‘Chemo-Brain’ or Getting Older?
(does it matter??)

Making the Most of Your Brain-Power

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What to Know, What to Do

1. What is ‘chemo-brain’?
   - How do people describe it?
   - How do we understand it?

2. What do we know from research?

3. What are your options to improve brain power?
What to Know

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What People Say after Transplant

- I’m doing fine, but I know my brain doesn’t work as well. I saw my good friend in the grocery store and know his name as well as my own. I knew who it was and I just couldn’t get his name out of my head.

- I do fine in the morning but then by 2:00 or 3:00 I just crash, it’s like I need a time out at work. In the past I could work for 12 hours straight, now I just can’t.

- I manage a big department, people interrupt me all the time and it never bothered me, I’d just answer questions and go back to my work. Now I have to close the door to concentrate, and if I’m interrupted, I have to start over with what I was working on.

- If I don’t write it down I don’t remember – is it cancer or is it getting old?
Common Concerns

- Memory: acquire and retrieve
- Attention, screening out distractions
- Speed of information processing
- Executive functions [Multi-tasking]
  - Planning and organizing
  - Trial and error reasoning
  - Complex attention
Memory: Acquisition & Retrieval

• Visual memory

• Verbal memory
  – Acquisition
  – Recall
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Summary of Cancer and Cognition

• Chemotherapy-related cognitive dysfunction: 13-78%

• Persists in a subgroup of patients: 17-34%

• Mostly mild, subtle effects
Hypothesized Mechanisms

Mechanisms being examined:

- Inflammatory cytokine dysregulation: chronic elevations → ‘sickness behavior’ (fatigue, lethargy, decreased libido, increased sleep, aches and pains, reduced cognitive function)
- Changes in the hormones (cortisol, estrogen, etc.)
- Oxidative stress
- DNA damage and compromised DNA repair
- Genetic susceptibility: APOE e4 allele, COMT
- Decreased brain blood flow or disruption of the blood-brain barrier, oxygen to the brain
- Decreased telomere length
- Cell senescence
- Reduction in gray or white matter volume
Brains of Twins Doing a Memory Task:
top twin had breast cancer, bottom twin had no cancer

Robert Ferguson, PhD, Eastern Maine Medical Center
Brain structural change seen 1 year after BMT in gray matter volume.

Not associated with neurocognitive test results or self-report of problems.
Executive Function

Syrjala et al. JCO, 2011, 29:2397
Global Function Score
5 Years after BMT

Score ≥ 0.5: (mostly mild problems)

- 42% of survivors
- 20% of controls
  - $P < .0001$

Syrjala et al. JCO, 2011, 29:2397
Combining results of published studies, no significant change in cognitive function from before to after BMT

Phillips et al. *BMT*, 2013

- Long-term deficits may not be a result of transplant conditioning
  - Disease effects
  - Conditioning prior to transplant
  - GVHD and its treatment

- **Cognitive reserves**: risks are based on the accumulation of factors rather than any specific treatment
What to Do

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What to Do

• What to do first:
  – Write down a plan, put it where you see it

• Change what you can:
  1. Reversible things
  2. Mindset – Lifestyle
  3. Self-Help Strategies

• Cognitive Rehabilitation if problems disrupt your ability to function
Step 1 – Fix Reversible Things

- Talk to your doctor about what is fixable
- Reversible changes:
  - Change Medication
    - Find meds with less cognitive impact, or stop meds you don’t need
  - Sleep
    - Stop sleep meds gradually
    - Do a sleep study to find out your specific issues
  - Blood counts – anemia, vitamin deficiencies
  - Treat pain or other symptoms
  - Treat depression / anxiety
  - Face fatigue, improve energy
Step 2 – Face Fatigue

- Check with your health care provider, fix what you can
- Lifestyle strategies
  - Exercise
  - Pace yourself during the day
    - Take breaks, don’t wait till you can’t function
    - Face your reality: schedule important things when you have the most energy
  - Delegate – get help for tiring tasks
  - Eat for your brain!
  - Manage sleep, lot’s of tips online
Step 3 – Manage Mindset

– Be aware of difficulties

– Avoid “catastrophizing”
  (being hard on yourself)
  “what an idiot!” “I’ll never be the same, it’s hopeless!”

– It may take more effort than you wish

– Talk to yourself, be nice, relax
  “OK, take a few seconds, deep breath, switch gears for a minute to get back on track”
Step 3a – Improve Emotional Functioning

- Stress management: find balance
  - Self-help books on relaxation and stress management
  - Join a class
  - Meditation / yoga

- Pleasant activities: make time every day!

