Cancer and Cognitive Functioning: Strategies for Improvement

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Cognitive Functioning after Cancer

- Location of cancer
  - Brain
  - Organ with effects on brain functioning
  - All others (e.g., breast)

- Treatments
  - Surgery
  - Radiation Therapy
  - Medication or Chemotherapy
Medications in Cancer – Type of Agents

- Three general types
  - Chemotherapy – target cancer cells
  - Biological response modifiers (immunotherapies)
  - Hormone Tx
    - Common in breast and prostate cancer
- Not highly specific – can affect healthy tissues
Treatment Outcome in Cancer

- Focus on
  - Survival time
  - Time to disease progress
  - Remission
  - Cure

- Side effects – treatment toxicities
Cancer Treatment Side Effects

- Historically focused largely on physiological symptoms, like:
  - Nausea
  - Appetite loss
  - Fatigue
  - Vomiting
  - Decreased blood cell counts - anemia
  - Hair loss
  - Pain

- More recent focus on quality of life
  - Satisfaction
  - Neurocognitive functioning
“Chemobrain”

- Does it exist?
- If yes, what’s its etiology?
- What kinds of cognitive problems arise?
- How long does it last?
- What to do about it!
“Chemobrain”
Hurricane Voices Study

- Online survey - *Hurricane Voices Breast Cancer Foundation 2007*
- 471 respondents (majority with breast cancer)
- 98% reported changes in cognitive abilities during or after cancer treatment
- Of survivors, 5 or more years after completion of chemotherapy
  - 92% reported persistent difficulties with cognitive functioning

- Majority of respondents reported problems in:
  - Concentration – hard to maintain focus
  - Mental multitasking
  - Speed of mental processing – things take longer
  - Short-term memory
  - Planning and organization

- Most (62%) reported symptoms severe enough to adversely affect:
  - Everyday functioning (work, education, etc.)
  - Relationships
What Does the Research Say?

- Across other studies, self-reported cognitive difficulties in persons receiving chemotherapies have varied greatly: but up to 90%

- Is it all just chemotherapy?

- Yes and no……

- Its typically *multifactorial!*
  - Several factors can influence a persons cognitive functioning
  - *Biopsychosocial model*
The Biopsychosocial Model

- Biological Factors
- Psychological Factors
- Social Factors

Cognitive Functioning
It’s Not that Easy

Cognitive Functioning

- Chemotherapy?
- Cancer Condition
- Environmental Demands
- Emotional Functioning
- Sleep / Fatigue Problems
- Other Medications
- Age / Baseline Ability Level
- Other Medical Conditions

Other Medical Conditions
Cancer Condition
Environmental Demands
Emotional Functioning
Sleep / Fatigue Problems
Other Medications
Age / Baseline Ability Level
Other Medical Conditions
The Complexity of It All – Cancer Effects

- Cancer-related cognitive dysfunction
  - Cognitive declines may be present:
    - At time of cancer diagnosis
    - Before start of chemotherapy
  - Examples – cognitive testing before chemotherapy
    - Women with breast cancer: 11 to 35% had cognitive dysfunction
    - Pts with small cell lung cancer: 70-80% deficits in memory functioning (Meyers et al, 1995)
    - Acute myelogenous leukemia (AML): 41-44% deficits in memory functioning (Myers et al., 2005)

- Possible Reasons:
  - Inflammation processes
  - Autoimmune mechanisms
  - Other medications
    - E.g., pain medications
  - Emotional functioning / fatigue
The Complexity of It All – Emotional Functioning / Fatigue

- Emotional Factors:
  - Depression
  - Anxiety
  - Grief
  - Anger
  - Reduced Frustration Tolerance

- Fatigue – physical / mental

- Underscores the need for comprehensive assessment
The Complexity of It All – *Chemotherapy Effects*

- Best studies are those that:
  - Compare pre-chemotherapy and post-chemotherapy findings: longitudinal-prospective studies
  - Use objective measures of cognitive functioning – neuropsychological tests
  - Use good comparison groups
The Complexity of It All – *Chemotherapy Effects*

- **Wefel et al (2004)** – one of the first prospective studies on chemotherapy
  - Early stage breast cancer survivors
  - Measurement: pre; 3-weeks post; 1-year post
  - Findings:
    - Pre-chemo (baseline):
      - 33% showed impairment
    - 3-weeks post treatment:
      - 61% showed evidence of decline in one or more cognitive areas
    - 1-year post:
      - 50% with initial decline improved
      - Rest remained stable – i.e., ~30% showed continued declines
  - No relationship with depression or anxiety at either time point

