

Concussion Management

- ▶ May 21, 2025
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Roadmap

Understanding
the Brain Injury

Symptoms of
Concussion

Interactions
and Functional
Impact

Concussion
Management

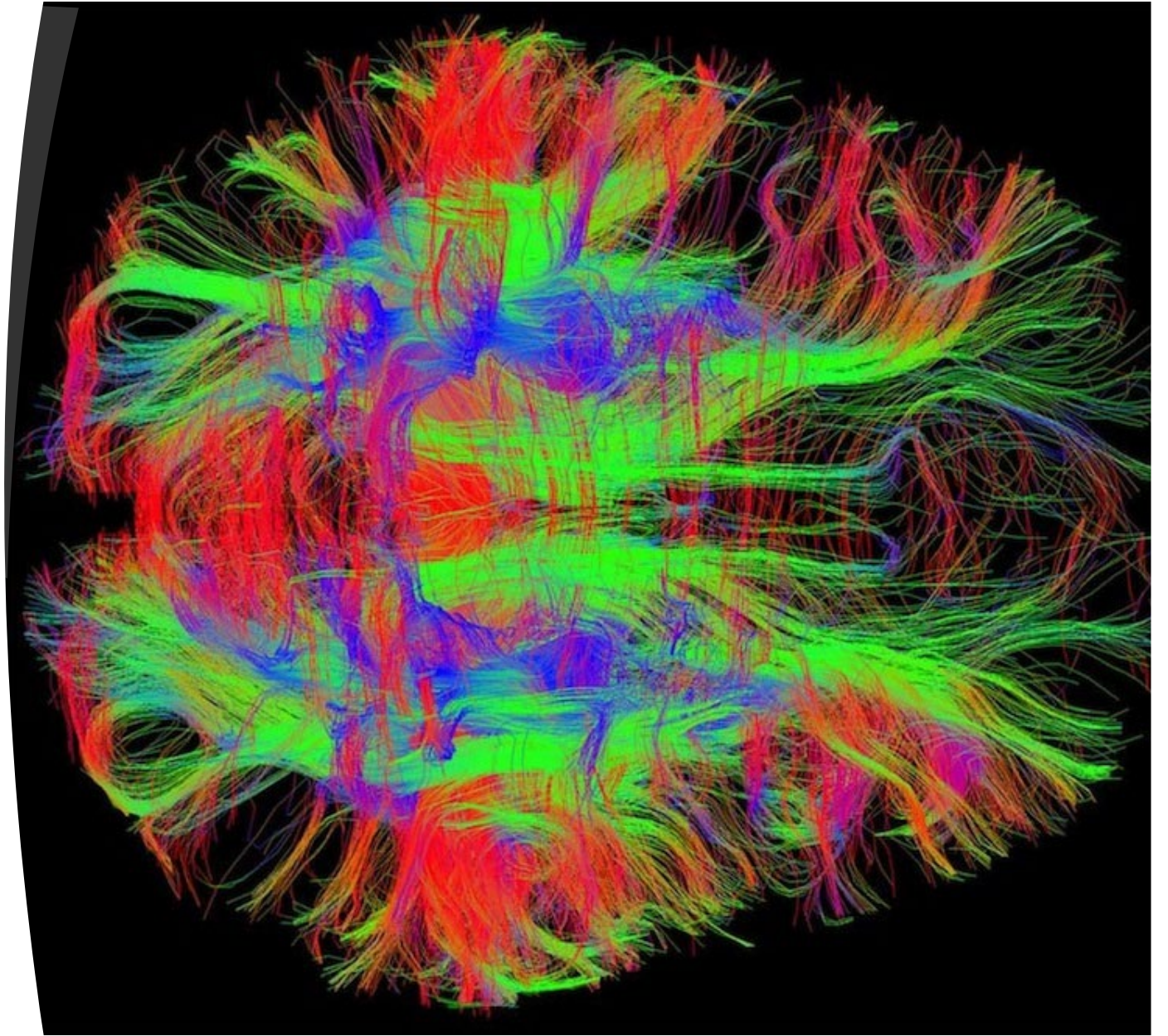
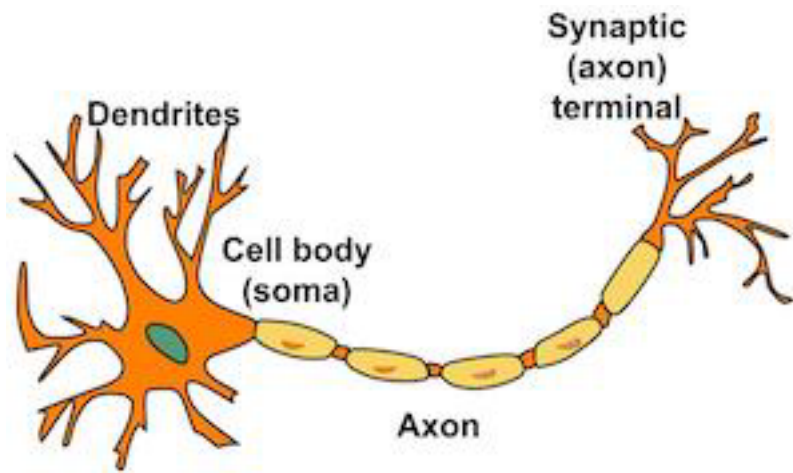
Outside
Referral
Sources

