SUMMIT RESEARCH

2nd year

Indoor-generated particulate matter: chemical signatures and associated mutagenic and cytotoxic effects

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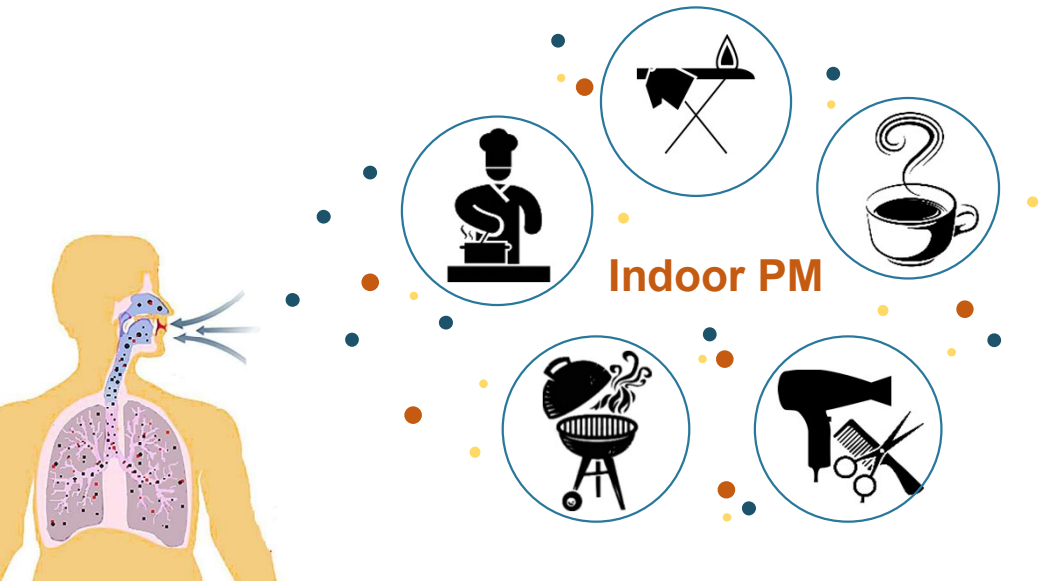
3 GOOD HEALTH AND WELL-BEING

Introduction

Particulate matter (PM)

Mixture of solid particles and liquid droplets suspended in the air, resulting from a variety of natural and human activities

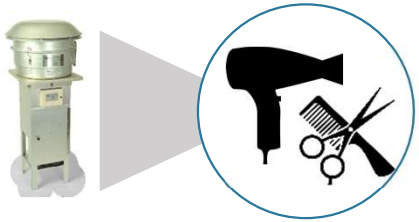


AIMS

- ✓ Detailed characterization of particulate organic and inorganic compounds emitted from indoor activities by multiple techniques
- ✓ Evaluation of the potential carcinogenic, mutagenic and toxicological effects of these particles towards Ames tester strains and human cell line models

Methods

SAMPLING OF INDOOR SOURCES



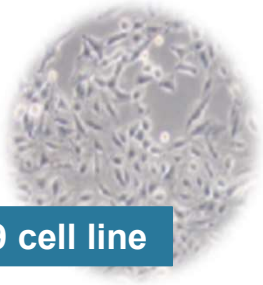
CHEMICAL CHARACTERIZATION OF PM

- ✓ Organic Carbon (OC)
- ✓ Elemental Carbon (EC)
- ✓ Total organic extracts (TOE)
- ✓ Detailed organic speciation (PAHs, resin acids, anhydrosugars, etc.)

TOXICOLOGY: IN VITRO SCREENING OF THE LUNG CYTOTOXICITY

MTT assay

- ✓ Evaluation of the cell metabolic activity

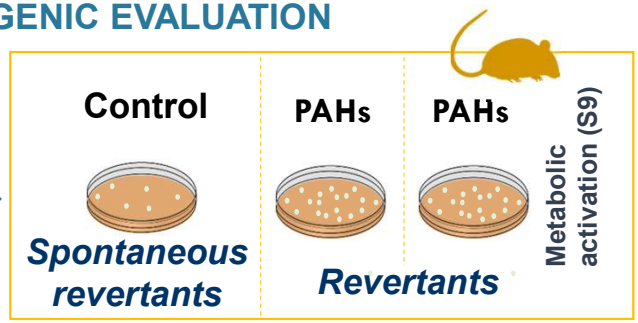


A549 cell line

TOXICOLOGY: MUTAGENIC EVALUATION

AMES assay

S. typhimurium TA98



SPREADING OF RESULTS

Results

Table. Mutagenicity of PAH extracts for *Salmonella typhimurium* TA98 strain in the absence (−S9) and presence (+S9) of metabolic activation.

		TA98 -S9		TA98 +S9	
	ng PAHs/ plate	Revertants/ plate	MR	Revertants/ plate	MR
Outdoor	49.1	26 ± 1	1.2	33 ± 2	1.3
Indoor	17.2	18 ± 2	0.8	27 ± 2	1.1
Outdoor	66.9	20 ± 5	0.9	32 ± 3	1.3
Indoor	19.6	25 ± 3	1.1	35 ± 7	1.4
Background	11.1	18 ± 4	0.8	24 ± 3	1.0
Outdoor	20.1	24 ± 10	1.0	30 ± 6	1.2
Indoor	14.1	23 ± 3	1.0	30 ± 6	1.2
Outdoor	14.0	18 ± 4	0.8	27 ± 11	1.1
Indoor	7.5	27 ± 6	1.2	26 ± 1	1.0
Outdoor	31.0	14 ± 4	0.6	22 ± 4	0.9
Indoor	19.0	22 ± 3	1.0	28 ± 8	1.1
PC		119 ± 12	5.3	127 ± 20	5.0
DMSO		23 ± 5		26 ± 4	

Fig. Cell viability assessed with the MTT assay after 24 h exposure to increasing PM_{10} concentrations.

Current Impact

Abstracts or proceedings in conferences

Accepted: D. Figueiredo, E.D. Vicente, A. Vicente, C. Gonçalves, I. Lopes, H. Oliveira, C. Alves. Cytotoxicity and mutagenicity of particulate matter emitted in beauty salons. IAC, 4-9 Sep 2022, Greece

D. Figueiredo, E.D. Vicente, A. Vicente, C. Gonçalves, I. Lopes, C. Alves, H. Oliveira, Cytotoxicity and mutagenicity of particulate matter from domestic activities, Jornadas Ibéricas de Toxicologia, 4-5 Jul 2021, Covilhã, Portugal

D. Figueiredo, E.D. Vicente, A. Vicente, C. Gonçalves, C. Blanco-Alegre, A.I. Calvo, A. Castro, I. Lopes, C. Alves, R. Fraile and F. Oduber, Assessment of PAHs mutagenic potential in emissions from domestic activities, *European Aerosol Conference - EAC 2020*, Aug 31 – Sep 4 2020, Aachen, Germany.

C. Alves, E. D. Vicente, D. Figueiredo, M. Evtyugina, A. Vicente and H. Oliveira, Chemical and toxicological properties of particles from ironing, The 16th Conference of the International Society of Indoor Air Quality & Climate (Indoor Air 2020), 1 – 5 Nov 2020, Seoul, Korea

Papers

In preparation: D. Figueiredo, E.D. Vicente, A. Vicente, C. Gonçalves, I. Lopes, C. Alves, H. Oliveira, Cytotoxicity and mutagenicity of particulate matter from domestic activities

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