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Laboratorio Olfattometrico

Dipartimento di Scienza
e Alta Tecnologia
(DISAT)

Occupational exposure of olfactometric examiners: possible solutions for the risk assessment

E. Polvara, A. Spinazzè, M. Invernizzi, A. Cattaneo, S. Sironi, D. Cavallo

9th IWA Odour & VOC/Air Emission Conference

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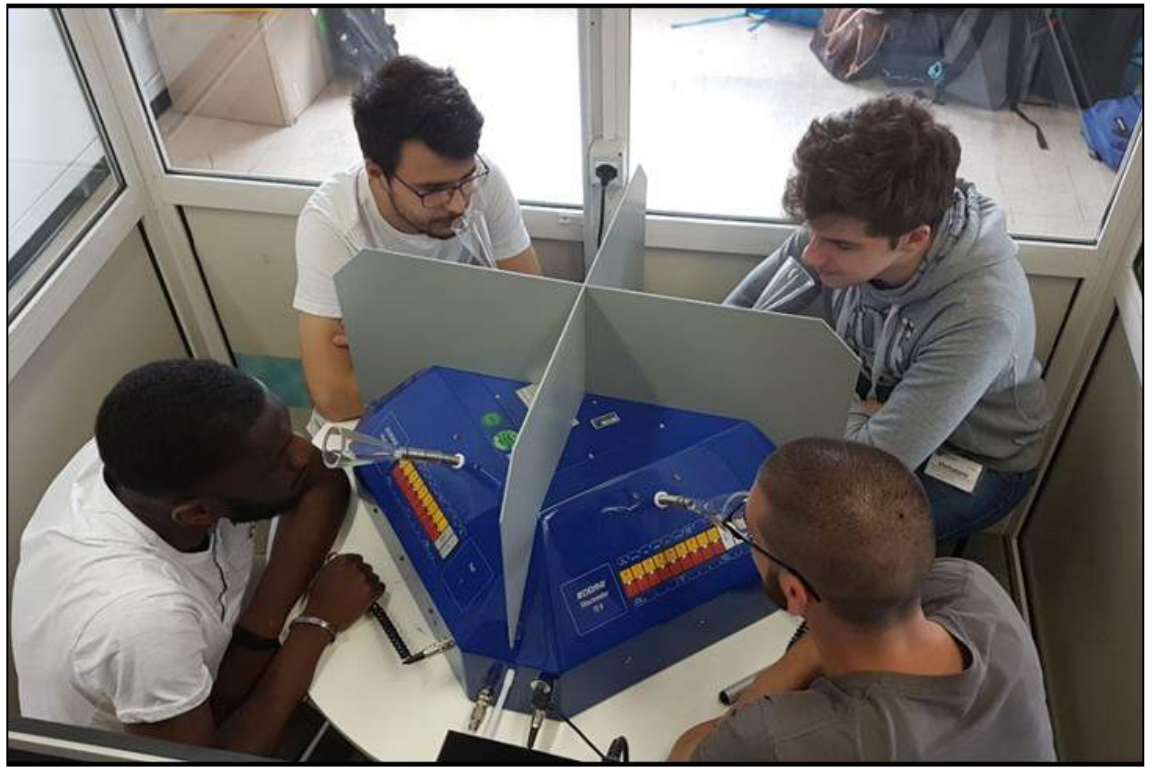
Dynamic olfactometry – Examiners

Dynamic olfactometry involves **human assessors**.

They are **directly** exposed to hazardous pollutants.

Definition of a minimum dilution value to be adopted
is mandatory to guarantee ***panellist safety***



EN 13725

The problem of occupational safety of panellists is common to **all the olfactometric laboratories**.

For this reason, the topic was discussed in the international technical committee during the drafting of the standard.

However, only **a general description** of the problem was provided in the standard and also in the revision.

Scientific literature

In the scientific literature, **two main approaches** are proposed.

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Dynamic Olfactometry and Sample Toxicity. A Case Study for a MSW Incinerator Odour Assessment Project

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Dynamic Olfactometry and Potential Sample Toxicity. Guidelines for a Safe Occupational Health Approach.

