

## Dr. Hiten Lad

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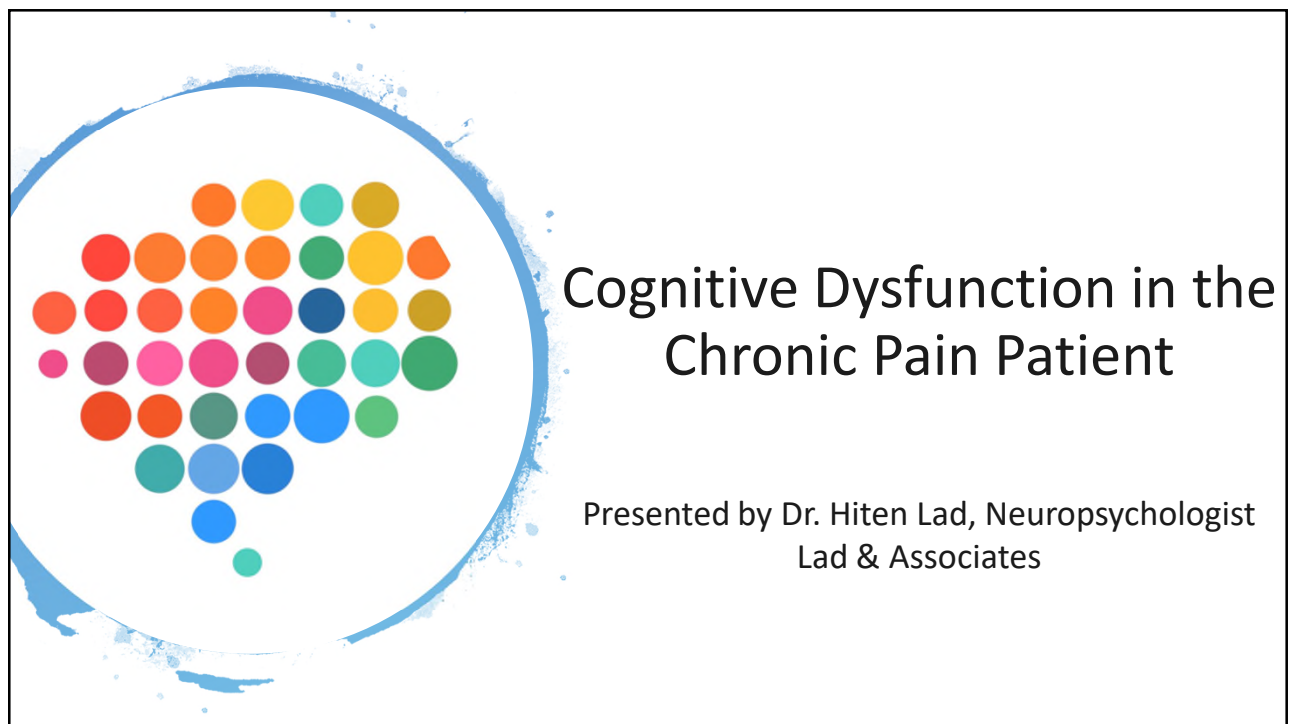
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Dr. Hiten Lad is a well-respected registered psychologist practicing in the areas of clinical psychology and clinical neuropsychology for adults and seniors for the past 16 years. He is listed with the Canadian Register of Health Service Providers in Psychology and is the Practice Director and Owner at Lad & Associates. Lad & Associates is a full-service boutique mental health care practice, with locations in Toronto, Waterloo and Prince Edward County, providing clinical neuropsychological and psychological assessments and treatment.

Dr. Lad received his Honours B.A. in Psychology and Kinesiology and Health Sciences from York University in Toronto. He obtained his Masters degree in Counselling Psychology, specialized training in trauma therapy, and a Doctorate in Clinical Psychology with a specialization in Neuropsychology from the Adler School of Professional Psychology in Chicago. Dr. Lad completed his residency in clinical neuropsychology at Hamilton Health Sciences with specific training in acquired brain injury, pediatric neuropsychology, geriatric neuropsychology, acute stroke and rehabilitation, as well as adult general neuropsychology.

