



Early Brain  
and Biological  
Development and  
Addiction, UME

Podcast Series:

INTRODUCTION

- 1 The Neuro-Developmental Pathway Origins of Addiction

CORE CONCEPTS OF EARLY CHILD DEVELOPMENT

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ADDICTION

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## PODCAST 1: The Neuro-Developmental Pathway Origins of Addiction

STUDY GUIDE | Run time 18:11, Released September 2012

*The Neuro-Developmental Pathway Origins of Addiction* is the first in a series of podcasts on early brain and biological development and its connection to addiction. As such, it introduces the themes that will be addressed throughout the series, including adverse childhood experiences; brain architecture; the neuro-developmental origins of addiction; and the prevention, intervention and treatment of addiction. The podcast provides a definition of addiction, which includes substance and process addictions, and begins to explore the impact of adverse childhood experiences on the reward system of the brain. The podcast series has been designed to offer a quick introduction to the subject of early brain and biological development and its connection to addiction. Each podcast links specific medical learning objectives with emerging research. Several podcasts also follow the story of Dr. Ray Baker, a physician who has struggled with addiction, to help illustrate the key concepts addressed.

The Association of Faculties of Medicine of Canada (AFMC) created the podcast series based on lectures from the Alberta Family Wellness Initiative, a knowledge mobilization initiative designed to translate scientific research into policy and practice. The lectures have been repurposed, with permission, for undergraduate medical education. Supplementary resources, including virtual patients and a Primer on the Neurobiology of Addiction, are also available on [www.afmc.ca](http://www.afmc.ca).

### Learning Objectives:

Once you have listened to this podcast, you should be able to:

- Describe the fundamental definition of addiction and the two primary types of addiction
- Understand that childhood and adolescent adversity can lead to lower stress tolerance and increase the likelihood of addiction development later in life (through self-soothing behaviours, self-medication)
- Explain how positive and trusting relationships between an infant and caregiver can build healthy brain circuitry in the child
- Describe how the cognitive, social-emotional and reward systems of the brain are sensitive during early development and maturation
- Understand the importance of recognizing addiction as a chronic, relapsing disease of brain reward and motivation circuitry

### Featured Subject Matter Experts:

This podcast features excerpts from the following lectures:

- [Stress and Neurobehavioral Development in Childhood](#)  
*Dr. Megan Gunnar, Professor of Child Development, University of Minnesota*
- [Stress and Parental Care: Intergenerational Transmission of Parenting Abilities](#)  
*Dr. Linda Mayes, Arnold Gesell Professor of Child Psychiatry, Pediatrics, and Psychology, Yale Child Study Center, Yale School of Medicine*
- [Risk, Resilience, and Gene-Environmental Interplay in Primates](#)  
*Dr. Stephen Suomi, Chief of the Laboratory of Comparative Ethology, National Institute of Child Health and Human Development*

Listeners are encouraged to learn more about the subject matter through their interactions with patients, research and by checking out the AFWI lecture series available at [www.albertafamilywellness.org](http://www.albertafamilywellness.org).



## Key Learning Points:

- Addiction is defined as a primary, chronic disease of brain reward, motivation, memory and related circuitry; it can refer to a substance-related addiction and behavioural or process-related addiction
- Addiction is a relapsing brain disease and not simply a failure of will
- Early childhood adversity appears to result in lowered stress tolerance and heightened stress reactivity in adulthood, and this can set the ideal environmental conditions for the development of addiction
- There are sensitive periods during early development and maturation when the architecture and chemistry of the reward systems in the brain can be changed and damaged
- Positive and trusting relationships between an infant and caregiver—known as secure attachment—confer resiliency to the young

## Reflective Questions:

1. Does what you have learned about the role that early experiences and genetic risk can play in the architecture and chemistry of the reward systems in the brain influence your attitude toward individuals with addiction?
2. In your role as a medical student or practising physician, how would you assist or advocate for patients with addiction in your practice? How important would you deem the rapport, relationship and continuity of care you establish with your patients?
3. In a family practice setting, do you think that what you have learned about positive and negative influences altering brain development in the early years could be integrated into family wellness programs?

## Acknowledgements

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## Preparing for your exams...

### Medical Council of Canada (MCC) Objectives for the Qualifying Examination (excerpt):

**103 ADDICTIONS/SUBSTANCE ABUSE Rationale:** Addiction may be to substances or may be a process (behavioral) addiction. Alcohol and nicotine abuse are such common conditions that virtually every clinician is confronted with their complications. Addiction to prescription drugs and to other substances is prevalent in all communities and is a common cause of medical morbidity and mortality.

**Causal conditions:** 1. Substance use: a. Stimulants, b. Depressants, c. Other substance; 2. Process (behavioral) addictions (e.g., gambling); 3. Adverse childhood or traumatic experiences; 4. Epigenetic changes **Key objectives:** Given a patient with an addiction or a substance abuse problem, the candidate will be able to identify the issue, potential consequences and the need to provide immediate and continuing support and intervention. (Source: [MCC Objectives for the Qualifying Examination: 103 Addictions/Substance Abuse](#))

Other relevant objectives:

### [36 GENETIC CONCERNS](#)

### CanMEDS-FMU Undergraduate Competencies from a Family Medicine Perspective

(excerpt):

#### 2. THE FAMILY MEDICINE COMMUNICATOR

2.5. The learner will be able to carry out a patient-centred interview that will include the following:

2.5.7. Explores patients' personal history and context including their family and other important relationships, occupation, socioeconomic status, support systems and spiritual aspects. (Source: *CanMEDS-FMU Undergraduate Competencies from a Family Medicine Perspective: 2. The Family Medicine Communicator*)

#### 5. THE FAMILY MEDICINE HEALTH ADVOCATE

5.5. The learner will be able to describe the attributes of a population they have worked with or are working with and will be able to identify the initial steps on how to work with this population to improve its health. (Source: *CanMEDS-FMU Undergraduate Competencies from a Family Medicine Perspective: 5. The Family Medicine Health Advocate*)

**ADDICTION**, adverse childhood experience, **MEDICAL EDUCATION**, Substance Addiction, **ALCOHOL**, stress, child development, Chronic Disease, process addiction, **Behavioural Addiction**, **BRAIN ARCHITECTURE**