McGill | Department of Epidemiology, Biostatistics and Occupational Health

EPIDEMIOLOGY

EPIDEMIOLOGY SEMINAR / WINTER 2019

THE DEPARTMENT OF EPIDEMIOLOGY, BIOSTATISTICS AND OCCUPATIONAL HEALTH, - SEMINAR SERIES IS A SELF-APPROVED GROUP LEARNING ACTIVITY (SECTION 1) AS DEFINED BY THE MAINTENANCE OF CERTIFICATION PROGRAM OF THE ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF CANADA

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A Picture Tells a Thousand… Exposures: Opportunities and Challenges of Deep Learning Image Analysis in Exposure Science and Environmental Epidemiology

MONDAY, 11 FEBRUARY 2019 / 4:30 pm – 5:30 pm

Strathcona Anatomy & Dentistry Building

3640 University Street, Room 2/36 – Directions from Purvis Hall

ALL ARE WELCOME

ABSTRACT:

Background: Artificial intelligence (AI) is revolutionizing our world, with applications ranging from medicine to engineering. **Objectives:** This lecture will discuss the promise, challenges, and probable data sources needed to apply AI in the fields of exposure science and environmental health. In particular, we focus on the use of deep convolutional neural networks to estimate environmental exposures using images and other complementary data sources such as cell phone mobility and social media information.
Discussion: Characterizing the health impacts of multiple spatially-correlated exposures remains a challenge in environmental epidemiology. A shift toward integrated measures that simultaneously capture multiple aspects of the urban built environment could improve efficiency and provide important insights into how our collective environments influence population health. The widespread adoption of AI in exposure science is on the frontier. This will likely result in new ways of understanding environmental impacts on health and may allow for analyses to be efficiently scaled for broad coverage. Image-based convolutional neural networks may also offer a cost-effective means of estimating local environmental exposures in low and middle-income countries where monitoring and surveillance infrastructure is limited. However, suitable databases must first be assembled to train and evaluate these models and these novel approaches should be complemented with traditional exposure metrics. **Conclusions:** The promise of deep learning in environmental health is great and will complement existing measurements for data-rich settings and could enhance the resolution and accuracy of estimates in data poor scenarios. Interdisciplinary partnerships will be needed to fully realize this potential.

OBJECTIVES

1. Introduce common approaches to environment exposure modelling;
2. Highlight how deep convolutional neural networks may be used in exposure science;
3. Discuss probably data sources to implement these methods in environmental health.

BIO:

Dr. Weichenthal is an Assistant Professor in the Department of Epidemiology, Biostatistics, and Occupational Health at McGill University in Montreal, Canada. His research program is dedicated to identifying and evaluating environmental risk factors for chronic diseases such as cancer and cardiovascular disease. To support this objective, Dr. Weichenthal develops new approaches to population-based exposure assessment and examines how the urban built environment influences environmental exposures at both the individual and population-level.