**Exercises - Day 1 - Workshop on Dose-Response Meta-Analysis**

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**Group 2: Continuous outcome**

**Intended Learning Outcomes:**

* Read and describe individual patient data from multiple studies
* Read and describe aggregated data from multiple studies
* Estimate and interpret a linear trend model in each study
* Perform and interpret a meta-analysis of linear trends
* Conduct statistical inference (test, confidence) about the summary dose-response
* Present graphically the estimated summary dose-response function

**Part I: Meta-analysis of linear trend estimated on individual data**

Let’s consider 12 clinical trials investigating the association between Omega-3 Index and a cognitive score. Age is not considered an important confounding factor as it is believed to be unrealted with Omega-3 Index. The dataset contains stacked individual data for the 12 studies with the following variables:

* *id*: identifier of the study
* *x*: Omega-3 Index as a percentage
* *y*: continuous cognitive score (higher is better)
* *c*: binary variable for age (1 = older vs 0 = younger)
* *z*: study-level characteristic (a = Short duration of omega-3 supplement, b = Prolonged omega-3 supplement, c = Schizoaffective patients)

**Questions**

1. Describe the main features of the individual data, in particular the exposure and outcome distributions.

1. Create a table with the study-specific linear trend coefficients and standard error for the exposure-outcome association suitable for conducting a meta-analysis.

1. Present the study-specific estimates of the linear trends using a forest plot and/or the estimated summary dose-response function. Write the findings for the result section of an hypothetical review paper.

**Part II: Meta-analysis of linear trend estimated on aggregated data**

Let’s consider aggregated dose-response data derived from the individual patient data of the 12 studies analyzed in part I of the lab. The dataset contains the following variables:

* *id*: identifier of the study
* *xcat*: categories of Omega-3 Index
* *dose*: assigned Omega-3 Index value representative of the exposure category
* *n*: total number of subjects for each exposure category
* *mean\_y*: mean cognitive score for each exposure category
* *sd\_y*: standard deviation of cognitive score for each exposure category
* *e\_b*: mean difference
* *e\_se*: estimated standard error of mean difference
* *e\_lb*: lower 95% confidence interval bound of mean difference
* *e\_ub*: upper 95% confidence interval bound of mean difference
* *type*: type of outcome type (md or 4 = mean difference)
* *z*: study-level characteristic (a = Short duration of omega-3 supplement, b = Prolonged omega-3 supplement, c = Schizoaffective patients)

**Questions**

1. Describe the main features of the aggregated data, in particular th exposure and outcome distribution.

1. Create a table with study-specific estimated regression coefficients and estimated standard error suitable for conducting a meta-analysis.

1. Present the study-specific estimates of the linear trends using a forest plot and/or the estimated summary dose-response function. Write the findings for the result section of an hypothetical review paper.
2. Comment main differences between the main results obtained from the individual and the aggregated data.