Understanding the Injury

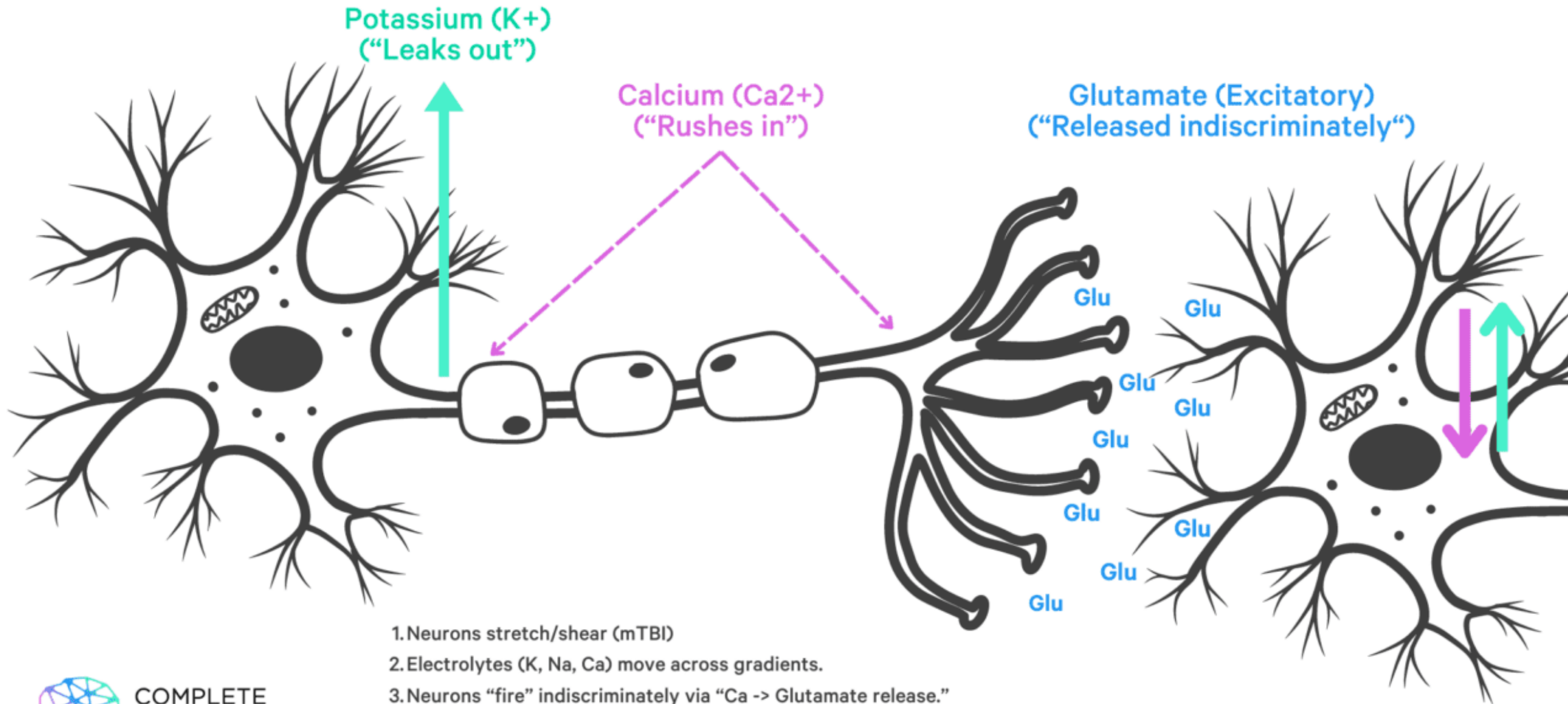


- ▶ A concussion is a traumatic brain injury
- ▶ And should be taken seriously
- ▶ Concussions occur when your brain moves suddenly inside your skull and is shaken from the force
 - ▶ Direct hit to your head or body
 - ▶ Falls, collisions, sport-related injuries
- ▶ This movement strains, stretches or breaks the neurons in your brain
 - ▶ Damaged neurons leak and cause chemical imbalance
 - ▶ Communication pathways are disrupted
 - ▶ Less energy produced and more energy needed
 - ▶ Cellular damage too small to show up on CT / MRI

Neuronal Pathways



The Neurometabolic Cascade of Concussion.