- **Updated prospective study by Wefel et al (2010) on breast cancer survivors**
  - Pre-treatment:
    - 21% showed cognitive dysfunction in at least one cognitive domain (e.g., memory)
  - During or shortly after treatment
    - 65% showed decline from pre-treatment status
  - 1-year post baseline; nearly 8 months post chemo completion
    - 61% showed decline from their acute status
      - Of these individuals:
        - 29% demonstrated new onset decline – not present acutely
    - In the vast majority (94%), only one cognitive domain was affected
    - Improvement from acute to late testing was rare
The Complexity of It All – Chemotherapy Effects

- Other pre-to-post breast cancer treatment studies:
  - Acute decline: 20% to 50% of patients
  - Long-term: 13% to 34% show long-term cognitive declines; though sometimes not greater than controls

- Across other forms of non-brain cancer results for relationship between chemotherapy and cognitive functioning have varied
  - For example:
    - Small cell lung cancer study (Whitney et al; 2008)
      - 62% showed some form of cognitive decline 1 month after chemotherapy
      - At 7 months post chemotherapy nearly total resolution for most
    - Review of advance prostate cancer studies – hormone therapy (Nelson et al; 2008)
      - 9 studies from 2002 to 2006: nearly all with small sample sizes
      - Compared pre-treatment to 6 to 12 months post-treatment
      - Conclusions:
        - 47% to 69% of men showed “subtle but significant declines” in one or two domains (e.g., memory), but not across all cognitive domains.
The Complexity of It All – *Chemotherapy Effects*

- Reason for the variation in findings across studies on chemotherapy
  - Type of cancer
  - Chemotherapy agents
  - Different measurement instruments used
  - Definition of cognitive decline
    - How much of a “decline” is a “decline”
  - Number of people in the studies / different patient demographics (e.g., education level)
Chemotherapy Effects: Typical Measured Cognitive Problems

- Most frequent areas of demonstrated decline
  - Learning and memory
  - Speed of mental processing
  - Executive functioning
    - Cognitive flexibility
    - Problem solving
    - Verbal fluency (response initiation and organization)

- Often the degree of decline is mild
  - But may not be proportional to effect on functional status – e.g., home or work setting demands
Chemotherapy Effects: Mechanisms

- **Chemotherapy agents can vary:**
  - By level of neurotoxicity
  - Central nervous system effects: different vs. indirect mechanisms / pathways

- **Direct potential mechanisms – brain cellular function / neurotransmitters**
  - Metabolic changes causing inflammatory reactions that injure nerve cells
  - Oxidative stress
  - Anemia – decrease oxygen to the brain
    - Occurs at a high rate in persons treated with chemotherapy
  - Microvascular injury in the brain
    - White matter may be especially vulnerable
  - Effects on nerve cell generation – e.g., suppression of neurogenesis in hippocampus

- **Indirect potential mechanisms:**
  - Effects on other organs that can affect brain functioning
    - E.g., liver or kidneys
  - Fatigue
  - Psychiatric symptoms
    - E.g., increases in depression shown with interferon alpha for treatment of leukemia
Chemotherapy Effect: Risk Factors

- Exposure to higher doses of drug
- Multi-agent chemotherapy
- Longer duration of exposure to drug
- Intrathecal administration – injection into the spinal canal
- Other medications often prescribed
  - Steroids
  - Pain medications (e.g., opioids)
  - Anti-emetics – anti-nausea medications
- Genetic risk factors
What Can You Do?
What to do?

- First step:
  - Tell your doctor!
- There may be reversible causes – need to sort out the factors
- For example:
  - Medication changes to less cognitive interfering ones
  - Medication for sleep / sleep study?
  - Medication to improve energy level
  - Examination of blood counts – e.g., anemia, vitamins
  - Treatment for pain
  - Treatment for depression / anxiety
What helps in day-to-day life?

- **Mind set**
  - Be mindful of difficulties – but try to “normalize” them
  - It’s going to take more effort!
  - Self-efficacy – I can make a difference (cognitive re-structure)

- **Lifestyle changes**
  - Get organized!
    - Establish consistent daily routines
      - Regular wake and sleep time
      - Meal time
      - Routine activities
    - Have a central (or “hub”) place for essential, routinely used items (e.g., keys, wallet, purse, mobile/smart phone)
More Lifestyle Changes!

