00	25/02/20	First emission	I. Ceserani	V. Guzzo	D. Gilormo
Rev.	Date	Review's reason	Prepared by Referent	Verified by Technical Manager	Approved by President

INDEX

1. INTRODUCTION

To regulate the complex world of chemical substances' application field and safe use, European Commission has adopted a series of guidelines and regulations for specific fields of application, for example, EC Reg. 1107/2009 for pesticides, Reg. 528/2012 for biocidal products, Reg. 1223/2009 for cosmetic products, authorization procedures for medical devices and drugs, as well as the Regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency (ECHA) and the Regulation (CE) n. 1907/2006 of the European parliament and of the council that imposes the obligation to prepare CSR (Chemical Safety Reports) and CSA (Chemical Safety Assessments).

The REACH regulation imposes that only substances registered by ECHA can be produced or imported in the European Union, and establishes a safety evaluation for all chemical elements and compounds, both on their own and in mixture, which occur in nature or chemically synthesized, used or disposed of, or resulting from any work activity, intentionally or not.

The Risk analysis, established by REACH regulation, is a complex process that includes three crucial phases:

1. Risk evaluation and characterisation
2. Risk management
3. Risk communication

The phase "Risk evaluation and characterisation" is the scientific basis of risk analysis. Risk evaluation includes the danger identification and its characterisation, exposure evaluation, and risk characterisation, as decreed also by the Word Health Organization (Environmental Health Criteria n. 240 "Principles and methods for the risk assessment of chemical in food 2009 dated in 2019). The danger identification consists in the identification of adverse effects (on a qualitative base) produced by the examined substance as, for example, neurotoxicity, hepatotoxicity, developmental toxicity, etc., regardless the dose that has provoked them; it is the identification of chemical substances' potential toxicity, in other words, of their innate toxic properties.
Instead, danger characterisation is focused on adverse effect quantification based on a dose-response relation. In well carried out experiments the danger characterisation should be able to identify a dose without observed adverse effect (for example the NOAEL: the highest dose that not causes toxicity in laboratory animals), that is the base for the subsequent calculation of Acceptable Daily Intake (ADI) to which population can be exposed for the entire life without health risk.
These two phases derive from appropriate experiments, even better if they fulfil international standards' requirements (i.e. OECD and ICH guidelines), carried out *in silico, in vitro* and *in vivo* on laboratory animals, or from epidemiological observations of human population.
The exposure evaluation is part of risk evaluation and it is defined, according to the World Health Organization, as the quantity evaluation of possible exposure to a chemical substance, considering all relevant sources (food, water, air, etc.).
The risk characterization integrates information derived from danger identification and characterization and from exposure evaluation to estimate the odds of observe a specific effect in population and give information useful for decisional purposes and risk management.

This is the only method scientifically accepted on international basis, that now can be used to evaluate the odds that an adverse/toxic effect happen in humans after the exposure to a risk source in specific conditions, as for example to some doses of every chemical substance.
Therefore, it is imperative the need to train and certificate professional figures (toxicologists), considered fundamental, who can authoritatively be part of all the phases of chemical substances safety evaluation process, both on national and international levels, because of the frequent global commercial exchanges.
Risk management is the process through which strategies for its mitigation are developed. Generally, these activities are carried out by public structures together with international regulatory agencies. Lastly, risk communication is the interactive exchange of information and opinions between all risk communication participants about elements of risk and danger and risk perception, foundation of decisions on risk management.
Risk management and risk communication are not strictly competence of Toxicologist, but it is necessary to establish an active dialogue between who evaluate risk and who manage and communicate it.

In a European general context, considering the existence of different directives and regulations about safety use of chemical substances, the problem is considered current not only by ECHA, but also by the Directorate-General for Health and Food Safety (UE - DG Sante) of European Union, the European Medicines Agency (EMA) and the European Food Safety Authority (EFSA) and by the World Health Organization (WHO) itself, that have been complaining for years the lack, on an international and European level, of a Toxicologist figure who is able, with in-depth skills, to manage the toxicological principles application described in the guidelines internationally harmonized.

