

# SÉMINAIRE DE L'AXE MÉDICAMENT ET SANTÉ DES POPULATIONS

## No causality in – no causality out: utility and limits of machine learning in drug safety research



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à l'invitation de la professeure Mireille Schnitzer

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Machine Learning (ML) methods are gaining increasing popularity in drug safety studies using large observational databases. Applications include the identification of risk factors for critical health outcomes under certain treatment conditions and the classification of patients into risk strata to optimize individual treatment recommendations and health outcome surveillance over the course of treatment. Risk-modifying factors can be invariant characteristics of an individual but also time-dependent exposures. A particular threat are unintended drug-drug interactions that are difficult to model using conventional data analysis approaches (e.g. risk regression models) due to the complex time-dynamic nature of multiple drug exposures.

In my talk I will show examples on how Machine Learning approaches can be used to help identifying potential risk predictors in complex data settings and illustrate how marginal predicted outcomes can be used to compute associational effect measures. I will demonstrate limitations of ML approaches in situations where the temporal order of input information (predictor candidates) is ignored and collider stratification bias will render estimated variable importance and associated effect estimates invalid proxies for their causal counterparts.