- **Time management**
  - Plan daily or weekly schedule ahead of time – write out a check list
  - Estimate how long a given activity will take
  - Prioritize activities - what’s essential to get done
  - Check off activities as they are completed
  - Adjust schedule if unexpected problems arise – look at activity priorities
  - Check over list at the end of day – adjust next day schedule

- **Establish good habits**
  - Exercise – get okay from medical providers
    - Positive effects on mood and cognition
  - Good nutrition
  - Watch alcohol consumption
Even More Lifestyle Changes - Dealing with Fatigue

- Cancer-related fatigue
  - One the most commonly reported and stressful symptoms in persons with cancer
  - Prevalence rates vary – 50% to 99% (higher with chemotherapy)
  - May last for years posttreatment

- Trying to function at an acceptable level --
  - But at a greater cost
  - Mental – physical fatigue

- Combating fatigue – what to do:
  - Check with your physician
    - Any medical problems other than cancer / tx -- e.g., sleep disturbance, anemia
    - Medications to increase energy
  - Nonpharmacological strategies
    - Exercise – if medically cleared
      - E.g., take short walks / light exercise
    - Pace yourself during the day
      - Take breaks when you can, even if not yet overly fatigued
    - Be flexible – task schedule, work schedule
    - Do important tasks when you have the most energy
    - Delegate – i.e., get help for tiring tasks
  - Nutrition
  - Manage sleep
    - To nap or not to nap? – that is the question!
      - Catnap versus long nap
Improving Cognitive Functioning Directly – What Works?

- Restoration vs. compensation
  - Restoration – make improvements in our natural cognitive abilities
    - Brain / mental exercising
      - Sprouting / re-organization
      - Generalization?
    - Medication

- Compensation
  - Focus is on lessoning the interference of cognitive problems in performing daily tasks
  - Develop internal and external strategies for enhancing cognitive abilities
  - Goal is to improve ability to perform given tasks and overall day-to-day functional status
Managing Attention Problems

- Get into the habit of telling yourself to focus
  - Much easier said than done – takes effort!!
  - Being mindful
- Keep distractions to a minimum when doing complex tasks -- e.g.,
  - Quiet please!
  - Remove clutter from desk
  - Unplug the phone
  - Perform the task away from computer (if it's not involved)
- Complete only one task at a time - avoid multitasking
- Divide complex tasks into small steps
- Control the pace of performance or the speed of incoming information – if possible
  - E.g., Take planned rest breaks
Compensating for memory problems

- Memory functioning -- stages
  - Acquisition
  - Storage
  - Retrieval
- Breakdown can occur at any of the stages
- Strategies can be applied for each stage
Compensating for memory problems: strategies by stages

- **Acquisition**
  - Focus attention – minimize distractions
  - Make sure you understand info
  - Ask for info to be given slower or repeated

- **Storage / Retrieval**
  - Mentally rehearse information
  - Organize information
  - Link to something meaningful
  - Use mnemonic strategies
  - Written / Computerized Compensatory Strategies
Compensating for memory problems – the memory book!

- Memory book = daily planner = daytimer
- Use one central memory book
  - *Avoid the sticky approach*
  - Smart phone versus written daytimer
    - Smart phone → task initiation alarms!

- What to put in
  - Daily schedule – e.g., appts., to-do-list
  - Check off space
  - Summary of important conversations
    - E.g., Family members, new medical info, care providers, co-workers

- *Remember to remember* to use your memory device!

- Other strategies:
  - Pill box for medications
  - Memory board in one location – e.g., kitchen
What Helps – Improving Emotional Functioning

- Stress management
  - Self-help books on relaxation
  - Join a meditation / yoga class
  - Identify and prioritize stressors
    - Put the immediate fires out!
    - Problem solve – accept

- Pleasurable activities

- Exercise

- Treatment if necessary
  - Psychotherapy / Medication
What Else To Do?

- Seek neuropsychological evaluation – if cognitive problems persist and especially if:
  - Day-to-day functional status is being affected (e.g., work performance)
  - Difficulties seem to be worsening over time
    - Of course - consult with your physician!

- Neuropsychological evaluations help to”
  - Determine the type and degree of problems
  - Disentangle factors affecting cognitive functioning
  - Can help to indicate your ability to engage in certain activities, like work
    - ****Provides info on both weaknesses and strengths****
  - Provides a road map for treatment
Neuropsychological Evaluation

- Objective measurement of cognitive strengths and weaknesses across:
  - Attention / Memory / Communication / Problem Solving / Reasoning / Mental processing speed
- Emotional / Personality / Behavioral Changes
- Role of historical/other factors, e.g.,
  - Baseline cognitive capabilities
  - Learning deficiencies
  - Medications
- Prescribe treatment options/program to improve functioning
Formal Neuro-Rehabilitation Treatment

- Cognitive Rehabilitation
  - Often by Speech Therapy
- Physical Therapy
- Occupational Therapy
- Psychotherapy
- Vocational Rehabilitation
- Recreational Therapy
- MD Rehab Consultation
UW Study on Improving Cognitive Functioning

- CARES study
  - Currently enrolling cancer patients
  - 7-Week group based workshops designed to improve your memory and thinking abilities

- Call 206-667-7930
- Or email wellness@uw.edu
- Website: www.depts.washington.edu/wellness
Thanks!