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However, **two critical aspects** may arise:

1. **Choice of the *toxicological threshold***

2. **Few reference concentration data available**

 *how to manage compounds without toxicological threshold present in **real odour**?*

Scientific literature applied to real odour samples

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Occupational Safety for Panellists Involved in Dynamic Olfactometry: a Comparison of Available Risk Assessment Models

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Application of the two models to **real odorous samples**

oil refinery odour sample- outlet of a vapour recovery unit (VRU)

Choice of the *toxicological threshold*
drastically influences the final results

It is essential, at a regulatory level, to **define a uniform source** for the reference concentration to obtain comparable values.

Scientific literature applied to real odour samples

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Application of the two models to **real odorous samples**

oil refinery odour sample- outlet of a vapour recovery unit (VRU)

In databases suggested, for a large number of compounds (**between 30 and 75% depending on the approach applied**), a specific toxicological threshold for non-carcinogenic effects **is not available.**

The absence of a reference value for several compounds present in an odorous sample may lead to an **underestimation of the real risk**.

New methodology

Contents lists available at ScienceDirect

Regulatory Toxicology and Pharmacology

journal homepage: www.elsevier.com/locate/yrtph

Toxicological assessment method for evaluating the occupational risk of dynamic olfactometry assessors

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The method is **robust but simple** to be used by various operators.

It **overcomes the critical aspects** observed in the models available connected with the general approach described in the EN 13725.

New methodology

The method defines:

- A ***clearer definition of panellists exposure***: they are workers exposed for a **shorter time** than common workers

- ***Carcinogenic risk*:** calculated for compounds defined as carcinogenic/potential carcinogenic, following the definition of Part 3 of Annex VI to Regulation (EC) 272/2008

$$Inhalation\ Risk\ (IR) = CDI \times IUR \qquad CDI = \frac{C_{air} \times EF_{iw} \times ED_{iw} \times ET_{iw}}{AT_{iw} \times LT}$$

- ***Non-carciogenic risk***:

$$HI = \sum_{i=1}^{n} HQ_i \qquad HQ = \frac{C_{observed}}{Threshold}$$

New methodology

Evaluation of panellists exposure → Carcinogenic risk

Evaluated in according to EPA directives and for the compounds defined classified as carcinogenic or potential carcinogenic, according to the definition supplied in Part 3 of Annex VI to Regulation (EC) No 272/2008

$$Inhalation\ Risk\ (IR) = CDI \times IUR$$

$$CDI = \frac{C_{air} \times EF_{iw} \times ED_{iw} \times ET_{iw}}{AT_{iw} \times LT}$$

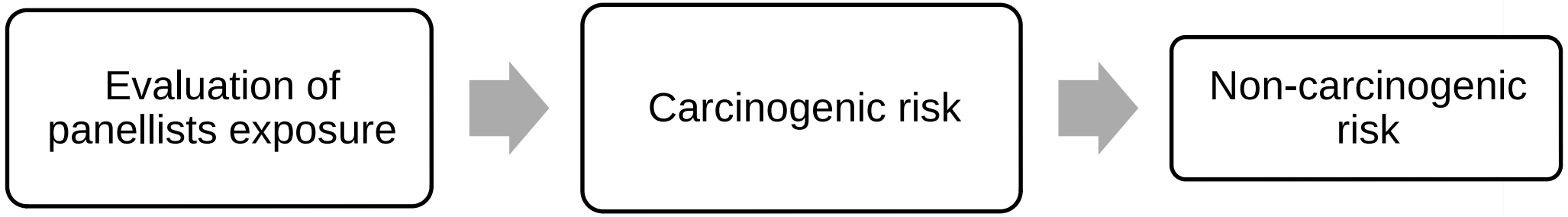
To be defined in according to the **specific working acivity of its own panel**.

