotherapy drug, cyclophosphamide.

- Sedentary
- Exercise alone
- Cyclophosphamide alone
- Exercise in combination with cyclophosphamide

- Tumor growth was significantly slower in mice treated with exercise and cyclophosphamide.
- Tumor growth was also delayed in both the exercise alone and the cyclophosphamide alone groups ... but there was no difference in tumor growth between those two groups, suggesting that exercise showed similar effect as chemotherapy in this experiment. This does not mean one does not have chemo but it does stress the importance of exercise.

The authors summarized....

- Exercise made the breast cancer tumors in the mice more amenable to chemotherapy. By making the tumors less hypoxic, and paradoxically healthier, exercise "also had made those tumors easier to kill."
- On the basis of these findings in mice, they are now designing studies to test whether exercise can inhibit tumor growth/risk of recurrence in humans. Such research will prove very exciting.
This book is for you if....

- Your get-up-and-go has got up and gone!
- You used to be in fairly good shape. Since your cancer diagnosis, you’ve lost your athletic prowess. You want to get it back.
- Your oncologist told you to exercise…but you don’t know where to begin.
- It’s taken years to get our of shape and you fear it’ll take awhile to get into good physical condition.

What this book is not

- It is not a book for women cancer survivors. It’s for men and women who are struggling to be more healthy after a diagnosis of cancer.
- It does not provide exercises but rather addresses the need to exercise. It is not an exhaustive review of information on exercise for cancer patients.
- It’s a beginning guide, designed to motivate you to become more physically fit.
Research in the past months raises some compelling thoughts....

- What happens to the brain, years after chemotherapy has ended and the patient has been declared "disease free?"
- Will chemo agents change so that this CTRCI no longer occurs?
- What treatment options will be available in the future?

Evidence is mixed as to whether changes in cognitive performance associated with normal aging are exacerbated by cancer survivorship status.

It is also unclear whether a history of cancer makes it more or less likely that a person will be diagnosed with dementia or Alzheimer's disease in the future.

The researchers evaluated the effect of self-reported cancer chemotherapy on cognitive function assessed at baseline, 4, and 8 years.

Participants reporting history of chemotherapy (n = 76) had lower scores on memory, processing speed, and executive function compared with those reporting cancer without chemotherapy (n = 289) and no cancer history (n = 1508).

Results suggest chemotherapy prior to old age is associated with faster decline in memory in late life but that it does not affect decline in other domains of cognitive function.
Ten breast cancer survivors, currently free of recurrent cancer and without a diagnosis of a cognitive disorder, were compared to matched healthy controls.

Using Positron Emission Tomography (PET Scans) the researchers reported uptake was significantly lower in the survivors compared with control subjects in bilateral orbital frontal regions, consistent with differences reported on the Trail Making Test, Part B and mini-mental state examination ..., despite no significant differences with respect to age, education, intelligence, or working memory.

None of the survivors and only one control manifested a global positron emission tomography score consistent with an Alzheimer's disease metabolic pattern.

In 2003, a multidisciplinary group of neuropsychologists, clinical and experimental psychologists, neuroscientists, imaging experts, physicians and patient advocates participated in a workshop on cognition and cancer, which led to the formation of the International Cognition and Cancer Task Force (ICCTF).

The mission of the ICCTF is to advance our understanding of the impact of cancer and cancer-related treatment on cognitive and behavioral functioning in adults with non-central nervous system cancers.

Members of the ICCTF conduct local, national and international research to help elucidate the nature of the cognitive and neurobehavioral sequelae associated with cancer and cancer therapies, the mechanisms that underlie these changes in function, and interventions to prevent or manage these undesired symptoms and/or their side effects.

Using a rodent model of chemobrain, the authors found that intrahippocampal transplantation of human neural stem cells resolved all cognitive impairments when animals were tested 1 month after the cessation of chemotherapy.

Stem cell transplantation significantly reduced the number of activated microglia after cyclophosphamide treatment in the brain. Granule and pyramidal cell neurons within the dentate gyrus and CA1 subfields of the hippocampus exhibited significant reductions in dendritic complexity, spine density, and immature and mature spine types following chemotherapy, adverse effects that were eradicated by stem cell transplantation.

