

The novel platform will enable regulators and industry to identify, quantify and prevent cardiotoxic co-exposures to industrial chemicals and pharmaceuticals in a cost-effective way.

A European Green Deal

Striving to be the first climate-neutral continent

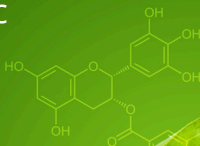


ALTERNATIVE

**BUILDING THE INNOVATIVE
PLATFORM FOR DETECTING THE
CARDIOTOXICITY OF CHEMICALS**

<https://alternative-project.eu/>

Environmental toxicity
chemical mixtures through
an innovative platform
based on aged cardiac
tissue model





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CONTACT DETAILS



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TARGET AUDIENCES



Policymakers & regulators



Scientific community in the areas of toxicology and biomaterials



National health services in Europe



Environmental & health-related NGOs and citizen initiatives in Europe



Pharma companies and agricultural industry



ALTERNATIVE

PROJECT RESULTS

Improved understanding of the **regulatory utility** of complex **in vitro 3D models** versus simpler 2D models



Scientific evidence to enable **prevention and mitigation of co-exposure** to pharmaceuticals and industrial chemicals **in the environment and the technosphere**

Improvement of existing **risk assessment approaches** to **reduce the most critical exposures**, including setting limit values, assessment of new regulatory approaches such as **Mixture**

CONSORTIUM PARTNERS

11 BENEFICIARIES WORLDWIDE



Duration: 1 October 2021 - 30 September 2024 (36 months)



ALTERNATIVE PROJECT



Project type: Horizon 2020 Research and Innovation Action (RIA)



EU Contribution: € 5.5 millions

Building the Innovative Platform to Assess the bio-transformation

NOVEL PLATFORM

ALTERNATIVE novel platform will enable regulators and industry to identify, quantify and prevent cardiotoxic co-exposures to industrial chemicals and pharmaceuticals in a cost-effective way.



MACHINE LEARNING

The platform will be coupled with a reliable, high-throughput monitoring system based on multi-omics analyses, and integrated into a Machine Learning (ML) risk assessment tool.

The platform will consist of a three-dimensional tissue engineering in-vitro model mimicking the human cardiac tissue.



In addition, ALTERNATIVE will modify the tissue model to reproduce the aged myocardial tissue and elucidate the adverse effects of chemicals on older people.

Pharmaceuticals

Current regulatory guidelines



In vivo testing

Evaluation of heart rate, ECG, blood pressure, QT prolongation

In vitro testing hERG/_{IKr}

Knowledge gaps



- Interspecies differences
- Missing assessment of heart structure & contractility
- Limited predictivity of current methods

Needs

Development of human-relevant non-animal based methods

- Cost-effective
- Small chronic doses
- Complex mixtures
- Include susceptible populations

Chemicals, Pesticides, and Biocides

Current regulatory guidelines



In vivo testing

Evaluation of cardiac organ weight, pathology, histopathology, cardiac

Knowledge gaps



- Interspecies differences
- MoA identification difficult
- Large number of chemicals
- *In vivo* testing is expensive, time-consuming, and unethical

Cardiotoxicity of Chemicals and their products

DECISION-HELPER

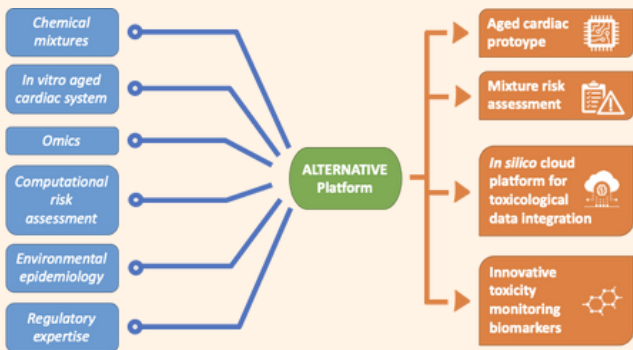
ALTERNATIVE will also provide systematic reviews of high-quality epidemiological studies to support integrated in-vitro and in-silico data, giving a more robust basis for regulatory decisions.

ALTERNATIVE's proof-of-concept validation will be performed on well-known mixtures of pollutants, affecting different environmental compartments, and selected via epidemiological, toxicological and modelling expertise.



ALTERNATIVE platform will be an Innovative tool

for complying with the current regulation associated with the assessment of chemical compounds. It will be a new instrument to evaluate unpredictable toxicity due to synergistic effects of different chemicals, additionally worsened by the human ageing process.



WP3 – EPIDEMIOLOGY & TOXICOLOGY

Epidemiological and toxicological evaluation of chemical mixtures

WP7 – PROOF OF CONCEPT VALIDATION

Proof of concept and case study testing of ALTERNATIVE system

WP2 - REGULATORY

Addressing regulatory needs for cardiotoxicity data and providing tools to guide the use of the developed methods

WP6 - RISK ASSESSMENT

Innovative models for risk assessment of chemical mixtures

WP6 - CLOUD ML IN SILICO SYSTEM

A cloud-based Machine Learning approach for biological data evaluation and integration

WP4 - AGED CARDIAC TISSUE

3D mimicking vulnerable tissue replicating biological environment

WP4 - SENSORISED BIOREACTOR

A sensorised system able to simulate hemodynamic cell environment

WP5 - OMICS

Omics approaches to analyse the effects of chemical mixtures on cellular genes, proteins and metabolites

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ALTERNATIVE

Building the Innovative Platform to Assess the Cardiotoxicity of Chemicals and their bio-transformation products

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