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We Need to Develop, Not Forget, Our Toxicological Knowledge

Considering chemical risk today may be of marginal interest, and some less benevolent scholars might belittle it as a form of scientific veteranism. Other issues are currently attracting the attention and commitment of occupational physicians (referred to as "competent" according to Italian law), i.e., biomechanical and psychosocial risks, Total Worker Health® programs, and biological hazards faced at the beginning of this decade during the COVID-19 pandemic.

We have also seen a contraction in the number and quality of publications in our scientific journals dedicated to toxicological issues. Given these undoubted facts, it is appropriate to fine-tune the issues that still represent an essential area of commitment for our Discipline. I will, therefore, try to briefly explain the reasons for this reflection with a necessary premise.

Careful and qualified regular environmental and biological monitoring practices appear essential to correctly quantify chemical risk. Only quantitative data provide objective bases comparable over time and in different work situations on which to develop health and prevention programs. Qualitative other different methods, often still used, cannot guarantee this, even if they are recognized and have a preparatory or complementary value if well-identified and conducted.

It is also in total harmony with Galileo Galilei's famous aphorism: "Measure what is measurable, make measurable what is not". As early as 1600, this aphorism foretold a way of doing science that was no longer based on subjective observation but on data provided by scientific instruments.

It appears difficult to dispute that the values of environmental and biological indicators measured in the occupational field are increasingly close to those measured in the living environment and in the general population groups not exposed. This results from the reduction of the former and the relative increase of the latter, resulting from the well-known eco-dispersion of many pollutants.

A result of no minor importance is that, for a complete, correct evaluation of exposures, the current action levels and the limit values proposed in the field of employment need to be revised. These are sometimes significantly above the measured values, thus creating grey areas in which appropriate decision-making guidelines must be revised.

It is therefore highly advisable to use the reference values together with them, i.e., those measured in the general population with a footnote: the difference between the two values tends to be increasingly blurred, also due to the lowering of the limit values, a sometimes drastic lowering and, as a matter of fact, also of objective difficulty or impossibility of measuring and verifying that they meet the quality standards in force (at least with the tools and methodologies currently available).

It cannot be forgotten that the trend above of the reduction in exposures should be confirmed over time, be demonstrated in all working realities (it is easy to infer the reference to tiny shops), and hopefully be so for the newly introduced chemical agents and the most innovative work cycles.

Another point worth considering is that the already mentioned current low levels of the indicators measured in the occupational field are generally higher than those of the general population. Thus, this testifies to exposure to the absorption of xenobiotics as worthy of study and control.

These considerations on the present and these hypotheses of research advancement for the future can only be made thanks to the same extraordinary progress recorded in analytical techniques and methods, progress concerning practically all the analytical areas of our interest, from spectrometry to gas chromatography, electron microscopy, analytical and immunological and molecular approaches. This should create the conditions:

- to have increasingly sensitive and informative dose indicators, coming to explore doses well below the critical or effective ones, thus allowing us to start and achieve some of our historical objectives;

- to put in place indicators of effect that are increasingly specific and early and therefore increasingly providing information on the mechanisms of action of toxic agents, ensuring a greater understanding of the pathologies related to them, at a stage in which their prevention is still possible.

Thanks to the commitment to multidisciplinary work and interdisciplinary permeability, with a certain optimism, we can foresee their greater availability and accessibility in a relatively short time. We will be able to do this if at least two conditions are met:

- the provision of adequate resources, certainly higher than the current ones, intended for innovative instrumentation essential for applied and translational research;

- the creation and development of facilities for the measurement of these new analytes that make them increasingly available, usable, and accessible.

Creating regional and national networks of the leading centers and offices of specialized sections of Occupational Medicine appears crucial to achieving these ambitious goals.

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