2. AIM AND FIELD OF APPLICATION

The latest application of European Commission's regulatory frameworks on chemical substances, plant protection products, biocides, pharmaceutical products, cosmetic products, novel foods et., has brought to an urgent request of qualified Toxicologists. Industrial associations both nationals, as Federchimica, and internationals, as European Chemical Industry Council (CEFIC) and the International Life Sciences Institute (ILSI), research and academic community, but also national and international regulatory agencies need a certified and recognized professional figure through the creation of a Toxicologist Register.
Toxicologists' register objectives are:

- Recognise those who actively work in toxicology multidisciplinary field
- Ensuring that certified toxicologists maintaining high standard of professional expertise
- Ensuring that certified Toxicologist title is strictly for whom satisfy certification requirements of this Regulatory and of the Examination Committee for their expertise and professional experience

Toxicologist definition

The title Toxicologist shall be defined as the professional figure appointed to identify and characterize the exposure risk and to extent to chemical agents and their metabolites, even on their own or in a mixture, from synthetic or natural sources, included medicines, in population, patients and workers, as well as to identify strategies for health control and protection of population, patients

and workers against potential damages due to exposure to chemical agents of natural or synthetic source.

Toxicologist responsibility

Depending on expertise field and work activity, Toxicologist must:

- know main information sources in toxicology field and know how to critically analyse quality according to latest knowledge
- know experimental methods and approaches in toxicology, for example computational toxicology, in-vitro and in vivo methods with animal models and epidemiology general principles used to characterize the danger of chemical substances
- know national and international guidelines that regulate toxicology trial of chemical substances with attention to different application fields and main quality systems
- know the main analytical and modelling techniques for exposure identification
- know application of toxicological evaluation in regulatory and public health international frameworks with particular attention towards EU Regulations, included how these regulations diverge for specific groups of products
- know principles and methods of evaluation risk for health
- know principles to derive guiding values (HBGV) concerning safe use of chemical substances used in different fields (food, health…), as well as the practical application of these values
- know main principles of statistical sciences relevant for health risk evaluation
- know how to write scientific works, opinion and reports, and to provide danger and risk evaluation also in forensic situations
- know how to provide consultation on safety handling of toxic substances at work
- know how to provide consultation about clinical treatment of patients highly intoxicated
- know how to collaborate with regulatory authorities to ensure the observation of local, national and international laws.

4. DOCUMENTS

3.1 Basic documents

CHEMICAL SUBSTANCES

- CLP - classification, labelling and packaging of substances and mixtures Regulation (EC) n. 1272/2008

https://eur-lex.europa.eu/legal-content/IT/TXT/?uri=CELEX%3A32008R1272

- Legislation REACH https://echa.europa.eu/it/regulations/reach/legislation
- Klaassen,C.D.,Ed.:Casarett and Doull'sToxicology:The Basic Science of Poisons.8thEdition,McGrawHill,(2013)
- Hayes, A.W., Ed.:Principles and Methods of Toxicology. 6th Edition,CRC Press,(2014)
  ICH Guidelines Safety(S) and Multidisciplinary M3, M4 and M7.(http://www.ich.org/products/guidelines.html)
- OECD/OPPTS guidelines for the Testing of Chemicals–Human Health Effects(http://www.oecd-ilibrary.org/environment/oecd-guidelines-for-the-testing-of-chemicals-section-4-health-effects_20745788)
- U.S.EPA Risk Assessment Guidelines - Human Health (https://www.epa.gov/risk/human-health-risk-assessment),and Ecological (https://www.epa.gov/risk/guidelines-ecological-risk-assessment)
- National Academies of Sciences, Engineering, and Medicine. 2017.Using 21st Century Science to Improve Risk- Related Evaluations. Washington, DC:The National Academies Press. https://doi.org/10.17226/24635.
- Gilman, A.G. Rall,T.W.,Nies, A.S. and Taylor, P., Eds: Goodman and Gilman's The Pharmacological Basis of Therapeutics, 12thEdition (2011)
- RG 03 – General regulation for professional figure expertise certification

3.2 Applicable documents

AICQ SICEV Manual of Quality Management System and related Procedures

3.3 Reference documents

National and European regulations which methodological instrument is the evaluation and risk management of chemical substances, as for example, not only indicated regulations, regulation about plant protection products, biocides, cosmetics, food and animal feeds, food contact materials and objects, (https://www.sitox.org/documenti);

PLANT PROTECTION PRODUCTS

Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC". https://eur-lex.europa.eu/eli/reg/2009/1107/oj

BIOCIDES

REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 22 May 2012 concerning the making available on the market and use of biocidal products https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02012R0528-20140425&from=EN

COSMETICS
REGULATION (EC) No 1223/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on cosmetic products Regulation (EC) N° 1223/2009 .