Our findings provide the first evidence that cranial transplantation of stem cells can reverse the deleterious effects of chemobrain, through a trophic support mechanism involving the attenuation of neuroinflammation and the preservation host neuronal architecture.
ONCOLOGY CAN ADD YEARS TO LIFE...

BUT....

REHABILITATION CAN ADD LIFE TO YEARS.”

Michel L. Gevaert, MD, 1993

“It is no small advantage that we enjoy living at the present day with the medical arts already brought to such a level of perfection.”

- Galen 130 - 200 AD

So... are you able to.....

- After this course, participants will be able to list five symptoms that may be evident in patients who complain of CTRCI.

- After this course, participants will be able to identify three treatment modalities that are applicable to this patient population.

- After this course, participants will be able to explain the chemo-toxic dynamic that contributes to this side effect.
AND ...

- Explain the chemo-toxic dynamic that contributes to this commonly documented side effect
- That’s the next part of this presentation.....

Patient Report of Therapy

Daniel Webster, 1782–1852

“If all my possessions were taken from me with one exception, I would choose to keep the power of communication for by it, I would soon regain all the rest.”
“We restore, repair, and make whole those parts which nature has given and fortune has taken away. Not so much that they may delight the eye, but that they may buoy the spirit and help the mind of those afflicted.”

Gasper Tagliacozzi, 17th Century

CHEMOTHERAPY INDUCED COGNITIVE IMPAIRMENT

CHEMOTHERAPY AND CHEMOTOXICITY

JULIA OSBORNE, PT, CLT-LANA

CANCER PATHOGENESIS
CANCER PATHOGENESIS

Mutated TSG's no longer have an inhibitory effect and both growth hormones and their receptors allow for unstoppable cell proliferation.

SUSTAINED PROLIFERATION WITH GROWTH HORMONES AND RECEPTORS

Once growth hormones and their receptors allow for unstoppable cell proliferation, then these "hallmark" features of cancer cells begin to take hold.

CHEMOTHERAPY

RESPONDS TO:
TUMOR TYPE
PHASE OF CELL CYCLE WHERE DNA DAMAGE TAKES PLACE
GROUPINGS OF CHEMOTHERAPY DRUGS

- **Alkylating Agents**
  - add an alkyl group to DNA molecules and prevent cell proliferation
    - Cytoxan
    - Platinum Based Drugs
- **Antimetabolites**
  - affect DNA synthesis by substituting the metabolites that would be used in the normal metabolism
    - 5 FU, Xeloda, Methatrexate, Gemzar
- **Mitotic Inhibitors**
  - disrupt microtubules, the structures that pull the cell apart during division
    - Taxol, Taxotere, Vinca Alkaloids
- **Anti-Tumor Antibiotics**
  - molecules insert themselves between strands of DNA, rendering it unable to replicate
    - Adriamysin, Epirubicin

TYPES OF NEUROTOXIC CHEMOTHERAPY DRUGS

- **TAXANE CLASS:** (mitosis)
  - Paclitaxel (Taxol®)
  - Docetaxel (Taxotere®)
  - Abraxane™
- **VINCA ALKALOID CLASS:** (mitosis)
  - Vincristine (Onkovin®)
  - Vinorelbine (Navelbine®)
- **PLATINUM COMPOUNDS:** (cell cycle)
  - Cisplatin (Platinol®)
  - Carboplatin (Paraplatin®)
  - Oxaliplatin (Eloxatin®)
CLINICALLY IMPORTANT CHEMOTHERAPY SIDE EFFECTS

1. Myelosupression
   - decreased blood and platelet counts
2. Cardiotoxicity
   - toxic injury to cardiac muscle
3. Cancer Related Fatigue
   - physiological and disproportionate to activity levels
4. Chemo Induced Peripheral Neuropathy
   - toxic injury to peripheral nerves including vestibular nerve
5. Cachexia
   - >5% body weight loss in 6 months
6. Chemo Induced Cognitive Impairment

INFLAMMATORY CYTOKINES CROSSING THE BBB
The BBB keeps most things "out", but not quite everything!

