

Introduction to the Virtual Human Platform

ECETOC 2025 workshop



VHP4Safety project NWA 1292.19.272 is part of the Netherlands Science Agenda (NWA) research program 'Research along Routes by Consortia (ORC)', which is funded by the Netherlands Organization for Scientific Research (NWO).





Concept Article

The Virtual Human Platform for Safety Assessment (VHP4Safety) Project: Next Generation Chemical Safety Assessment Based on Human Data

Anne Kienhuis^{#1,2}, Cyrille Krul^{#3}, Jacqueline van Engelen¹, Chris T. Evelo⁴, Ellen Hessel¹, Jarno Hoekman⁵, Nynke Kramer⁶, Esmeralda Krop², Rosalinde Masereeuw⁷, Ellen Moors⁵, Simona O. Negro⁵, Aldert H. Piersma^{1,2}, Raymond Pieters^{2,3}, Marc Teunis³, Egon L. Willighagen⁴ and Juliette Legler² on behalf of the VHP4Safety consortium[§]

¹Center for Health Protection, RIVM, National Institute for Public Health and the Environment, Bilthoven, The Netherlands; ²Institute for Risk Assessment Sciences, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands; ³Innovative Testing in Life Sciences and Chemistry, University of Applied Sciences Utrecht, Utrecht, The Netherlands; ⁴Department of Bioinformatics (BiGCaT), NUTRIM, Maastricht University, Maastricht, The Netherlands; ⁵Copernicus Institute of Sustainable Development, Faculty of Geosciences, Utrecht University, Utrecht, The Netherlands; ⁶Division of Toxicology, Wageningen University, Wageningen, The Netherlands; ⁷Division of Pharmacology, Utrecht Institute for Pharmaceutical Sciences, Utrecht University, Utrecht, The Netherlands



VHP4SAFETY

virtual human platform for safety assessment

The Virtual Human Platform

Our platform is online available at:

platform.vhp4safety.nl

It has three main sections:
Tools, Case studies, and Data.



THE VIRTUAL HUMAN PLATFORM

TOWARDS SAFETY ASSESSMENT BASED ON HUMAN DATA

Tools

Select any of the VHP tools to streamline your risk assessment process and get results relevant to your research.

41 tools available

Case Studies

Have a look at our case studies to see how multiple VHP tools can be combined to best answer your research question.

3 case studies

Data

Find all the (meta)data you need to use the VHP tools and run workflows as efficiently as possible.

0 datasets

About VHP4Safety

What is the Virtual Human Platform?

The Virtual Human Platform (VHP) was developed through the VHP4Safety project to support chemical and pharmaceutical safety testing. By developing in silico tools and in vitro models, we provided a platform for precision safety testing that aims to eliminate the need for laboratory animals. VHP helps risk assessors evaluate the safety of chemicals for human use, focusing on vulnerable groups like infants, the elderly, and individuals with health conditions.



The Virtual Human Platform

The *Tools* section of the platform show services VHP4Safety provides or provided elsewhere.

They have rich metadata around sustainability, validation, and documentation.

Tools

Explore tools developed by and/or used in VHP4Safety.

You can search for a tool that you know using the search box below. Alternatively, you can filter the tools with respect to the **case studies' flow step** that they belong to and/or the regulatory question that they are associated with. Use the "Filters" button to show filter options, then "Apply Filter" to see results, and click "Clear Filter" to reset the filters.

Search by tool name...

Search

Clear

Filters

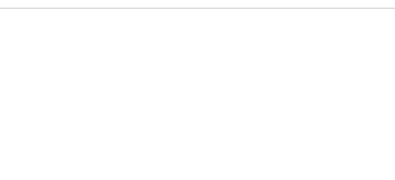


AOP Network Builder

web-based tool for building, visualizing, and analyzing Adverse Outcome Pathway (AOP) networks. It serves as an extended user interface for the AOP-Wiki RDF SPARQL endpoint.



No VHP Instance



AOP-BUILDER

A tool to explore scientific literature to extract relevant entities and their relations for AOP construction, using AI.



VHP Instance

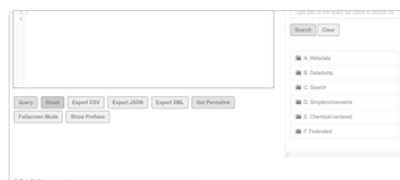


AOP-Wiki API

A REST API for AOP-Wiki content to make SPARQL queries.



VHP Instance



AOP-Wiki Snorql UI

A graphical interface to make queries to the AOP-Wiki SPARQL endpoint.



VHP Instance



ArrayAnalysis

A user-friendly service to conduct quality control and pre-processing analyses for microarray data.



VHP Instance



BioModels

A repository of mathematical models of biological and biomedical systems.



No VHP Instance





VHP4SAFETY

virtual human platform for safety assessment

The Virtual Human Platform

Project data has not been formally released yet, but will be indexed on the *Data* section of the platform.

You can filter the list in various ways.

VHP4Safety Data

Explore datasets generated or used in VHP4Safety and hosted on BioStudies archive.