Scientific Committee on Consumer Safety (SCCS) by the Directorate-General for Health and Consumer Protection of the European Commission https://ec.europa.eu/health/scientific_committees/consumer_safety_en

MEDICINES
https://www.ema.europa.eu

FOOD
http://www.efsa.europa.eu

'Novel Foods' legislation – Regulation (EU) No 2015/2283 on novel foods https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32015R2283

Directive 2002/46/EC of the European Parliament and of the Council of 10 June 2002 on the approximation of the laws of the Member States relating to food supplements. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32002L0046&from=EN

ENDOCRINE DISRUPTOR (ED)
COMMISSION REGULATION (EU) 2018/605 of 19 April 2018 amending Annex II to Regulation (EC) No 1107/2009 by setting out scientific criteria for the determination of endocrine disrupting properties.
Corrigendum to Commission Regulation (EU) 2018/605 of 19 April 2018 amending Annex II to Regulation (EC) No 1107/2009 by setting out scientific criteria for the determination of endocrine disrupting properties https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0605R(01)&from=EN

4. DEFINITIONS AND ACRONYMS

For the definitions, it is valid what is reported in the Basic documents and Applicable documents of previous paragraphs 3.1 and 3.2.

5. SPECIFIC REQUIREMENTS FOR TOXICOLOGISTS CERTIFICATION

5.1 Minimum requirements for the admission to oral and written exam

MINIMUM REQUIREMENTS	RTOS
Education level (Note 1)	Degree or master's degree of first or second level in a discipline like toxicological sciences

MINIMUM REQUIREMENTS	RTOS
Specific academic/work experience	Demonstrate proven years of experience in toxicological field: - 3 years of post Phd - 3 years post master's degree (UNI EN 736) - 6 years post Master's Degree - 8 years post Bachelor's degree and at least 10 scientific titles highlighted by published works, confidential reports or toxicological evaluations.
Education and training (Note 2)	A Toxicologist needs to have knowledge, according to the indicated educational level, in these fields: - Toxicology - Biological discipline (Human anatomy, General biology, Biochemistry, Physiology) - Chemical disciplines (Analytic Chemistry, General Chemistry, Organic Chemistry) - Computer technology (informatics)

MINIMUM REQUIREMENTS	RTOS
Operative experience (Note 3)	During the years of specific work, the candidate must have developed knowledge and abilities in toxicological field: - if the candidate is an employment: must demonstrate that at least the 70% of his working time in the following "thematic areas" (working days in a year are equal to 220) - if the candidate is a free-lancer must demonstrate to have 100 working days in the following subject matters: a) Regulation-legal area: knowledge and implementation of legal responsibilities and roles of figures involved in social, sector-specific and product-specific regulatory that have risk evaluation and management as methodological instrument. Introduction of regulatory general framework and of their implementation phases b) Chemical area: knowledge and implementation of substances' chemical-physical properties; principles and implementation c) Toxicological area: knowledge and implementation of substances' toxicological properties, knowledge and use of in silico, in vitro and in vivo methods for an integrated evaluation of chemical risk d) Risk analysis and evaluation area: knowledge and implementation of risk analysis procedures referring to exposure scenarios of workplace, consumers and population.
Foreign languages	Ability to read and understanding texts, to speak and write in English. This knowledge can be demonstrated through public and private linguistic institutes statements, by the Society the candidate came from, through publications or a self-certification for free-lancer. AICQ SICEV has the right to verify the real linguistic knowledge of candidate during oral exam.

Note (1) Degrees or master's must be with technical-scientific address, with a consistent number of credits for the development and increase of competences on toxicological topics.

Note (2) Education and training can be done at University or at training agencies internationally approved.

Note (3) The accurate list of required experiences has to be supported by a reference letter in which a candidate's referent, possibly ERT certificated, declares that the activities listed were effectively be done by the candidate who wants to be certificated as Toxicologist. If there is no possibility to have references it is possible to do a self-certification according to Decree 445/2000

5.2 Qualifications for the recognition of sectorial competences

Toxicologist competence fields:

- Analytical toxicology
- Biomonitoring and exposure evaluation
- Molecular, cellular toxicology
- Genotoxicity and Carcinogenicity
- Reproduction and developmental toxicology
- Clinical toxicology and advanced therapies
- Environmental toxicology
- Occupational toxicology
- Regulatory toxicology
- Forensic toxicology

To obtain the competence recognition in these fields, the candidate must demonstrate at least three years of working experience in one or more of the mentioned fields, providing objective and recorded evidences and/or a self-certification according to Decree 445/2000.