POTENTIAL MECHANISMS OF CHEMO-INDUCED COGNITIVE IMPAIRMENT

- Inflammatory Cytokines
  - Neurotoxic injury as a result of direct injury to neurons
  - Altered levels of neurotransmitters
  - DNA damage and subsequent oxidative stress
- Mechanisms that cause direct ischemia
  - Results in Cerebral white or gray matter microvasculature obstruction
  - Saykin, Ahles, & McDonald, 2003; Wefel et al., 2004; Ahles & Saykin, 2007
  - Ahles & Saykin; Chen, Jungsawadee, Vore, Butterfield, & St. Clair, 2007
Peripheral Inflammatory Cytokines pass through the BBB and have a direct effect on the Brain.

Ischemia - Imaging Before and After Chemo

- Reductions in white and gray matter volume and density
- Frontal hypo – as well as hyperactivity during memory-related cognitive tasks
  - Wieseler-Frank et al., 2005; Hutchinson et al., 2012; O'farrell et al., 2013
  - "While these changes in brain volume and activity improve over time after cessation of treatment, subtle changes are still apparent years into survivorship”
  - Jounai et al., 2012

The Frontal Region of the Brain

- The most significant effects of chemotherapy are for executive function, memory, and processing speed, all of which involve frontal regions of the brain
  - Cleeland et al., 2003; Jones et al., 2013; Seren & et al., 2014
CODING, DOCUMENTATION, AND BILLING

IS THERE GOOD REASON AND VALIDITY FOR CICI EVALUATION IN TREATMENT IN THE ONCOLOGY PATIENT POPULATION?

VALIDATION OF THE IMPORTANCE OF CICI INTERVENTION IN PATIENT MANAGEMENT

• In 2012, the American College of Surgeon’s Commission on Cancer (CoC) released the Cancer Program Standards 2012, Version 1.2. – Ensuring Patient-Centered Care

• By 2015, all Commission on Cancer–accredited institutions will need to have a process in place for the development and delivery of survivorship care plans."

IN THE CoC DOCUMENT....

• E11: Rehabilitation Services –

• A policy or procedure is in place to access rehabilitation services either on-site or by referral to community based facility

• Rehabilitation services help patients cope with activities of daily living affected by the cancer experience and enable them to resume normal activities
ACCEPTED ICD-9 CODES

- Cognitive deficits 784.60
- Difficulty remembering words 784.3
- Word retrieval difficulties 784.3
- Difficulty with word meaning 784.3
- Difficulty processing information 784.3
- Difficulty following directions 784.3
- Difficulty expressing thoughts 784.3 or 310.8
  - Mild memory disturbance – organic brain damage 310.8
- Difficulty remembering tasks 310.1 or 310.8

CPT CODES

- 96125 Standardized cognitive performance testing
  - (e.g., Ross Information Processing Assessment) per hour of time, both face-to-face time and time interpreting test results and preparing the report $118.22
- 97532 Development of cognitive skills to improve attention, memory, problem solving
  - Includes compensatory training, direct (one-on-one) patient contact by the provider, each 15 minutes $27.31
- 97533 Sensory integrative techniques to enhance sensory processing and promote adaptive responses to environmental demands
  - Direct (one-on-one) patient contact by the provider, each 15 minutes $29.47
- 97535 Self-care/home management training
  - (e.g. activities of daily living and compensatory training, meal preparation, safety procedures, and instructions in use of assistive technology devices/adaptive equipment) direct one-on-one contact by provider, each 15 minutes $35.21

MAC - Medicare Administrative Contractors. These are private organizations that carry out the administrative responsibilities of Traditional Medicare (Parts A and B)
- Except for CPT 97532, SLPs’ appropriate use of the 97000 series codes should be verified with the MAC

FUNCTIONAL REPORTING – G CODES

- ATTENTION G-CODE SET
  - G9165 Attention functional limitation, current status at therapy episode outset and at reporting intervals
  - G9166 Attention functional limitation, projected goal status at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G9167 Attention functional limitation, discharge status at discharge from therapy or to end reporting
- MEMORY G-CODE SET LONG DESCRIPTOR SHORT DESCRIPTOR
  - G9168 Memory functional limitation, current status at therapy episode outset and at reporting intervals
  - G9169 Memory functional limitation, projected goal status at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  - G9170 Memory functional limitation, discharge status at discharge from therapy or to end reporting
SEVERITY MODIFIERS TO GO WITH G-CODES