Dr. Lad also held a position as a neuropsychologist in the Acquired Brain Injury Program at Hamilton Health Sciences from 2006-2015 where he was involved in assessment, treatment, clinical supervision, as well as research. He was also a coordinator and one of the clinical supervisors in the Canadian Psychological Association Accredited Neuropsychology Pre-Doctoral Residency training program at Hamilton Health Sciences from 2006-2015. Furthermore, Dr. Lad held an Assistant Clinical Professor (Adjunct) position in the Department of Psychiatry and Behavioural Neurosciences at McMaster University from 2006-2015. Moreover, Dr. Lad worked for 4 years in a Commission on Accreditation of Rehabilitation Facilities (CARF) accredited specialized interdisciplinary chronic pain management program where he developed knowledge about understanding and working with the chronic pain population.

Dr. Lad has been qualified as an expert by the Financial Services Commission of Ontario (FSCO) Arbitration Hearing and License Appeal Tribunal. He is a Certified Catastrophic Impairment Evaluator through the Canadian Academy of Psychologists in Disability Assessments / Canadian Society of Medical Evaluators. He also served on the Board of Directors for the Brain Injury Society of Toronto (BIST) for 6 years. Finally, Dr. Lad was awarded the Healthcare Provider of the Year for 2019 in the area of brain injury rehabilitation by the Ontario Brain Injury Association (OBIA).



# Cognitive Dysfunction in the Chronic Pain Patient

Presented by Dr. Hiten Lad, Neuropsychologist  
Lad & Associates



## Chronic Pain & Cognitive Impairment

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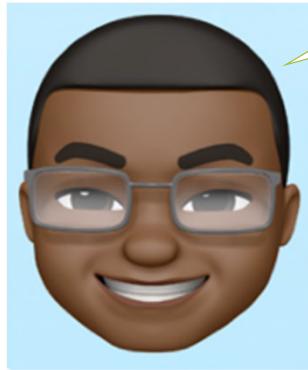
- Pain is a multidimensional experience that includes sensory discrimination, emotional motivation, and cognitive evaluation interacting with each other (Treede et al., 2019).
- Research has shown that chronic pain (CP) has many adverse outcomes, such as mood disorder, daily functional loss, lower quality of life, and higher costs of health (Saraiva et al., 2018).
- Another critical problem sometimes reported by people with CP is cognitive impairment (CI).



## Chronic Pain & Cognitive Impairment

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- CI has been reported to significantly impact medical compliance, workability, interpersonal interaction, ability to perform ADLs, and quality of life.
- Purpose of this presentation is to try to better understand what the research tells us about the connection between CP and CI to better inform how we can help our clients.



“I am &@\*\$#!”



## Challenges in Clinical & Research Settings

- Not enough clinical or research attention given to the problem of cognitive impairment in pain. Possible reasons include misattribution to:
  - Sleep difficulties
  - Co-morbid depression, anxiety
  - NPA not as easily available in most pain clinics
  - Patients do not report such problems when the focus of consultations is pain itself
  - Thought to be a by-product of mental strain of having pain
  - Side effect of medication to treat pain
  - Age related changes



## Challenges In Clinical & Research Settings

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- Biggest challenge was evaluative method of cognition remained various, making it difficult for researchers to conduct clinical trials or meta-analyses.
- When you look at the research regarding whether CP has any impact on cognitive functioning, most of the information suggests that it does.
- There is some research that does not show a correlation; however, most researchers agree that likely reasons for this are differences in the pain and cognitive assessment methods used (Chen et al., 2023).



## Challenges In Clinical & Research Settings

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- CI is not well documented or assessed in clinical settings in patients with chronic pain.
  - Lack of cognitive testing that occurs.
  - Limited information provided about the impact of CI on daily activities.
  - DSM V does not speak about CI with Somatic Symptom Disorder With Predominant Pain – therefore CI are never captured properly.



