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Research into both radiological and chemical toxicology has been stepped up at CEA with the launching in 2001 of the Nuclear Toxicology programme.

Cover background images

Whole-body magnetic resonance imaging.
S. Fraser/SPL/Cosmos
Visualisation of an agarose gel under a UV lamp at the Molecular Biology Laboratory, at the CEA Marcoule Centre.
C. Dupont/CEA

Insert

Chamber for whole plant culture in controlled conditions at the CEA Cadarache Centre.
C. Moirenc/CEA
Visualisation of a proteomic two-dimensional electrophoresis gel at the CEA Saclay Centre.
L. Médard/CEA

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Editorial

When the general public associates nuclear energy with health, it is usually the adverse effects of radiation on the human body that first come to mind, followed possibly by the beneficial medical uses of various "rays". Meanwhile, the scope of toxicology is commonly perceived as restricted to "chemicals", albeit in the widest sense. Yet the concept and methods of toxicology are wholly applicable to the "nuclear toxics" that may be encountered in medicine, scientific research, and industrial activities, of which nuclear-fuelled electricity generation is the most obvious example, even though its impact is relatively slight in terms of delivered dose.

In the nuclear field, toxicity can be radiological, i.e., attributable, directly or indirectly, to radiation emitted by radionuclides, or it can be "classical", i.e., arising from the chemical properties of a substance occurring or liable to occur either accidentally or in the normal course of any of the applications of nuclear energy. In practice this more usual chemical toxicity often outweighs the first form, for example for many heavy metals.

The results of scientific advance in this area have caused these two aspects of nuclear toxicology to be viewed in parallel, as regards both the elucidation of the biological mechanisms through which the toxicity is expressed, and the development of methods of investigation. In the nuclear field, scientists naturally sought first to study the specific hazards of radiation. Today, to carry this research further, they are using the resources of genomics, which also allow new progress in the study of chemical toxicity, for example the effects of exposure to the heavy metals involved in many industrial activities.

This is one of the reasons why the CEA launched its "Nuclear Toxicology" programme in 2001, to which this issue of *Clefs CEA* refers. The presentation of this programme in the following pages provides an occasion to set out the some of the basic findings that help to answer the four main questions addressed here:
How do nuclear toxics travel from their source to man?
How do they behave in the body? What are their effects on health? How can they be eliminated, and how can a contaminated subject at least be efficiently treated?

Now that this five-year CEA programme is entering its second phase, with its enlargement to include the other major French life science research bodies, this issue of *Clefs CEA* will help to show how researchers are engaged in building ever more reliable foundations for scientifically sound risk assessment and means to cope with these risks.

> Bernard Bouquin