[Search](#)[Clear](#)[Filters](#)[Case Study ▾](#)[Flow Step ▾](#)[Regulatory Question ▾](#)

Selected Filters:

[Case Study: Parkinson ✕](#)[Flow Step: Chemical Information ✕](#)[Apply](#)[Clear](#)[Previous](#)

Page 1 | Showing 1 - 0 of 0 studies

No studies found

EXPLORE

[Tools](#)
[Case Studies](#)
[Data](#)

RESOURCES

[About](#)
[Partners](#)
[Contact](#)

LEGAL

[Terms of Service](#)
[Privacy Policy](#)

CONNECT

[GitHub](#)
[LinkedIn](#)



VHP4SAFETY

virtual human platform for safety assessment

The Virtual Human Platform

VHP4Safety implements the generic risk assessment workflow in six process flow steps.

Case studies are aligned with these six steps, and cover six different regulatory questions that demonstrate the approach.

Case Studies

The Virtual Human Platform has been developed using three example case studies, which function as a proof of concept.

For each case study, two exemplary regulatory questions were formulated to show how the platform can be used for a step-by-step human-based risk assessment.



Kidney case study

To study kidney disease and pharmacovigilance.



Parkinson case study

To study life course pesticide exposure and neurodegenerative disease.



Thyroid case study

To study health effects discriminated by age and sex on thyroid-mediated neurodevelopment.

Process Flow Steps

The Virtual Human Platform implements the generic risk assessment workflow as a process flow comprising six steps.

Hazard / Chemical Characteristics

(External) Exposure

(Toxicology) Kinetics

(Internal) Exposure

Toxicodynamics / AOP

Adverse Outcome

EXPLORE

[Tools](#)
[Case Studies](#)
[Data](#)

RESOURCES

[About](#)
[Partners](#)
[Contact](#)

LEGAL

[Terms of Service](#)
[Privacy Policy](#)

CONNECT

[GitHub](#)
[LinkedIn](#)

Tools

AOP tools

- Starting at the VHP4Safety platform, a guided walkthrough will help participants to familiarize themselves with a variety of AOP-related tools developed in VHP4Safety
- With these tools, users can access and explore AOPs, connect with additional resources and other VHP4Safety tools, and visualize detailed AOP networks. The uses range from technical implementation to user-friendly interface interactions

toxtempassistant.vhp4safety.nl

- Based on the ToxTemp template from OECD Guidance Document 211, the tool guides users through 77 structured questions to create standardised cell-based test method descriptions.
- Uses LLMs to extract and organise information on cell-based toxicological test methods from user-uploaded documents.
- Current output: prefilled ToxTemp templates

ToxTempAssistant

toxtempassistant.vhp4safety.nl



Step 1: Register

 **ToxTempAssistant** v2.0.1-beta

Login

Email or ORCID iD

Password

Login

beta
Sign-up

Or login using your ORCID account:

 Login with ORCID



About ToxTempAssistant

ToxTempAssistant¹ helps scientists document cell-based toxicological test methods more efficiently. Based on the ToxTemp template² from OECD Guidance Document 211, the tool guides users through 77 structured questions to create clear, standardised test method descriptions.

Using large language models, ToxTempAssistant extracts and organises information from uploaded documents, turning manual data entry into an expert-review process. Its goal is to reduce the documentation burden and support the wider acceptance of New Approach Methodologies.

¹ [doi:10.14573/altex.1909271](https://doi.org/10.14573/altex.1909271)

² [doi:10.5281/zenodo.17192971](https://doi.org/10.5281/zenodo.17192971)

Supported by



Step 2: Following the onboarding

 **ToxTempAssistant** v1.25.1-beta

 jente.houweling@rivm.nl

1. Overview

1.1 Descriptive full-text title

1.2 Abstract

2. General information

2.1 Name of test method

2.2 Version number and date of deposition

2.3 Summary of introduced changes in comparison to previous version(s)

2.4 Assigned data base name

2.5 Name and acronym of the test depositor

2.6 Name and email of contact person

2.7 Name of further persons involved

2.8 Reference to additional files of relevance

3. Description of general features of the test system source

3.1 Supply of source cells

3.2 Overview of cell source component(s)

3.3 Characterization and definition of source cells

3.4 Acceptance criteria for source cell population

Test method: Thyroid hormone transport assay

1. Overview

1.1 Descriptive full-text title

1.2 Abstract

Provide a descriptive title using normal language without technical terms or acronyms.

A Study on How Chemicals Affect Thyroid Hormone Uptake in Brain Cells

GPT Update

Accepted

1.2 Abstract

Please write an abstract on the cell-based toxicological test system. The abstract should be no more than 200 words.