## Common Cognitive Impairments with CP

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- Research shows that chronic pain (CP) is commonly associated with neuropsychological (NP) impairments in the areas of:
  - Attention (sustained attention, selective attention, working memory)
  - Processing Speed (the speed with which a cognitive operation is performed)/ Psychomotor Speed (the speed in which tasks with a motor component are performed)
  - Learning & Memory
  - Executive Functioning (organizing/planning, cognitive flexibility, inhibitory control)



## Important Factors Determining if CP Will Contribute to CI

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- It is not the intensity or location of pain.
- Research shows that cognitive complaints in CP patients are more closely related to emotional distress than to sensory-discriminative (e.g., severity and location) aspects of pain.
- CI in people with CP has been associated with mood changes and emotional distress and with symptoms and clinical features such as increased somatic pre-occupation, sleep disturbance, fatigue, and perceived interference with daily activities that are potential sources of chronic stress (Hart et al., 2003)



## Important Factors Determining if CP Will Contribute to CI

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- Chronic stress related to emotional distress frequently accompanies chronic pain. Emotional distress is related partly to specific symptoms:
  - sleep disturbance
  - mood change because of the restrictions in daily activities, disruptions in preferred role functions, losses of sources of satisfaction and reinforcement, and changes in one's sense of identity and self-esteem (Hart et al., 2003).



## Relationship Between CP & CI

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- The exact relationship between CP & CI is not known.
- Current research has not established a causal relationship.
- Current understanding is that there is correlation between CP & CI.



## Potential Mechanisms for Cognitive Impairment in CP Patient

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### 1) Cognitive Resource Competition Hypothesis

Patients with CP have difficulty adequately diverting attention and memory resources away from pain-related sensations, feelings, and thoughts, leaving fewer cognitive resources for other concurrent cognitive processes.



## Potential Mechanisms for Cognitive Impairment in CP Patient

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### 2) Altered Neural Network Activity & Structural Changes in the Brain

- Default Mode Network (posterior cingulate/precuneus, the medial prefrontal cortex, the medial temporal lobes, inferior parietal lobes) – controls cognitive functions such as WM, decision-making, & attention allocation.
- Research shows that overactivation in the DMN may account for poor performance on attention allocation & WM (Chen et al., 2023).





## Potential Mechanisms for Cognitive Impairment in CP Patient

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### **2) Altered Neural Network Activity & Structural Changes in the Brain**

- Loss of gray matter volume in the hippocampus, amygdala, medial prefrontal cortex, insular cortex, thalamus, & dorsolateral prefrontal cortex (Shi, et al., 2016).
- The gray matter atrophy is not caused by neuronal loss but by changes in neuronal organization that is reversible with effective treatment of chronic pain (Rodreguez-Raecke et al., 2009).



## Potential Mechanisms for Cognitive Impairment in CP Patient

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### **3) Overactivation of Microglia and Neuroinflammation**

- Research has shown that activated microglia (immune cell in the CNS) and neuroinflammation play a key role in the occurrence and maintenance of chronic pain (Loggia et al., 2015 & Sideris-Lampretsas & Malcangio, 2021).
- Activation of microglia is protective for the brain.
- Overactivation of microglia cells triggers a cascade of responses to generate neurotoxicity and deposits of amyloid and tau proteins and then cognitive decline (Chen et al., 2023).



## Potential Mechanisms for Cognitive Impairment in CP Patient

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### **4) Psychosocial Variables**

- It is widely accepted that individual with CP often co-exist with psychosocial variables such as depression, anxiety, poor social environment, and sleep disturbances.
- Depression, sleep disturbances and little social interaction are known risk factors for cognitive impairment (Livingston et al., 2020).



## Potential Mechanisms for Cognitive Impairment in CP Patient

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### **5) Altered Intestinal Flora**

- There is increasing evidence accumulating that the composition of the gut microbiome (the system of microorganisms in a person's gastrointestinal system) changes in individuals with various types of chronic pain (Shoskes et al., 2016; Minerbi et al., 2019; Freiden et al., 2021; Sanchez Romero et al., 2021).
- Gut microbial products and their metabolites contribute to local or systemic inflammatory responses, thus inducing or exacerbating pain (Sanchez Romero et al., 2021).