1. Neurons stretch/shear (mTBI)
2. Electrolytes (K, Na, Ca) move across gradients.
3. Neurons "fire" indiscriminately via "Ca -> Glutamate release."
4. Energy deficit results from restoring electrolyte gradient.



COMPLETE
CONCUSSIONS

Energy Crisis

- ▶ Decreased Energy Production
 - ▶ Decreased blood flow – less energy-rich nutrients
 - ▶ Neuronal leaks damage mitochondria
 - ▶ Mitochondria generate energy within our cells
- ▶ Increased Energy Demand
 - ▶ Broken neurons need more energy to communicate
 - ▶ Healing and repair requires more energy
 - ▶ Resources deplete faster and recharge slower



Symptoms of Concussion

Cognitive

- ▶ Feeling mentally “foggy”
- ▶ Feeling slowed down
- ▶ Difficulty concentrating
- ▶ Difficulty remembering
- ▶ Forgetful of recent information
- ▶ Confusion
- ▶ Answers questions slowly
- ▶ Repeats questions

Physical

- Headache
- Nausea
- Vomiting
- Balance problems
- Visual Problems
- Sensitivity to light and noise
- Dazed
- Stunned

Sleep

- Difficulty falling asleep
- Drowsiness
- Sleeping more than usual
- Sleeping less than usual

Emotional

- Irritability
- Sadness
- More emotional
- Nervousness

Executive Functioning

Attentional Control

Working Memory

Shifting Attention

Cognitive Flexibility

Cognitive Organization

PRIMARY SYMPTOMS

- Headaches
- Sensory Sensitivities
- Energy Crisis
- Sleep Disturbance
- Impaired Cognitive Functioning



SECONDARY SYMPTOMS

- Activities Limited
- Irritability
- Withdrawal, Isolation
- Fatigue, Mental Fogginess, Low Energy
- Inefficiency
- Overwhelmed by Workload
- No Free Time
- Increased Stress

Secondary Symptoms of Concussion

Impact of Symptoms on Student's Life

Activities

- Reduced participation in meaningful activities
- Low energy
- Triggers headaches
- Told to rest/take it easy

Relationships

- Miss seeing friends during group activities (sports/hobbies/school)
- Self-isolate due to irritability
- Avoid crowded places
- Try to focus on "more important tasks"

Anxiety/depression symptoms

- Frustrated by prolonged symptoms
- Overwhelmed by workload

Sleep Disturbances

- Can't sleep due to stress
- Want to stay up to work
- Cycles of fatigue

The Road to Recovery

- ▶ Most children and teens return to baseline level of functioning within 1-month
- ▶ Some people experience a prolonged recovery known as Post Concussive Syndrome (15 – 30 %)
- ▶ Risk Factors for Prolonged Recovery From Concussion
 - ▶ History of Learning disability / Academic difficulties
 - ▶ Involvement in demanding activities/programs
 - ▶ Prior history of ADHD
 - ▶ Anxiety/Depression
 - ▶ Social or Family Stress
 - ▶ Prior history of concussion or brain injury



Frustrating Cycle of Concussion

- ▶ Concussion Management Strategies
 - ▶ Rest, avoiding crowds, limiting physical activity, limiting cognitive activity
 - ▶ Also impacts: social engagement, behavioral activation, workload, stress
- ▶ Increased Anxiety/Depression
 - ▶ Exacerbated by increased academic stress, decreased social engagement and physical activity
 - ▶ Impacts sleep; Impacts cognitive activity
- ▶ Difficulties with executive functioning
 - ▶ Exacerbated by increased anxiety/depression and decreased sleep
 - ▶ Increase time needed to complete work
 - ▶ Increased stress, decrease time spent in other activities (including sleep)

How to Help Your Students

- ▶ Understand cycle of symptoms of concussion
- ▶ Help parents / teachers / students understand concussion
- ▶ Listen to Students and validate their experiences
- ▶ Provide places to rest and take a break when needed
- ▶ Help students identify and develop concrete strategies they can use to help promote recovery
- ▶ Identify students in need of higher level of care
- ▶ Help facilitate referrals



