Advances Towards a Harmonized Environmental Safety Analytical Toolbox for Cosmetic Ingredients (ATEST)

Status, challenges, and strategies for broader acceptance of NAMs in Regulatory Assessments

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- Laboratory animal testing is ethically challenging.
- The principles of the 3Rs (refine, reduce, replace) emphasize the need for alternative approaches.
- New Approach or Non-Animal Methods (NAMs) offer a promising solution to avoid *in vivo* animal tests for ecotoxicity assessments of chemicals.
- The ATEST project systematically reviewed currently available NAMs.
- An automated R workflow (litsearchr package) and SwiftActive Screener an AI-based systematic review tool has been used to identify relevant literature [1].

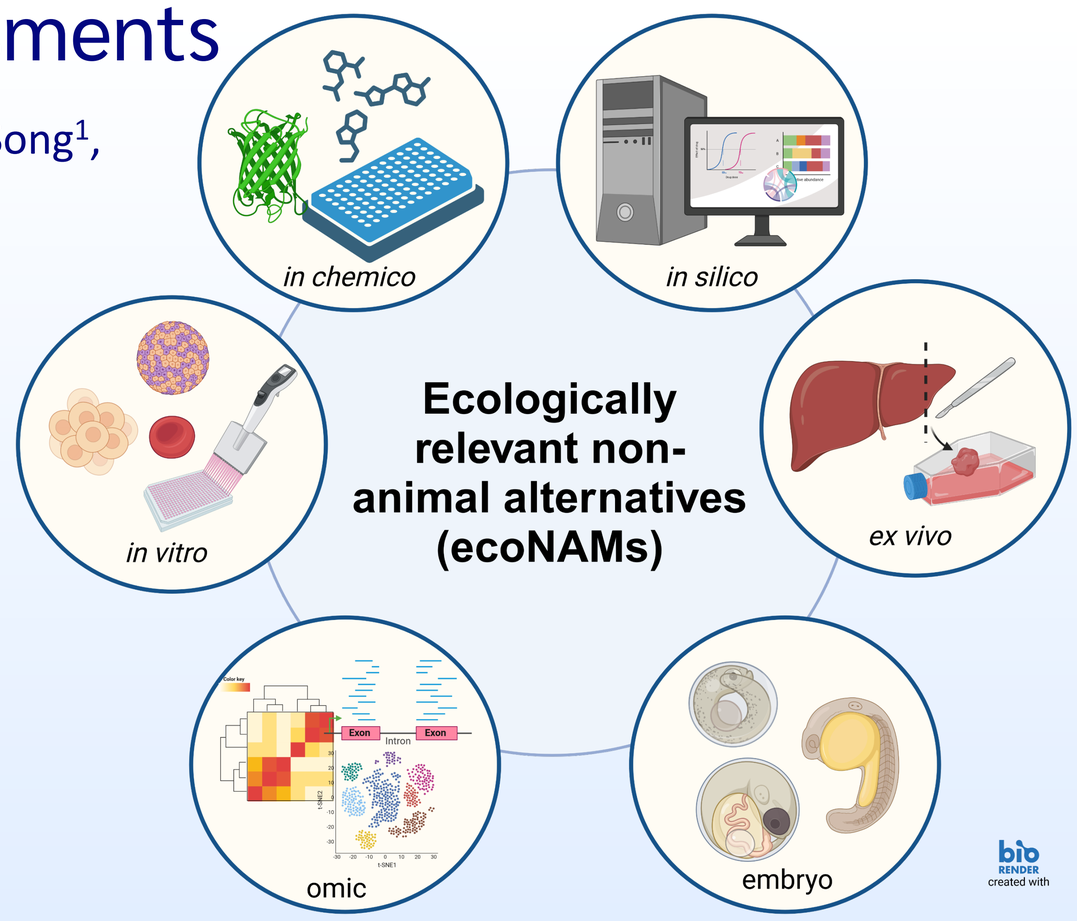

Figure 1. Examples of different groups of NAMs

Pubmed search strategy: Building the naïve libraries

Keyword 1	Keyword 2	Keyword 3	Keyword 4	Keyword 5
ecoNAMs *in vitro* *in silico* *ex vivo* *in chemico* Embryo	**Target group to replace** Fish OR Amphibian	ecotox* OR toxicity	chemical	assay

Generation of two naïve libraries

Library A: *in vitro* OR *in silico* OR *ex vivo* OR *in chemico* **1398 results**

