GARD™—next generation safety testing

THE TECHNOLOGY

GARD™ platform

GARD (Genomic Allergen Rapid Detection) is an *in vitro* platform based on genomics technology. The platform offers a portfolio of tests sharing the same scientific principle but focusing on different toxicological endpoints.

GARDskin is the first *in vitro* assay for classification of skin sensitizers exhibiting highest accuracy on the market, well balanced between sensitivity and specifity[1].

	DPRA (TG 442C)	ARE-NRF2 (TG 442D)	h-CLAT (TG 442E)	2 out of 3 ITS	GARD (TGP 4.106)
Accuracy	80%	83%	77%	83%	88%
Sensitivity	78%	84%	80%	84%	90%
Specificity	83%	78%	67%	78%	83%

Results based on 69 compounds in a retrospective meta-analysis from chemicals published in four publications(2-5). For further details, see Roberts D.W., 2018.[1]

GARDpotency is an add-on assay to GARDskin and is the first and only *in vitro* assay for potency classifications according to CLP/GHS[6].

GARDair is the first and only *in vitro* assay capable of identifying respiratory sensitizers from both true non-sensitizers and skin sensitizers.

Broad applicability domain

The GARD tests are capable of classifying substances that have proven difficult in other *in vitro* systems, such as pre- and pro- haptens. The broad range of compatible solvents also enables assessment of compounds with low water solubility. www.senzagen.com/science/application-notes

How to GARD™ your products in six steps:

1. **GARD Input Finder:** Dose-response to find the GARD input concentration where 90% of SenzaCells survive.
2. **GARD Main Stimulation:** SenzaCells are exposed at the GARD input concentration.
3. **RNA extraction:** Following 24h of cellular stimulations, total RNA is isolated using an RNA extraction kit.
4. **Gene expression profiling:** Gene expression of the 200 genes in the biomarker signature is measured using NanoString.
5. **GARD data analysis application:** Gene expression pattern is compared to patterns of reference samples in an equation developed using a machine learning algorithm.
6. **Results:** Report provided on test substance classification as sensitizer or non-sensitizer (Y/N).

Robust, Safe and Secure

The GARDskin assay has been accepted for the OECD Test Guidelines programme (TGP 4.106). A formal validation study has been performed in compliance with OECD guidelines involving the blinded classification of 28 test substances in three laboratories. GARDskin demonstrated an excellent reproducibility, both within and between laboratories.[7]

Results OECD validation ring trial

Within Laboratory Reproducibility	82-89%
Between Laboratory Reproducibility	92%

• REACH TESTING • CLP/GHS POTENCY CLASSIFICATION • IN VITRO •

OECD validation status

In the same OECD validation study that demonstrated an excellent reproducibility, GARDskin also reported an outstanding predictive performance[6]. In a second phase of the same study, GARDpotency reported a hitherto unmet accuracy of 82% for CLP/GHS classifications. A report summarizing results from the validation has been submitted to ECVAM for scientific review.

Results OECD validation ring trial –average over three laboratories

Accuracy	94%
Sensitivity	93% (FNR: 7%)
Specificity	96% (FPR: 4%)

GARDpotency

Accuracy	82%

So far, no other test, in vitro or in vivo has shown such high accuracy (1,7).
FNR: False Negative Rate, FPR:False Positive rate.

REACH and ECHA compliance

The GARDskin assay is accepted by ECHA for REACH testing and dossier filing with the following official statement:

"The REACH Regulation allows the use of non-adopted in vitro methods in case they meet the EURL ECVAM criteria for entering pre-validation. For the GARD assay this criteria is met" ECHA, official answer.

About us

SenzaGen is dedicated to the development of innovative *in vitro* methods for safety testing of various toxicological endpoints across different industries. SenzaGen performs GARD in its own laboratory and through CRO partners around the world.

References

1. Roberts, D.W. Is a combination of assays really needed for non-animal prediction of skin sensitization potential? Performance of the GARD (Genomic Allergen Rapid Detection) assay in comparison with OECD guideline assays alone and in combination. Regulatory Toxicology and Pharmacology, 2018
2. Johansson H., et al. Evaluation of the GARD assay in a blind Cosmetics Europe study. ALTEX 2017
3. Asturiol et al., Consensus of classification trees for skin sensitisation hazard prediction. Toxicology In Vitro, 2016
4. Forreryd et al., From genome-wide arrays to tailor-made biomarker readout – Progress towards routine analysis of skin sensitizing chemicals with GARD. Toxicology In Vitro, 2016
5. Johansson et al., GARD in-house validation – A proof of concept. Tox Sci, 2014
6. Zeller et al., The GARD platform for potency assessment of skin sensitizing chemicals. ALTEX, 2017
7. Johansson et al., The validation of GARDskin. Abstract 3066, SOT Conference 2018

Available GARD™assays

GARD™skin. or in vitro classification of skin sensitizers with an outstanding accuracy > 90 %.

GARD™potency. First-in-class assay for CLP/GHS classification of skin sensitizers[4] with a hitherto unmet accuracy.

GARD™air. First-in-class assay for specific identification of respiratory sensitizing chemicals.

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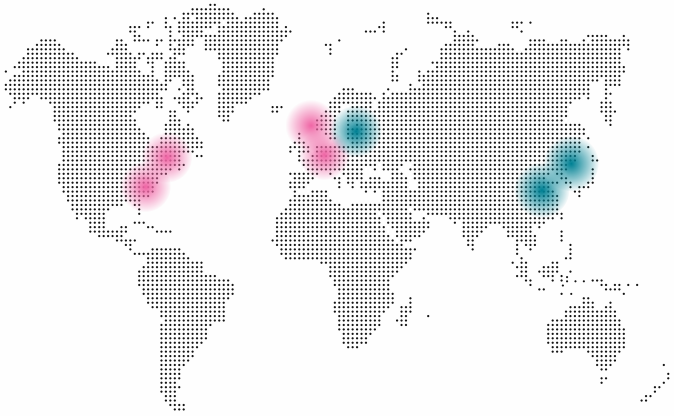
The GARD™ portfolio is available at several CROs:

Licence labs*
Burleson Research Technologies
Eurofins BPT
MB Research Laboratories

Distributors*
Charles River Laboratories
Eurosafe
Guangzhou CHN-ALT Biotech Co. Ltd
Woo Jung BSC
XCellR8



**In alphabetic order*

Contact us

EUROPE. Andy Forreryd, Scientific Liaison MGR
andy.forreryd@senzagen.com

AMERICAS. Joshua Schmidt, Business development MGR
Joshua.schmidt@senzagen.com

APAC & ROW. Julia Huijie Li, Business Development Coordinator julia.li@senzagen.com

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