Using structural causal models to identify biases in standard epidemiological analyses.

In this talk, I will give a quick overview on Structural Causal Models, and in particular on the so-called ignorability condition and the back-door criterion.

I will then present how these tools can be used to quickly identify selection bias in standard epidemiological analyses, with examples ranging from the « obesity paradox »  to the estimation and interpretation of hazard ratios in survival analysis. In the the last and main part of my talk, I will focus on the situation, which is quite common in practice, where the true causal model involve time-varying exposures, but these exposures are measured once only, typically at the inclusion in the study.  I will consider two cases: when the available data correspond to (i) « instantaneous levels » of exposures and (ii) some summary measure of exposure levels up to inclusion. I will show that biases generally arise in either case. These results raise the need for the availability of repeated measurements and/or the development of sensitivity analyses when such data is not available. This is joint work with Lola Etievant (Univ. Lyon).