Library B: embryo **2114 results**

Input to R workflow **(litsearchr package)**

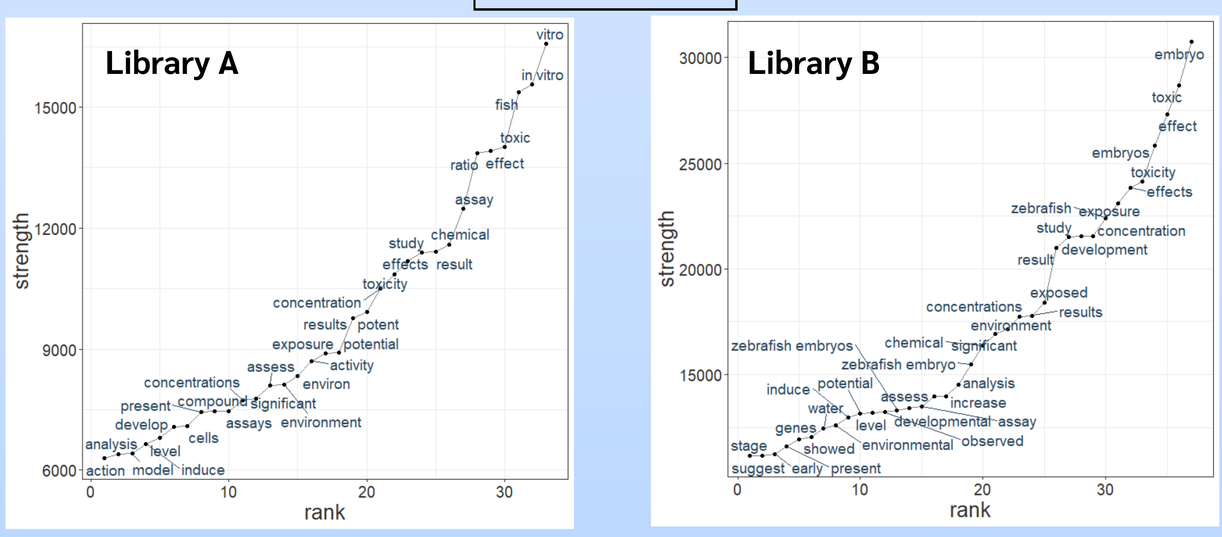

Figure 2. Pubmed search strategy: building the naïve libraries, using the R package litsearchr and graphs representing keywords relevance analysis for Library A (*in vitro, in silico, ex vivo, in chemico*) and B. The litsearchr R package helps to identify the most represented terms that can be used for search and retrieval of articles from databases.

Table 1. Pubmed search strategy: Building the library for screening with SwiftActive screener. Search terms were identified using R package litserachr.

ecoNAM	Additional search terms					Retrieved articles (n)
	toxic*	chemical	assay	water OR aquatic	NOT human	
in vitro, cell line, primary cell	✓	✓	✓	✓	✓	2177
in silico	✓	✓	✓	✓	✓	207
ex vivo	✓	✓	✓	✓	✓	85
in chemico	✓				✓	83
embryo	✓	✓	✓	✓	✓	1804
omic	✓			✓	✓	164

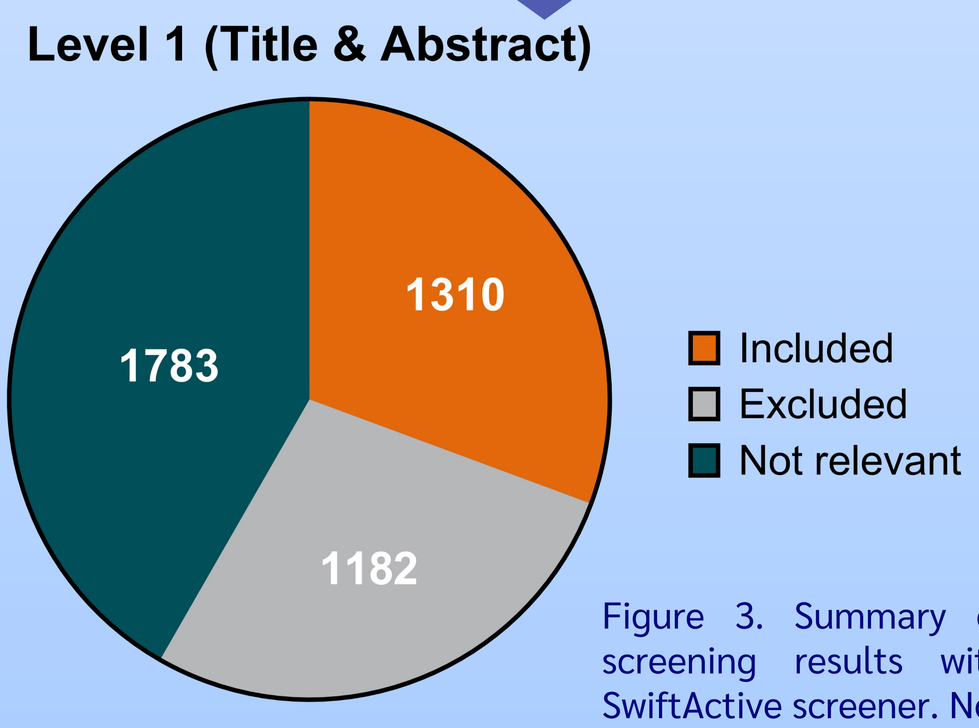

Figure 3. Summary of screening results with SwiftActive screener. Not relevant papers were excluded.

OUTCOMES:

- A database of different NAMs for environmental safety assessments.
- A ranking scheme that assesses reliability, relevance, and regulatory acceptability.

By promoting the transition from conventional animal-based testing to NAMs, this initiative supports organizations like the International Collaboration on Cosmetics Safety (ICCS) in making informed decisions and driving progress in environmental chemical safety assessments.

Reference

[1] Howard et al. 2020. SWIFT-Active Screener: Accelerated document screening through active learning and integrated recall estimation. Environment International 138, 105623.

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