New methodology

Evaluation of panellists exposure → Carcinogenic risk → Non-carcinogenic risk

$$HQ = \frac{C_{observed}}{Threshold}$$

New methodology

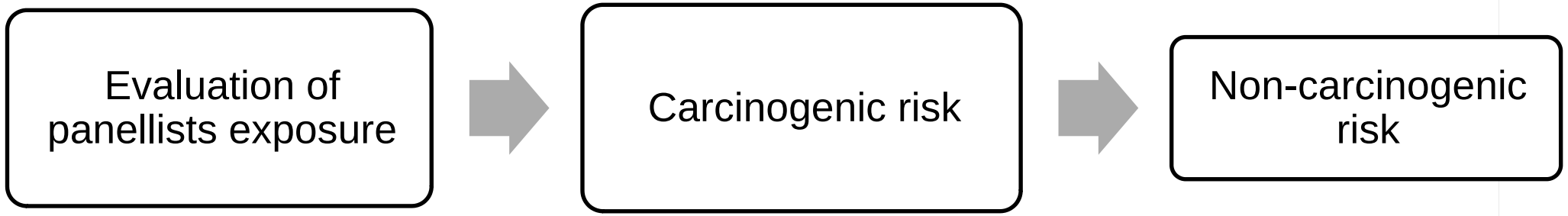


OELV for short exposure (i.e. 15-min)
selected according to a hierarchical order based on the adequacy of available limits

- **Short-term Occupational Exposure Limit Values (OELVs)**, that have the force of law at the international level
- **Derived No Effect Levels (DNELs)** for workers' short-term exposure and to prevent systematic effects;
- **Other short-term occupational limit values without mandatory value**

This procedure provides a toxicity value useful for calculating the HQ of a **wide range of compounds** present in a real odour sample.

New methodology

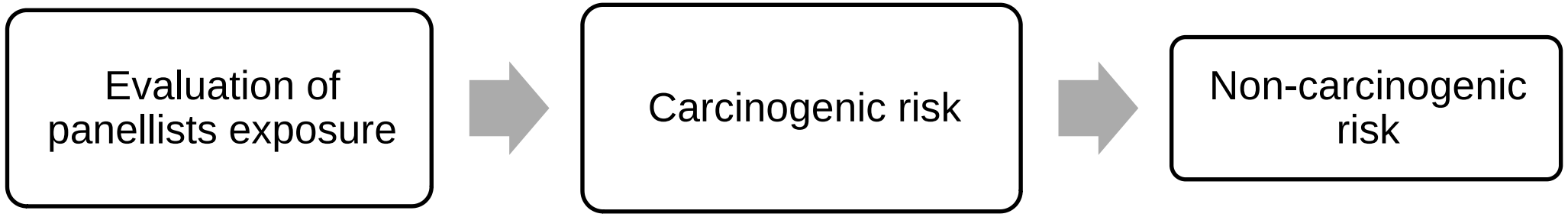


For some of the components of a mixture of a real odour sample it may not be possible to establish a specific threshold value.

It is proposed to to use an
occupational limit value defined for a famil/group.

With the application of this approximation, it is considered possible to be able **to characterize the HI of the entire mixture**

Nuova metodica per la valutazione del rischio



Risk type	Acceptability criteria
Non carcinogenic	HI < 1
Carcinogenic	IR < 10^{-5} for gaseous mixture

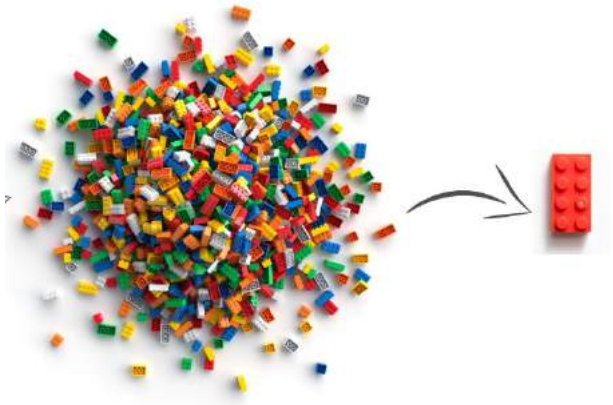
If the acceptability criteria are not respected,
a **minimum diluition value must be setted in order to protect panellists' safety.**

Conclusion

The problem of evaluation of occupational exposure risk for panellists is fundamental to guarantee the examiners' safety.

A **method proposed** was developed in order to overcomes the critical aspects observed in the standard/scientific literature and quantify more mobustly the MDV.
This method:

It is **robust but simple**



It proposes different solutions to **complitly characterized** a real odour mixture

Thank you for your attention

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