The Energy Crisis Lens

- Anything that was hard or stressful before is harder and more stressful now
- Key to Recovery is in Balancing the Energy Equation
 - Improve Efficiency at the Outset
 - Increase Structure in all forms
 - Organized Delivery of New Information
 - Controlled Rate
 - Build – in Reminders and Prompts
 - Notes
 - Checklists
 - Verbal Cues
 - Decrease Demands
 - Physical and Cognitive
 - Increase time for Rest
 - Support Mental Health



Concussion Management Strategies

Start

Start Small but Start Somewhere

- Frustration leads to big jumps in physical and cognitive activity
- Difficult to tolerate
- Symptoms Spike

Increase

Gradually increase activity

- Modify workload,
- provide accommodations for cognitive challenges,
- Add in Study Class
- Modify Schedule
- Provide Breaks

Balance

Increase time spent in meaningful activities

- Prioritize friendships and social activities,
- increase time doing things that are important to the student
- be intentional

Concussion Management Strategies

- ▶ Target Sleep – melatonin, nighttime routine, sleep training, relaxation
- ▶ Work more efficiently – increase organization and planning
- ▶ Improve Mood: relaxation, coping strategies, behavioral activation
- ▶ Reassurance – You will get better

Stage	Activity	Objective
No activity	Complete cognitive rest- no school, no homework, no reading, no texting, no video games, no computer work.	Recovery
Gradual reintroduction of cognitive activity	Relax previous restrictions on activities and add back for short periods of time (5-15 minutes at a time).	Gradual controlled increase in subsymptom threshold cognitive activities.
Homework at home before school work at school	Homework in longer increments (20-30 minutes at a time).	Increase cognitive stamina by repetition of short periods of self-paced cognitive activity.
School re-entry	Part day of school after tolerating 1-2 cumulative hours of homework at home.	Re-entry into school with accommodations to permit controlled subsymptom threshold increase in cognitive load.
Gradual reintegration into school	Increase to full day of school.	Accommodations decrease as cognitive stamina improves.
Resumption of full cognitive workload	Introduce testing, catch up with essential work.	Full return to school; may commence Return-to-Play

Return to learning

MASTER CL. PEDIATRIC
ANNALS 2012.

- ▶ Early phase- 1-3 weeks (80-90%)
 - ▶ “Academic adjustments”
 - ▶ Non-formalized- except in a letter to the school
 - ▶ No major changes in curriculum or testing
- ▶ Middle phase- 3 weeks to months (5-10%)
 - ▶ “Academic accommodations”
 - ▶ Testing arrangements, extra time, reduced work
 - ▶ Formalized in 504 plan
- ▶ Late phase- long term (1-5%)
 - ▶ “Academic modification”- potentially permanent changes
 - ▶ Formalized in IEP

Adjustments for return to school

Identifying Students in Need of Higher Level of Care

- ▶ Symptoms have persisted for longer than 4 weeks
- ▶ Symptoms are significantly impacting academic performance
- ▶ Anxiety and Depression Symptoms are noticeable
- ▶ Student has withdrawn from typical activities and relationships
- ▶ Symptom recovery has plateaued despite accommodations
- ▶ Headaches are severe and prohibitive

Where to Refer

- ▶ Outside Referral Options
 - ▶ Sports Medicine
 - ▶ Return to Play decisions, education on concussion, symptom monitoring
 - ▶ Psychology
 - ▶ Assist with sleep management, anxiety/depression, stress management, relaxation
 - ▶ Neuropsychology
 - ▶ Comprehensive cognitive evaluations, assist with development of IEP/504 plans, provide education about concussion and help develop strategies for recovery
 - ▶ Biofeedback
 - ▶ Helps manage headaches and pain, helps with relaxation

Resources

- ▶ CDC Head's Up Program
www.cdc.gov/TraumaticBrainInjury/coachestoolkit.html
- ▶ REAP guidelines, Karen McAvoy
www.rockymountainhospitalforchildren.com/service/concussion-management-reap-guidelines
- ▶ Brain Injury Association of Washington
www.biawa.org
- ▶ AAP School recommendations following concussion
www2.aap.org/sections/schoolhealth/returntoschool.pdf
- ▶ “Big Hits, Broken Dreams”-Sanjay Gupta documentary on You Tube



Good Reads

- ▶ Halstead ME, McAvoy K, Devore CD. Clinical report--Return to learning following a concussion. *Pediatrics*. 2013;132(5):948-57.
- ▶ Master C, Giola G, Leddy J, Grady M. The importance of "return-to-learn" in pediatric and adolescent concussion. *Pediatric Ann*. 2012;41(9):1-6.
- ▶ McAvoy K. Return to learning: going back to school following a concussion. *Communique*. 2012;40(6):23-25.

Thank You!

Reach Out

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