A FAST SCREENING TEST FOR INDOOR AIR TOXICITY

The indoor air may be a significant health concern. The adverse health effects may be caused by chemical emissions from microbial contaminations, building materials and even cleaning substances. As these are complex mixtures, it is difficult and expensive to identify single chemicals. Therefore, a fast, high capacity and low cost screening test would be very useful to identify if indoor air possess a health hazard. FICAM has in co-operation with SEA Oy (www.sisailmatutkimuspalvelut.fi) developed a fast screening test to identify indoor air toxicity. The test recognizes potential health hazards of the indoor air regardless of their source. Additional investigations concerning the mechanisms behind the detected indoor air toxicity can then be employed.

BIOLOGICAL BACKGROUND OF THE TEST

Indoor air toxicity is investigated using human THP-1 monocyte–derived macrophages. Macrophages belong to the immune system and are involved in defensing the body against (inhaled) foreign substances. Macrophages are exposed to condensed indoor air samples for 24 hrs, after which their viability is investigated by using WST-1 assay, which is an indicator of mitochondrial activity.

[1]THP-1-cells are also used in the *In Vitro* Skin Sensitization assay, OECD TG 442E. *In series:* OECD Guidelines for the Testing of Chemicals, Section 4: Health Effects.

TESTING PROCEDURE

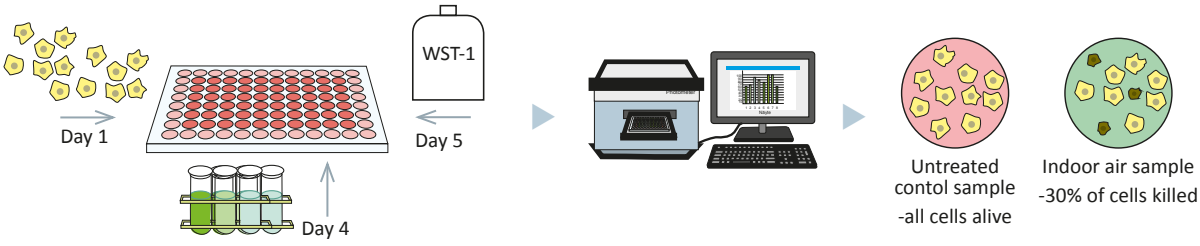
The indoor air samples are collected using the E-collector developed by Aattela (www.sisailmatutkimuspalvelut.fi): The indoor air condensates to water and freezes on the surface of the E-collector, which is filled with dry ice grains. The dry ice is removed. Frost melts down and migrates to the receiver. The water from the receiver is poured to the Eppendorf tubes, and the Eppendorf tubes are delivered to the laboratory for analysis.

The laboratory test is a five-day procedure. On DAY 1 human THP-1 -monocytes are seeded to the 96-well plates and their differentiation towards THP-1 macrophages start. On DAY 4 the macrophages are exposed to the indoor air samples for 24 hours. The samples are tested in six parallels. Distilled water is used as (untreated) control, and Dinitrochlorobenzene (DNCB) and Nickel II Sulfate, whose effects on macrophage viability are well known, are used as positive controls. (DNCB and Nickle II Sulfate are also used as positive controls in OECD TG 442E). On DAY 5 the viability of macrophages is assessed using WST-1 salt: living cells metabolize WST-1 to a coloured dye, whose absorbance is then measured. Absorbance is directly proportional to the amount of living cells. The results are given as (statistically significant) % reduction of viability of indoor-air treated cells as compared to untreated control cells.

CLASSIFICATION OF TOXICITY

The toxicity is classified as follows:

No toxicity:	All cells are alive
Mild toxicity:	Max 5 % of cells are killed
Moderate toxicity:	5-15 % of cells are killed
Severe toxicity:	15%- of cells are killed



FICAM is a GLP-compliant testing laboratory in the University of Tampere, and acts as the Finnish reference laboratory for EU in test method validations.

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