Regulatory Toxicology and Pharmacology 97 (2018) A4–A5

Contents lists available at ScienceDirect

Regulatory Toxicology and Pharmacology

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

Editorial

Let the IRIS Bloom:Regrowing the integrated risk information system (IRIS) of the U.S. Environmental Protection Agency

ABSTRACT

The Integrated Risk Information System (IRIS) of the U.S. Environmental Protection Agency (EPA) has an important role in protecting public health. Originally it provided a single database listing official risk values equally valid for all Agency offices, and was an important tool for risk assessment communication across EPA. Started in 1986, IRIS achieved full standing in 1990 when it listed 500 risk values, the effort of two senior EPA groups over 5 years of monthly face-to-face meetings, to assess combined risk data from multiple Agency offices. Those groups were disbanded in 1995, and the lack of continuing face-to-face meetings meant that IRIS became no longer EPA's comprehensive database of risk values or their latest evaluations. As a remedy, a work group of the Agency's senior scientists should be re-established to evaluate new risks and to update older ones. Risk values to be reviewed would come from the same EPA offices now developing such information on their own. Still, this senior group would have the final authority on posting a risk value in IRIS, independently of individual EPA offices. This approach could also lay the groundwork for an all-government IRIS database, especially needed as more government Agencies, industries and non-governmental organizations are addressing evolving risk characterizations.

1. Background

The Integrated Risk Information System (IRIS) of the U.S. Environmental Protection Agency (EPA) is a database containing information about a chemical's principal toxic effect and the concentration or dose at which the chemical is deemed not likely to cause the toxic effect in humans, even in sensitive individuals or groups (www.epa.gov/iris). For chemicals with cancer as the principal or critical toxic effect, this concentration or dose is deemed associated with a very low risk of cancer (usually one in a million). For chemicals with critical toxic effects other than cancer, e.g. liver toxicity, this concentration or dose is deemed to be safe. Collectively, these concentrations or doses represent and are referred to as risk values; they are developed according to current default policy-science procedural guidelines adopted by the Agency, and are the official benchmark risk values justifying regulations intended to protect public health.

The determination of the critical toxic effect is referred to as hazard identification while the determination of numerical risk values is considered dose response assessment. Merging hazard and dose response data with human exposures data, the latter being actually measured or estimated from models, characterizes what is deemed the potential risk of a chemical to humans, and is often used as a preamble to rulemaking. The process is described by EPA in many guidance documents based on deliberations from the National Academy of Sciences (1983).

Until 1995, IRIS contained risk values on over 500 chemicals and was universally considered as the official database publishing and explaining all finalized EPA risk values. Two senior EPA risk assessment groups met monthly to evaluate risk values brought forth by Agency offices, and to place their own final risk assessments on IRIS. Risk values listed on IRIS were considered to be EPA's official risk values for all rulemaking, and were to be used by all staff until other values might be developed by EPA (1995) or outside parties (EPA, 2003) from more recent or relevant data, reanalyzed data, or other scientific and policy considerations.

After 1995, the two senior Agency work groups were disbanded and EPA's offices reverted to using their individual approaches, thereby causing IRIS to slowly go out of date. As a result, scientists from various EPA offices have not always had the opportunity to review each other's work, not all the information on IRIS now represents EPA's official assessments, nor is IRIS considered to be EPA's primary risk database. In fact, IRIS now contains fewer risk values than in 1990.

2. Current challenges

Many IRIS risk values are outdated when compared with other databases such as the National Library of Medicine (2018) International Toxicity Estimates for Risk (*ITER*). In addition, newer IRIS information often does not include senior scientist oversight from multiple EPA perspectives. Indeed, because of the current low IRIS status and usefulness, questions have been raised about the substantial resources it

https://doi.org/10.1016/j.yrtph.2018.05.003
Received 17 April 2018; Received in revised form 27 April 2018; Accepted 1 May 2018
Available online 03 May 2018
0273-2300/ © 2018 Published by Elsevier Inc.

still receives.

Some stakeholders, uninformed of the current challenges, may pressure EPA to maintain IRIS as is. Other stakeholders, knowing the challenges and implications, may pressure EPA to scrap IRIS, for it does not offer recent and credible information. Neither perspective is the way forward: the former because one would perpetuate a database functioning at far less than its potential; the latter because the database is still used, albeit imperfectly.

Clearly a third option exists, which is to integrate again the reviewing and finalizing of risk values proposed by separate EPA offices into the hands of a central and senior EPA risk assessment group. The group ought to be established in short order to include some 10 senior toxicologists and epidemiologists, meeting at least monthly to finalize the Agency's official risk values posted in IRIS and harmonized for all EPA's offices.

There are several advantages to this proposed approach. It would save time and resources because monthly meetings of this senior EPA group would replace other, generally more time consuming, multiple intra-EPA reviews of risk information, especially when such reviews rely on written memos. In contrast to memos, monthly face-to-face meetings of the senior EPA group could resolve issues or disagreements in much shorter time (Dourson, 2018).

Also, this approach would maintain risk value development in individual EPA offices, which would conduct their own processes for document development and peer review. However, the senior EPA group – independent of individual EPA offices – would alone have the final authority on whether a risk value is officially published in IRIS to be the official risk position for the entire Agency, thus offering interested parties unequivocal information.

As a last and most important advantage, a successful implementation of this approach would set the ground for an overall IRIS database integrating risk value assessments across US federal Agencies. To realize that such harmonization is long overdue, one only has to marvel at the numerous disparate assessments among government agencies and others, as found in the *Toxnet ITER* database of the National Library of Medicine.

EPA has been a world leader in developing risk assessment guidelines based on the seminal recommendations of the National Academy of Sciences (EPA, 1986). EPA's IRIS was an integral part of that effort, and its lagging in recent years has been keenly felt by many groups. It is time to reclaim the lost ground.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.yrtph.2018.05.003.

References

Dourson, M., 2018. Most risk values were cleared for IRIS loading within two meetings. Recollections as co-chair of EPA's Reference Dose (RfD) and Reference Concentration (RfC) Work Group.

EPA, 1986. For response to NAS. see. https://www.epa.gov/risk/risk-assessment-guidelines.

EPA, 1995. Reference Dose (RfD) and Reference Concentration (RfC) Work Group was composed of senior agency scientists from various EPA offices that met monthly for the purposes of reviewing each other's risk values, and after consensus, placing these values on IRIS for all EPA actions. A similar group met monthly to review cancer risk values.

EPA, 2003. "At the same time, IRIS is not the only source of toxicological information, and in some cases more recent, credible and relevant data may come to the Agency's attention. In particular, toxicological information other than that in IRIS may be brought to the Agency by outside parties. Such information should be considered along with the data in IRIS in selecting toxicological values; ultimately, the Agency should evaluate risk based upon collective scientific expertise and judgment, and consider all credible and relevant information available to it." See: Farland and Longest, 1993. Use of IRIS Values in Superfund Risk Assessment. December 21. Position reaffirmed in 2003 by Cook, M.B. Human health toxicity values in superfund risk assessments. December 5.

National Library of Medicine, 2018. Toxnet database, International Toxicity Estimates for Risk (*ITER*) at http://toxnet.nlm.nih.gov.

NAS (National Academy of Sciences), 1983. Risk Assessment in the Federal Government: Managing the Process. National Academy Press, Washington, DC.

Michael L. Dourson [1]

Toxicology Excellence for Risk Assessment (TERA), Cincinnati, OH, USA

E-mail address: dourson@tera.org

[1] Former Co-chair of the Reference Dose (RfD) and Reference Concentration (RfC) Work Group of the U.S. Environmental Protection Agency