- Treatment if needed
  - Psychotherapy / Medication
Step 4 – Organize, 3 Ps: Prioritize, Plan, Pace,

• Organize

  • Have a central place for essential
    – Basket by the door?
    – Keys, wallet, purse, mobile/smart phone

  • Have consistent daily routines
    – Regular wake and sleep time
    – Meal time

• PRIORITIZE: what matters most?
Step 4 – Organize, 3 Ps: Prioritize, Plan, Pace,

– Plan

• Write a daily or weekly schedule
  – Prioritize tasks
  – Make a check list to track plans and accomplishments

• Allow time enough!

• Adjust schedule if unexpected problems arise
  – Remember priorities

• Check the list at the end of day
  – Adjust next day schedule if needed
Step 4 – Organize, 3 Ps: Prioritize, Plan, Pace,

– Pace (with pleasant activities)
  • Exercise
    – Positive effects on mood and cognition
    – Positive effects on heart and health
  • Good nutrition
  • Watch alcohol other drugs
  • Manage sleep / fatigue
  • Pleasant activity EVERY DAY!
Step 5 – Cognitive Rehab

• Guided practice on specific tasks
  – Attention, memory, executive functioning (flexibility)

• Can be computer-based or delivered by a therapist
  – Computer-based
    • Lumosity
    • Brain HQ: Posit Science

• Requires repetition
  – up to 50-60 sessions; 15-90 minutes per session
Step 5 – Cognitive Restoration

Computer program brain training

- Some recent studies suggest they help

Cognitive and Rehabilitation:

- Individual, group formats
- Effective in adapting to limits
- Not clear if it changes brain function, but new studies suggest it could
Managing Attention Problems

• Be more mindful on what needs to be done in the moment
  – Much easier said than done – takes effort!!

• Distractions to a minimum when doing complex tasks
  – Quiet please sign
  – Remove clutter from desk
  – Turn phone to silent
  – Perform the task away from computer (if its not involved)

• One task at a time - avoid multitasking
  – Give yourself enough time to complete each task

• Divide complex tasks into small steps

• Take planned rest breaks
Compensating for Memory

Acquisition
- Focus attention – minimize distractions
- Make sure you understand, make sure it gets into your brain
- Ask for information to be given slower or repeated

Storage / Retrieval
- Mentally repeat information
- Organize information
  - Any underlying themes
  - Link to something meaningful
  - Learn ‘mnemonic’ strategies
    - Acronyms
    - Easy to remember phrases
      (1st letter represents a word on the target list)
- Write down, keep on phone/computer
- Build skill with computer programs
Computer Brain Games

Worth a try?

Brain Training That Works

brainHQ from Posit Science

Real science to believe in

lumosity.com
Cognitive Rehab

• **Multiple Components:**
  – Learned about memory and attention;
  – Taught self-awareness
  – Self-regulation
    • Reduce arousal with relaxation training
  – Activity scheduling and pacing
  – Cognitive compensation strategies
Cognitive Rehab

- Think less catastrophically about memory failures and think more creatively to adapt to and overcome problems.

- Daily record of memory failures to help them identify environmental factors, such as noise, and internal factors, such as hunger or fatigue, that could affect their ability to store information in memory.

- Tools, such as verbally rehearsing and visualization, to compensate for the verbal part of the brain that might have been affected by cancer treatment.

- Quote: “Every time I ran into a word or name I couldn’t remember, I would relax, and almost every time, the word would pop into my mind,” “When I couldn’t remember, instead of getting frustrated, I just told myself it didn’t matter, and the word came to me.”

- Management skills.

Robert Ferguson, PhD, MAAT Program
Exercise & Cognitive Retraining

- Exercise increases the number of cells in the brain
- Cognitive training can drive those new cells to wire into the brain network and become functional.
- 48-session program over 12 weeks
- Used online cognitive training with Lumosity
- Results: improved cognitive flexibility, verbal fluency and processing speed

(Kesler *Clinical Breast Cancer*, 2013)
Putting It All Together:
Change what you can, Adapt where you can’t

1. Fix medication, medical factors that you can
2. Face Fatigue  
   ➢ Pace activities to your best time of day or after a break  
   ➢ Exercise: reduce fatigue, build brain cells
3. Manage Mindset  
   ➢ Mood  
   ➢ Relaxation, meditation, stress management  
   ➢ Decrease frustration and catastrophizing
4. Organize, Plan, Pace, Prioritize!
   ➢ Memory notebook (everything in one place)  
   ➢ Calendar, daily planner (smart phone?)  
   ➢ Habits, everything in the same place all the time  
   ➢ Sleep: 7-9 hours, regular habits  
   ➢ Reduce distractions, focus on one task at a time
5. Cognitive Restoration  
   ➢ Use computer programs: Lumosity, Brain-HQ Posit Science  
   ➢ Monitor, Pace, Schedule cognitive activities  
   ➢ Neuropsychological evaluation and cognitive rehab if needed