LOADING

Airborne Threats: Forecasting DNA Damage Across Seasons

Predictive Modelling of Genotoxicity Biomarkers in Response to Air Pollution Exposure Across Seasons
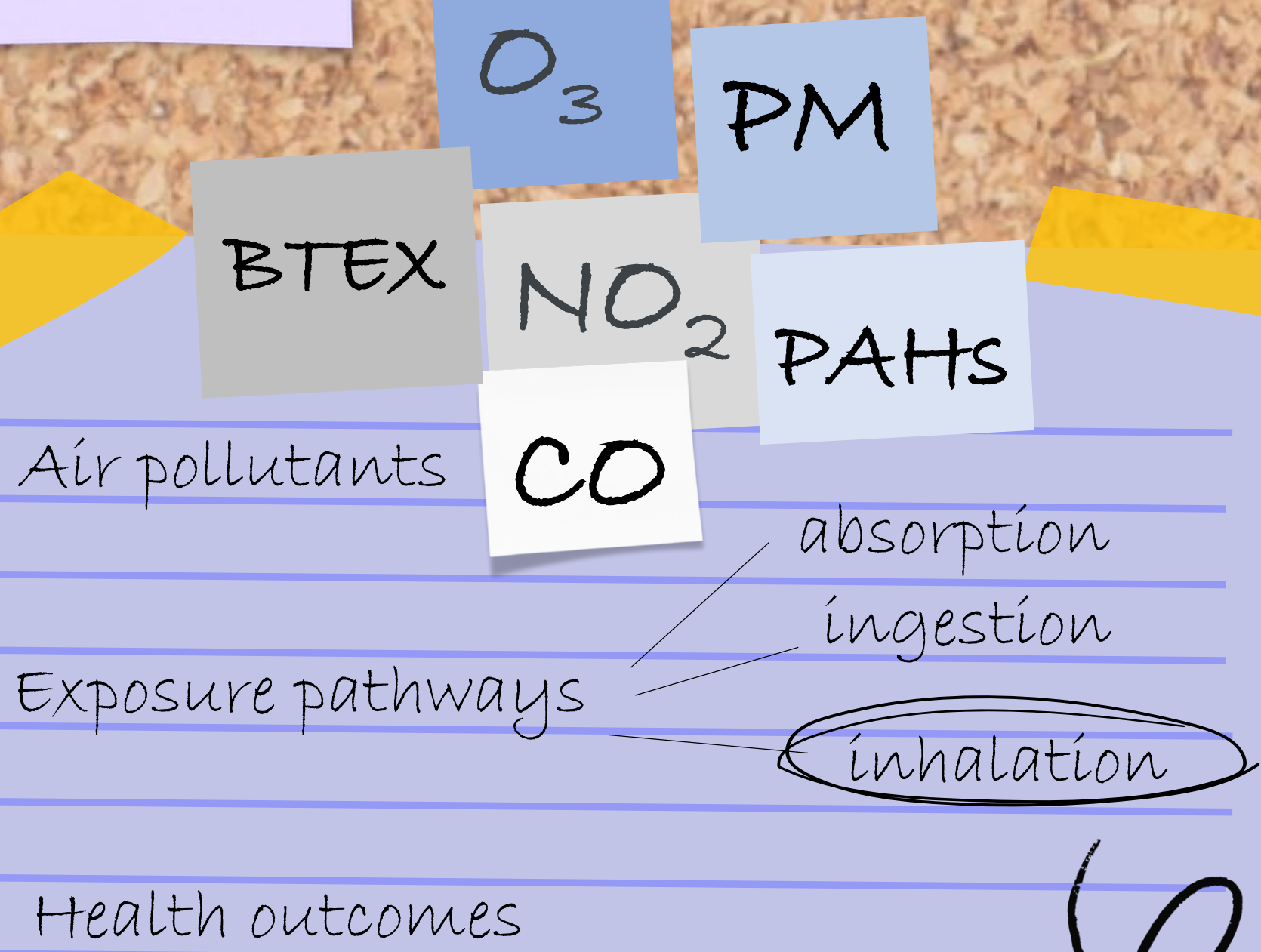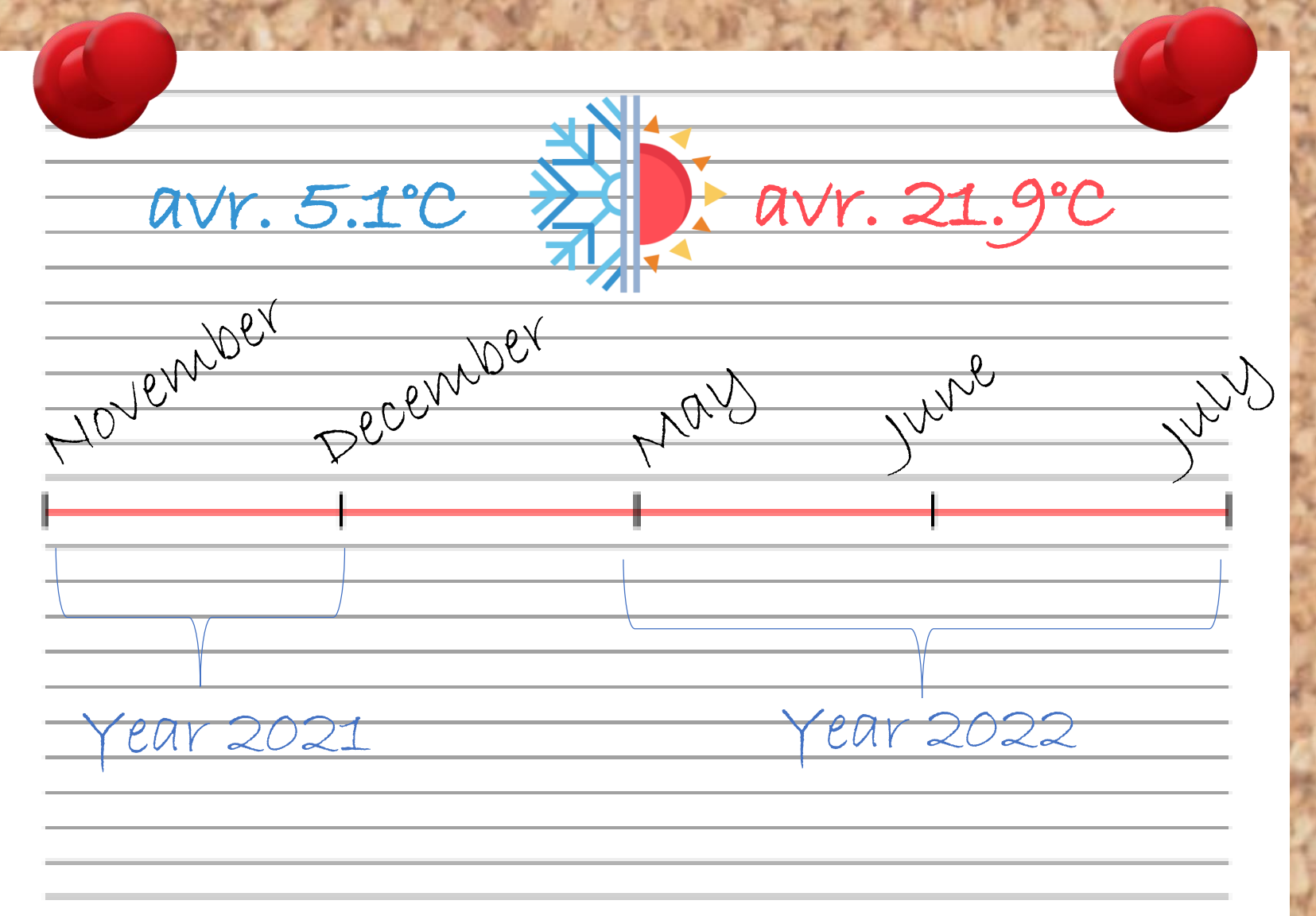
Katarina Matković[1], Andreja Jurič[5], Ivana Jakovljević[4], Luka Kazensky[1], Vilena Kašuba[1], Mirta Milić[1], Silvije Davila[1], Gordana Pehnec[1], Irena Brčić Karačonji[1], Nancy B. Hopf[3], Irina Guseva Canu[3], Pascal Wild[3], Goran Gajski[1], Marko Gerić[1]