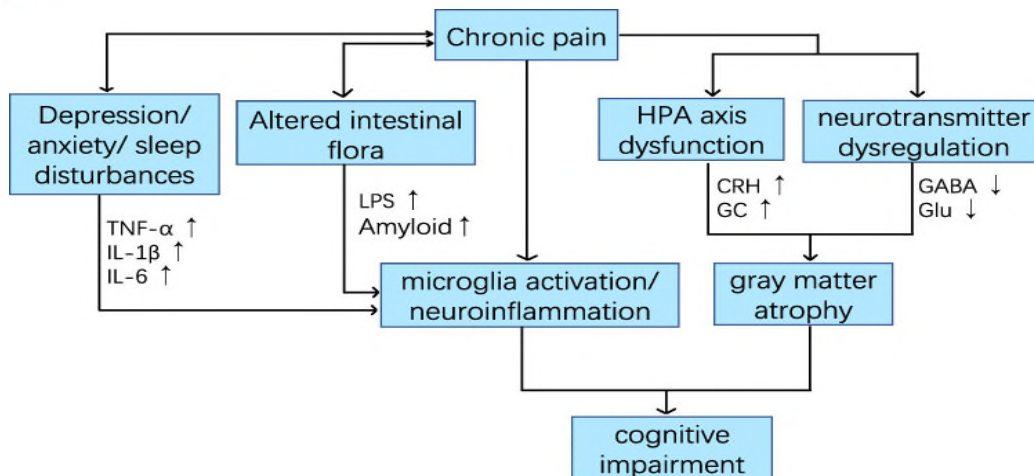
## Potential Mechanisms for Cognitive Impairment in CP Patient

### 5) Altered Intestinal Flora

- The gut microbiota has recently emerged as important contributors to homeostasis & dysfunction with the CNS (Zhu et al., 2020).
- Therefore, researchers believe the role of altered gut flora in cognitive decline cannot be ignored, as it may mediate and/or further accelerate CI in patients with CP.



## Potential Mechanisms for Cognitive Impairment in CP Patient (Chen et al., 2023)





## Therapeutic Implications of These Underlying Mechanisms for Comorbidity CP & CI

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### **Psychological Interventions**

- Most common is CBT which involves restructuring maladaptive beliefs, attitudes and behaviours that contribute to disease burden.
- Studies have shown that CBT is likely to work by reducing stress in patients with CP, thereby reducing the activation of the altered networks and downstream negative effects of this activation (Eller-Smith, Nicol, & Christianson, 2018).



## Therapeutic Implications of These Underlying Mechanisms for Comorbidity CP & CI

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### **Inhibition of Microglia Overactivation**

- While currently there are no approved medications available, there are clinical trials exploring microglial modulation.



## Therapeutic Implications of These Underlying Mechanisms for Comorbidity CP & CI

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### **3) Improvement of Intestinal Flora**

- Researchers suggest that lifestyle interventions such as diet, exercise, & sleep may improve the composition of the gut microbiota, thereby alleviating various chronic widespread pain conditions and improving quality of life (Gonzalez-Alvarez et al., 2023).
- So people with CP can try make appropriate lifestyle changes such as increasing intake of prebiotics and probiotics, engaging in regular exercise and practice healthy sleep hygiene may help address cognitive decline.



## Current Challenges

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When working with CP patients, CI are not well documented or assessed.



## What can we do?

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Various Rehabilitation Disciplines can better document and assess.

Multi-disciplinary approach to address all the various factors associated with CI in CP and reducing the associated chronic stress and emotional distress.



## Cautionary Note with CP & mTBI

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- When there is CP with comorbid diagnoses of mTBI, be aware to not misattribute CI to mTBI after 6-12 months post-injury.



Thank you