5.3 Special situations

AICQ SICEV wants to recognise well-known experts in toxicology disciplines simplifying the competences certification process, that however cannot exclude an objective evaluation. For these candidates it will be, at first, evaluated if there are the needed knowledge for the role in which the candidate requires the certification and, in case of positive response, candidates are exonerated from written exam.
Anyway, it must be done the oral exam, during which the Examination Committee must evaluate and confirm not only the ability to fulfil the role for which the candidate requires the certification, but also the consistency of knowledge, working experiences and sectorial competences.

Particular situations currently admitted by AICQ SICEV including:

- Toxicologists who have a certification from other accredited Certification Entity
- At least 20 years of working experience in toxicology as free-lancer and/or public or private employee
- At least 20 scientific titles highlighted by published works, confidential reports or toxicological assessments

In both cases, the Committee could decide the exoneration from oral exam.

Note: this paragraph will be valid for a temporary period of 3 years that will be defined with the Certification Committee and officialised in meeting reports.

5.4 Certification maintenance and renewal

Paragraph 10 of RG 03 is applicable, with the following clarification: certification is valid for five years. During this period, the certification, its supervision and its annual maintenance are automatically confirmed according to paragraph 10.1 of RG 03 regulatory.

For the certification renewal, during the five-years validity period the candidate must demonstrate:

a) Evidence of specific training/education for at least 200 hours in the last five years. Certificates of attendance have to concern courses/seminars/congresses of professional updating especially on personal improvement areas (as learner and/or teacher).
b) Objective evidence of continuously work activity as toxicologist in the last five years through activities in the competence fields of paragraph 5.2 scheme for at least 70% of the working time.
c) Written exam to verify competences with 30 questions (multiple choice – Matters specified in *Education and Training* paragraph).

5.5 Maintenance and extension of sectorial competences

5.5.1 Maintenance

At the five-year renewal of certification (paragraph 10.3 of RG 03), it will be confirmed the experience maintained/learned for the sectorial competences for which toxicologist give evidence of working activities in thematic areas of paragraph 6.2 (i.e. a course as teacher, a consultant, publications, congress participation, SITOX and/or EUROTOX and/or IUTOX seminars)
Note: For indicated data and/or documents, if it is impossible to provide what is required, it could be possible to provide, as an alternative, self-certification according to Decree 445/2000 (with specific recall to the criminal penalties provided for falsehood hypothesis in false acts and declarations).

5.5.2 Extension

If new competences are acquired in one of the "competences areas" of point 5.2, the extension for the recognition of the acquired competence can be required. In this case the requirements applied to the previous certification have to be fulfilled (see paragraph 5.2). The extension request can be disclosed after six months the issue of the first certification.

6 AICQ SICEV exam for certification

Exams are done according to paragraph 8 of RG 03 regulatory.

6.1 Examination methods

Certification exam consists in a written test and an oral test. These tests aim to verify knowledge, applicable skills and competences in toxicology fields.

WRITTEN EXAM: duration 2 hours. Written exam consists in 30 questions as multiple choice and/or open-answer questions. The result of write exam is the 40% of the total result. Minimum score for the admission to oral exam is 60/100.

ORAL EXAM: duration 30/45 minutes. Committee will test candidate on basic and specific topics of toxicological areas in which the candidate has competence. The result of oral exam is the 40% of the total result. Minimum score to pass the exam in 65/100.

The result, as weighted average of oral and written exam, has to be 67/100 or more.

6.2 Examination subjects

To demonstrate the competences of the candidate, the following basic and specific knowledge are required.

Existing legislation

Know how to consult and answer to questions about the evaluation of chemical substances toxicity in national and international regulations mentioned in paragraph 3.3.

Scientific

To know:

- Main toxicological database and other information sources that are significant for health risk evaluation, as how to evaluate reliability and how to use this information
- Planning, implementation and explanation of toxicology studies
- Descriptive toxicology: environmental, clinical, non-clinical and forensic surveys
- Mechanistic toxicology
- Risk evaluation
- Applied toxicology: public, environmental and occupational health

Toxicologist has to be able to identify substances with potential bioaccumulation, toxic and persistent, to evaluate their destiny according with their presence in the food chain and in the environment, to identify exposure scenarios and to characterize risks to man and environment, to establish procedures in order to define healthy levels for chemical substances use.