BACKGROUND INFORMATION

238,000 premature deaths were attributable to $PM_{2.5}$ in the EU
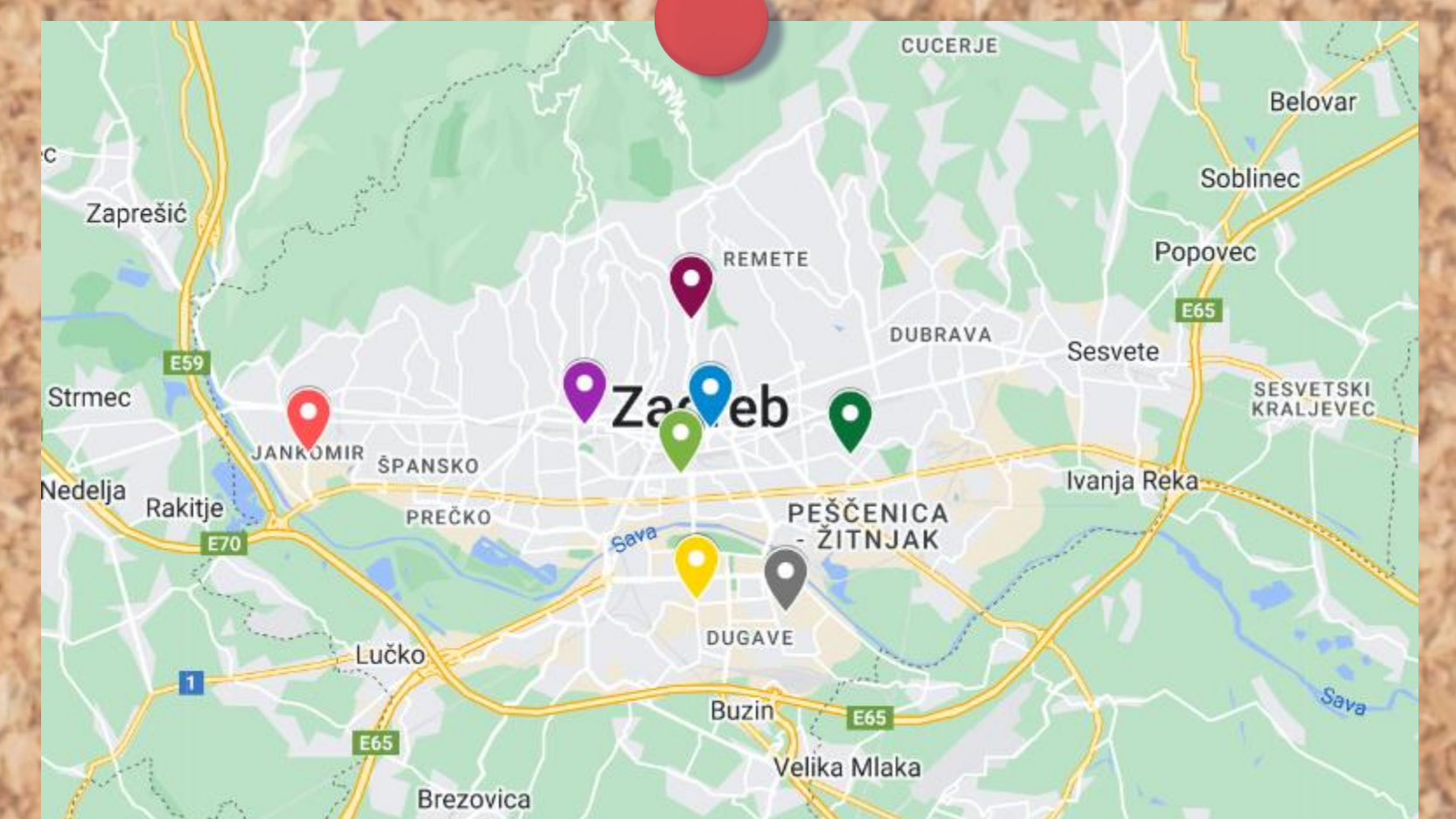
770 billion EUR, or 6% of EU GDP

