



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

- 2 **Brain Architecture and Development**
- 3 Early Experiences and Gene Expression
- 4 Building Cognitive Emotional and Social Capacities
- 5 Positive, Tolerable and Toxic Stress
- 6 Brain Plasticity and Behavioural Change
- 7 Intervention and Treatment in Children's Mental Health

ADDICTION

- 8 Different Kinds of Addiction
- 9 Prevention, Intervention and Treatment of Addiction
- 10 Early Trauma in Addiction
- 11 Chronic Disease Management Model of Addiction Treatment: A Healthcare System Response
- 12 Quality Improvement Strategies and Evaluation for Addiction Treatment Programs
- 13 Process Improvements in Healthcare Programs to Support Addiction Treatment

Listen to this Podcast

on AFMC.ca



PODCAST 2: Brain Architecture and Development

STUDY GUIDE | Run time 12:45, Released September 2012

Podcast 2, *Brain Architecture and Development*, highlights how the brain develops; the effect of early experiences and stress on brain development; how brain architecture regulates biological systems responsible for complex human behaviours; and how social interactions help guide development 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. In 10 to 15 minutes, 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.

Learning Objectives:

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

- Describe how the brain develops in an orderly and predictable fashion: some circuits mature earlier than others and are required to form a firm foundation on which later circuits can build
- Recognize how either negative social experiences, or the absence of positive social experiences, can derail brain development
- Understand that early positive social experiences help construct a solid foundation of brain architecture, e.g., the serve and return of parent–infant interactions foster healthy brain architecture
- Identify the parts of brain architecture that control the ability to interact with the outside world and create homeostatic balance in the body

Featured Subject Matter Experts:

This podcast features excerpts from the following lectures:

- [Brain Development and Early Behaviours](#)
Dr. Judy Cameron, Scientific Research Council, University of Pittsburgh
- [Early Genetic and Environmental Factors Impacting the Reward and Motivation System](#)
Dr. Pat Levitt, Director of Zilkha Neurogenetic Institute, University of Southern California, Keck School of Medicine

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.

BRAIN ARCHITECTURE, toxic stress, Reward Circuitry, GENE, epigenetic, amygdala, Hippocampus, PREFRONTAL CORTEX, Homeostatic Balance, ADVERSE CHILDHOOD EXPERIENCES



Key Learning Points:

- Simple brain circuits must be successfully created in order to provide a strong base or scaffold for the more advanced circuits and skills that develop later
- As different areas of the brain develop, various functions become possible, and as the brain matures, these skills grow more sophisticated
- Both positive and negative early social experiences leave lasting signatures on an individual's genes
- Certain parts of the brain are particularly important in regulating emotions and how individuals perceive and interact with the outside world
- These areas of the brain include the reward circuitry, which involves the amygdala, the hippocampus and the prefrontal cortex

Reflective Questions:

1. In your role as a medical student or practising physician, how would you integrate and apply what you have learned about brain development?
2. How could you integrate what you have learned about brain development when obtaining the personal history and identifying important relationships of a patient with an addiction? Could this be done in a safe and non-judgemental way?
3. How do you think children who have been subjected to early toxic stress might present? How would you assist or advocate for children who have been subjected to early toxic stress?
4. In a family practice setting, can you think of proactive initiatives to increase awareness about healthy brain development and to support maternal, family and child health?

Acknowledgements

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Preparing for your exams...

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

74 PERIODIC HEALTH EXAMINATION (PHE) Rationale: The periodic health examination (PHE) represents an opportunity for the prevention or early detection of health-related problems. The nature of the examination will vary depending on the age, sex, occupation, and cultural background of the patient. **Conditions to consider based on patient age:** 2. Infant and child: b. Abuse/neglect **Key objectives:** Given a patient presenting for a PHE, the candidate will determine the patient's risks for age and sex-specific conditions to guide the history, physical examination, and laboratory screening. (Source: [MCC Objectives for the Qualifying Examination: 74 Periodic Health Examination \(PHE\)](#))

Other relevant objectives:

[31-2 FAILURE TO THRIVE \(INFANT, CHILD\)](#)

[36 GENETIC CONCERNS](#)

[71-1 CRYING OR FUSSING CHILD](#)

[103 ADDICTIONS/SUBSTANCE ABUSE](#)

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*)

6. THE FAMILY MEDICINE SCHOLAR

6.4. [The student will] Find appropriate resources

6.5. and integrate the new knowledge in family medicine settings. (Source: *CanMEDS-FMU Undergraduate Competencies from a Family Medicine Perspective: 6. The Family Medicine Scholar*)