- CH 0 percent impaired, limited or restricted
- CI At least 1 percent but less than 20 percent impaired, limited or restricted
- CJ At least 20 percent but less than 40 percent impaired, limited or restricted
- CK At least 40 percent but less than 60 percent impaired, limited or restricted
- CL At least 60 percent but less than 80 percent impaired, limited or restricted
- CM At least 80 percent but less than 100 percent impaired, limited or restricted
- CN 100 percent impaired, limited or restricted

DOCUMENTATION EXAMPLE (MEDICARE)
UNDERLINED STATEMENTS ARE YOUR KEY DOCUMENTATION ELEMENTS

- BRCA patient Stage 3 receives Cytoxan and Taxol Chemotherapy Drug regimen
- Cachexia and deconditioning compromises their physical and cognitive function
  - Their safety and judgment is critical. Their reasoning and ability to adapt to new learning is essential for the future life style
- Through evaluation and Standardized Cognitive Testing it is determined that this person has verbal (word finding) and visual memory deficits
- SLP be involved to either slow the progression and/or adapt the environment

DOCUMENTATION IN SINGLE SLP SCENARIOS

- ICD-9 Codes – Treatment Diagnosis
  - Cognitive deficits 784.60
  - Word retrieval difficulties 784.3
  - Difficulty processing information 784.3
  - Difficulty following directions 784.3
- CPT Codes – Evaluation and Treatment Performed
  - 96125 Standardized cognitive performance testing - per hour
  - 97532 Development of cognitive skills to improve attention, memory, problem solving - per 15 min (Medicare 8 min rule)
- Functional G – Codes
  - G9168 Memory functional limitation, current status - CK
  - G9169 Memory functional limitation, projected goal status – CJ
  - G9170 Memory functional limitation, discharge status – CI
- Severity Modifiers
  - CK – 40-60%
  - CJ – 20-40%
  - CI – 1-20%
NEW MILD COGNITIVE IMPAIRMENT ICD–9 331.83

USED IN MULTIDISCIPLINARY SCENARIO

• Physical Therapy is treating someone for a gait disturbance, following weakness and deconditioning secondary to chemotherapy
  • If MCI is determined through objective testing of a SLP, the addition of 331.83 (MCI) to 781.2, Abnormality of Gait or 719.7, Difficulty in Walking, presents support to planning for safety, judgment, ability to adapt/learn new things

• Occupational Therapy in the same scenario (chemotherapy), would be treating self-care and home management
  • If MCI is determined by SLP, the addition of MCI would allow for intervention for grocery shopping planning, communication of needs, phone skills, and visual memory in regards to safety

• Speech Language Pathologist in the same scenario. Their safety and judgment is critical. Their reasoning and ability to adapt to new learning is essential
  • If it is determined that this person has verbal (word finding) or visual memory deficits (MCI), it is essential that SLP be involved to either slow the progression and/or adapt the environment

DOCUMENTATION IN MULTIDISCIPLINARY SCENARIO

• ICD–9 Codes – Treatment Diagnosis
  • 719.7 Difficulty Walking
  • 781.92 Postural Abnormality
  • 728.87 Weakness
  • Mild Cognitive Impairment 331.83

• CPT Codes – Evaluation and Treatment Performed
  • 96125 Standardized cognitive performance testing – per hour
  • 97532 Development of cognitive skills to improve attention, memory, problem solving – per 15 min (Medicare 8 min rule)

• Functional G – Codes
  • G9168 Memory functional limitation, current status – CK
  • G9169 Memory functional limitation, projected goal status – CJ
  • G9170 Memory functional limitation, discharge status – CI

• Severity Modifiers
  • CK – 40–60%
  • CJ – 20–40%
  • CI – 1–20%

THANK YOU!
WWW.ONCOLOGYREHAB.NET
WWW.ONCOLOGYREHAB.INFO
Alterations in brain structure and function in breast cancer survivors: effect of post-chemotherapy interval and relation to oxidative DNA damage

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