O_3 PM
BTEX NO_2 PAHs
CO

Air pollutants

Exposure pathways
- absorption
- ingestion
- inhalation

Health outcomes

Asthma   COPD
Cancer

METHODS

avr. 5.1°C   avr. 21.9°C

November December   May June July
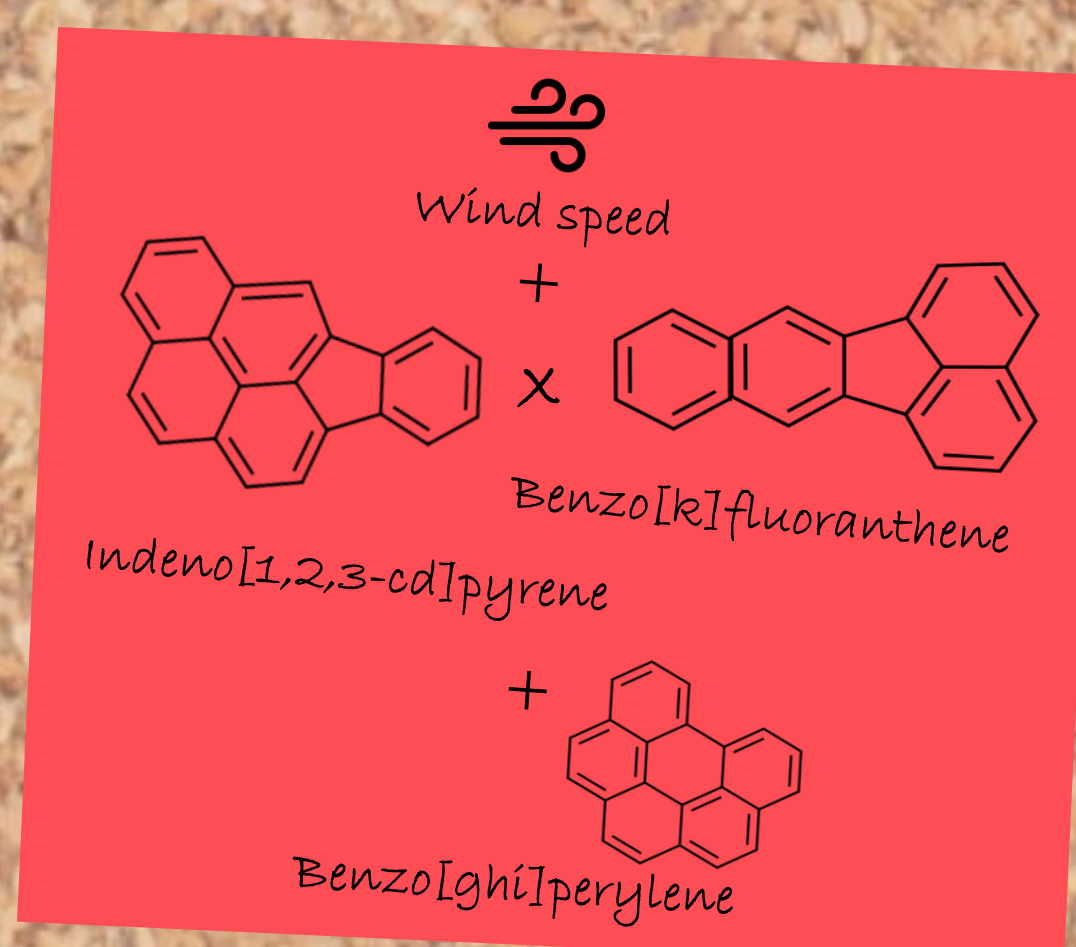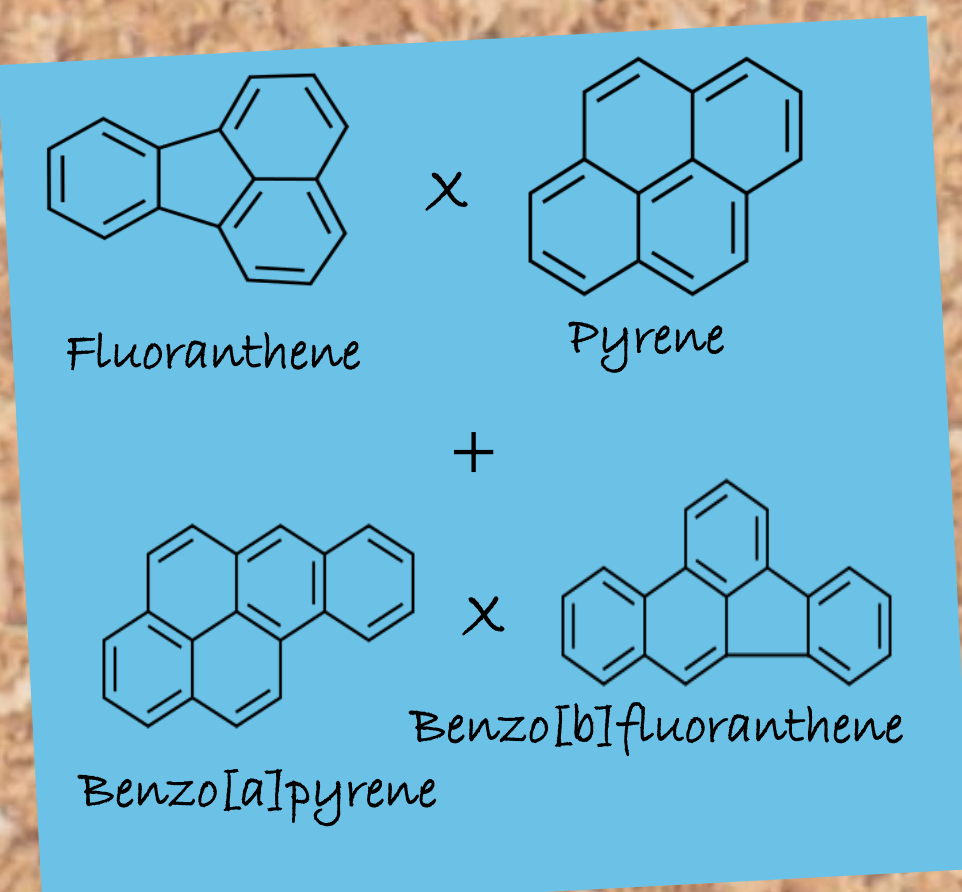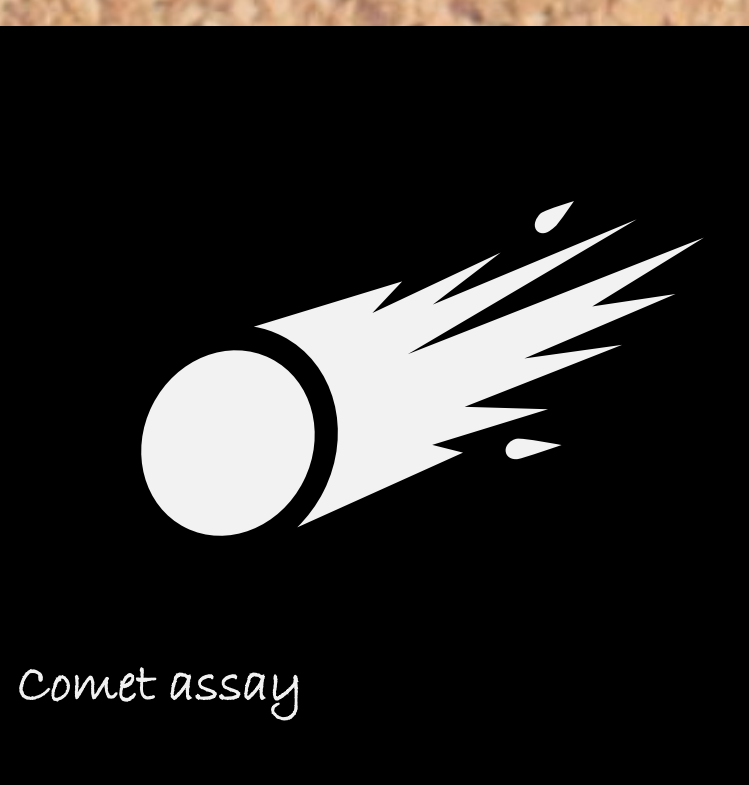
Year 2021   Year 2022