The thyroid hormone transport assay is a cell-based toxicological test designed to evaluate the impact of endocrine disrupting chemicals (EDCs) on thyroid hormone uptake in neural cell lines. This assay utilizes three specific cell lines: H4, representing astrocytes; MO3.13, representing oligodendrocytes; and SK-N-AS, representing neurons. The primary endpoint measured is the uptake of thyroid hormones (T3 and T4) in these cell lines compared to vehicle control, providing insights into the effects of EDCs on thyroid hormone transport. The assay models a cellular process related to thyroid hormone transport inhibition. By assessing the disruption of thyroid hormone signaling, the assay addresses significant regulatory concerns regarding neurodevelopmental toxicity and the safety of chemicals. Overall, the thyroid hormone transport assay serves as a valuable tool for understanding the implications of EDC exposure on thyroid hormone homeostasis and its effects on human health, particularly during critical developmental periods. _(Source: Cell model manuscript_draft_V2.docx)_

GPT Update

Accepted

12 %

Back

Save

Options

Export

Guided Tour

3/8

Click here to view the answer history for this question, including earlier LLM-generated responses.

Next


ToxTempAssistant
v1.25.1-beta

1. Overview
1.1 Descriptive full-text title
1.2 Abstract
2. General information
2.1 Name of test method
2.2 Version number and date of deposition
2.3 Summary of introduced changes in comparison to previous version(s)
2.4 Assigned data base name
2.5 Name and acronym of the test depositor
2.6 Name and email of contact person
2.7 Name of further persons involved
2.8 Reference to additional files of relevance
3. Description of general features of the test system source
3.1 Supply of source cells
3.2 Overview of cell source component(s)
3.3 Characterization and definition of source cells
3.4 Acceptance criteria for source cell population

Test method: Thyroid hormone transport assay

1. Overview

1.1 Descriptive full-text title

Provide a descriptive title using normal language without technical terms or acronyms.

A Study on How Chemicals Affect Thyroid Hormone Uptake in Brain Cells

1.2 Abstract

Please write an abstract on the cell-based toxicological test method in no more than 200 words:

The thyroid hormone transport assay is a cell-based toxicological test designed to evaluate the impact of endocrine disrupting chemicals (EDCs) on thyroid hormone uptake in neural cell lines. This assay utilizes three specific cell lines: H4, representing astrocytes; MO3.13, representing oligodendrocytes; and SK-N-AS, representing neurons. The primary endpoint measured is the uptake of thyroid hormones (T3 and T4) in these cell lines compared to vehicle control, providing insights into the effects of EDCs on thyroid hormone transport. The assay models a cellular process related to thyroid hormone transport inhibition. By assessing the disruption of thyroid hormone signaling, the assay addresses significant regulatory concerns regarding neurodevelopmental toxicity and the safety of chemicals. Overall, the thyroid hormone transport assay serves as a valuable tool for understanding the implications of EDC exposure on thyroid hormone homeostasis and its effects on human health, particularly during critical developmental periods. _(Source: Cell model manuscript_draft_V2.docx)_

jente.houweling@rivm.nl
You are logged in as **jente.houweling@rivm.nl**. Here you can link your ORCID, log out, or cite this tool.

Link ORCID

Guided Tour
Logout

DOI 10.5281/zenodo.15607642
36b0144
gpt-4o-mini

The onboarding auto-starts on registration, but can also be activated via the side-bar

Step 4: Export & leave feedback

 **ToxTempAssistant** v1.25.1-beta

1. Overview

1.1 Descriptive full-text title

1.2 Abstract

2. General information

2.1 Name of test method

2.2 Version number and date of deposition

2.3 Summary of introduced changes in comparison to previous version(s)

2.4 Assigned data base name

2.5 Name and acronym of the test depositor

2.6 Name and email of contact person

2.7 Name of further persons involved

2.8 Reference to additional files of relevance

3. Description of general features of the test system source

3.1 Supply of source cells

3.2 Overview of cell source component(s)

3.3 Characterization and definition of source cells

3.4 Acceptance criteria for source cell population

12 %

Back

Submit Feedback Before Export

i Prior to exporting your ToxTemp draft, we ask you to provide brief feedback. Your input contributes to the refinement of both the LLM-generated content and the ToxTempAssistant as documentation support tool for toxicologists.

What did you think of the LLM-generated responses?

Please comment on its usefulness, clarity, scientific accuracy, or anything else that stood out, including what worked well or what needs improvement.

How would you rate the usefulness of the LLM-generated ToxTemp draft?

"Useful" refers to whether the draft helped you get started, saved time, or provided relevant structure or content.

Not useful

Very useful

Selected rating: 3

Submit Feedback

thyroid hormone transport assay

chemical terms or acronyms.

in Brain Cells

GPT Update

Accepted

method in no more than 200

logical test designed to

s) on thyroid hormone uptake

: H4, representing

N-AS, representing neurons.

mones (T3 and T4) in these

the effects of EDCs on

ess related to thyroid

thyroid hormone signaling,

g neurodevelopmental

toxicity and the safety of chemicals. Overall, the thyroid hormone transport assay serves as a valuable tool for understanding the implications of EDC exposure on thyroid hormone homeostasis and its effects on human health, particularly during critical developmental periods. _(Source: Cell model manuscript_draft_V2.docx)_

GPT Update

Accepted

Save

Options

Export