follow-up study: N=60
Zagreb city general population
Age: 18 – 55
BMI < 30 kg/m²
34 females and 26 males

MAJOR FINDINGS

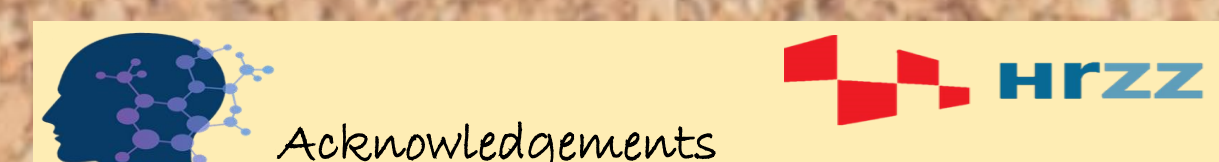OUTCOME VARIABLE   STAT. SIGNIFICANT POSITIVE PREDICTOR VARIABLES

CBMN

♀ + Benzene

♀ + Physical activity

Comet assay

Fluoranthene × Pyrene
+
Benzo[a]pyrene × Benzo[b]fluoranthene

Wind speed + × Benzo[k]fluoranthene
Indeno[1,2,3-cd]pyrene
+
Benzo[ghi]perylene
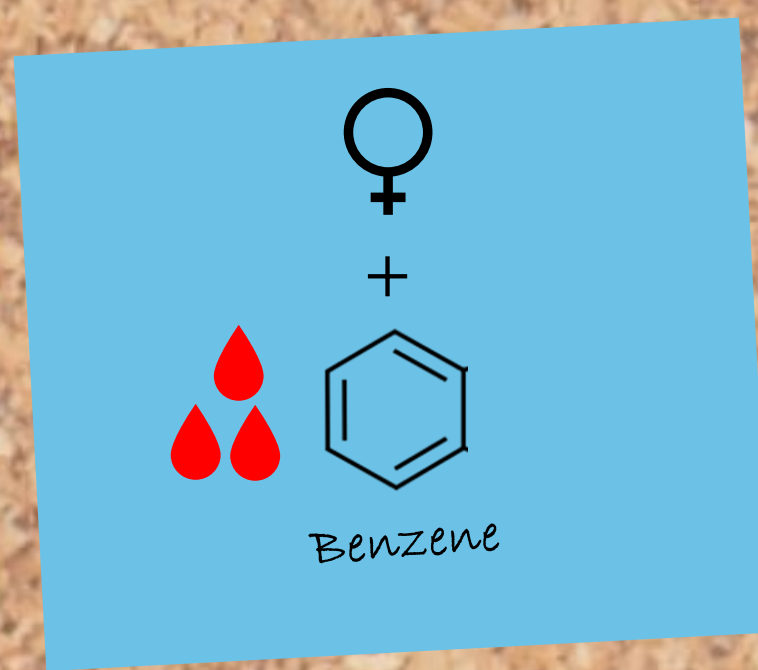
Preliminary best subset regression models were developed to identify biomarkers of DNA and chromosomal damage using over 30 air quality indicators. Some polycyclic aromatic hydrocarbons (PAHs) were found to be key predictors of DNA damage, while blood benzene levels were significant for predicting chromosomal damage (micronucleus assay).

This study underscores the need for further research and classification of PAHs, especially those with limited evidence on their genotoxic and carcinogenic effects.