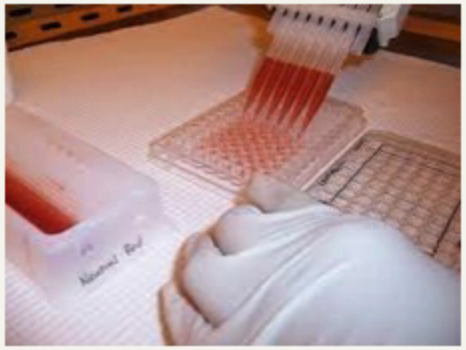
# Methods of Testing - No animals required.

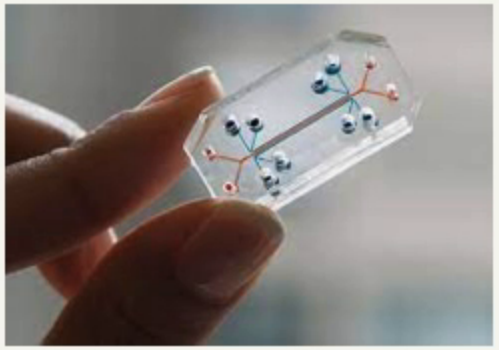
A snap shot to do your own research by Camp Beagle UK- advocates for change

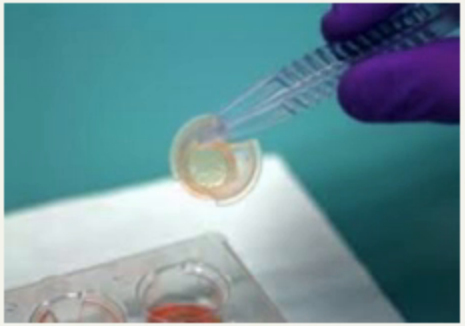
# Lots of names for methods of tests without animals.

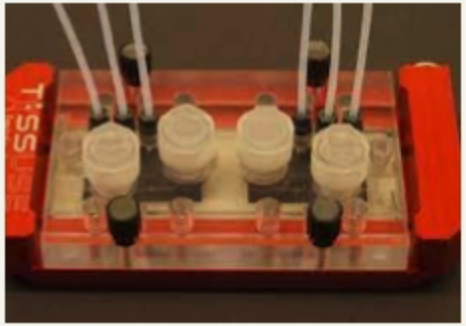
## Does it matter?

- Yes it does! Some of them still use animal parts or even animals but maybe not in the 'finished products'
- Some still use animal tested ingredients or processes.
- Some suggest alternatives but that does not mean no animals.
- Let's be clear Non Animal Methods of Testing is clear and obvious..
- Anything else is not honest.
- There are decades and decades of research, resources and tools available to make compulsory, the use of regulatory standard NAM's in testing .
- Imagine if the funding already available was even split 50/50 today as opposed to 99% to animal testing 1% to NAM's.
- What a difference this would make to research, safety testing, and product development!
- The saving in animal lives from pain and suffering incalculable.









AltTox.org

Non-animal Methods for Toxicity Testing

# Types of Non Animal testing

## In Silico, In Vitro, In chemico, Human subject

**This presentation is to help you see and find out more about the range of non animal methods of testing that are around today. Some of the scientific terms need a bit more research if you are really keen.**

In recent years *in silico* models have become increasingly popular. The term '*in silico*' refers to computational models that investigate pharmacological hypotheses using methods such as databases, data analysis tools, data mining, machine learning, and network analysis tools.

Usually, *in silico* methods are used alongside in vitro models.

https://www.news-medical.net/life-sciences/What-is-in-Silico.aspx

Human subject research is systematic, scientific investigation that can be either interventional or observational and involves human beings as research subjects, commonly known as test subjects. Human subject research can be either medical research or non-medical research.

In vitro

in vitro describes something "in glass" such as a test tube or petri dish.

Examples of in vitro studies include: the isolation, growth and identification of cells derived from multicellular organisms (in cell or tissue culture); subcellular components (e.g. mitochondria or ribosomes); cellular or subcellular extracts (e.g. wheat germ or reticulocyte extracts);

In chemico - the term in chemico is defined as referring. to "**the use of abiotic chemical reactivity methods as. replacements for animal (in vivo) assays**".

https://www.researchgate.net/publication/40694957_The_In_Chemico-In_Silico_Interface_Challenges_for_Integrating_Experimental_and_Computational_Chemistry_to_Identify_Toxicity

# Predictive computer based models

The potential toxicity of a chemical can be predicted by assessing the chemical structures and properties of a few or many thousands of chemicals, manually or with mathematical algorithms and supercomputing power.

Find out more:

*AltTox.org* is a website dedicated to advancing non-animal methods of toxicity testing, both to better protect the health of humans, animals, and the environment and to reduce the numbers and suffering of animals used in current toxicology assessments. The website is designed to encourage the exchange of technical and policy information on *in vitro* and *in silico* methods for all types of toxicity tests. The target audience includes stakeholders in industry, government, academia, and nongovernmental organizations.

**Click on the picture below to open the video**

**Tox21 project** https://ntp.niehs.nih.gov/whatwestudy/tox21/index.html

# High Throughput & Virtual Screening

High-throughput screening (HTS) is a drug discovery process that allows automated testing of large numbers of chemical and/or biological compounds for a specific biological target.

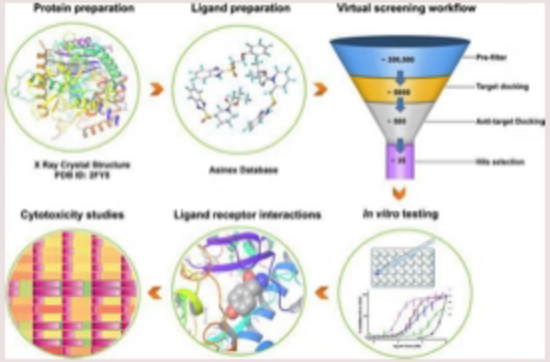
## EXISTING TECHNOLOGY

The main goal of the HTS technique is to accelerate drug discovery by screening large compounds at a rate that may exceed a few thousand compounds per day or per week. It is important, because different types of chemical synthesis generates a vast number of novel compounds.

## NEW TECHNOLOGY

Virtual screening provides the assessment of chemical compounds from those chosen in an established and agreed reference library, within weeks for use in new drug development. It is cost effective, shortens time to explore significantly and reduces uncertainty of success in new drug development

https://www.researchgate.net/figure/Overall-workflow-of-the-structure-based-virtual-screening-based-identification-of-novel_fig1_321276426



# Use of existing validated information and data

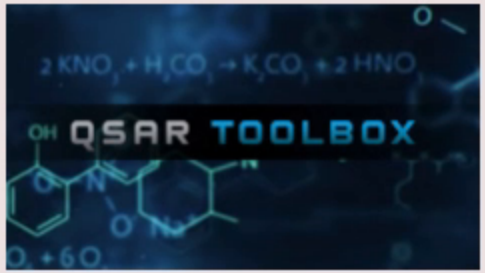
In silico approaches are becoming increasingly important tools in toxicology. 'In silico' data include results obtained from (quantitative) structure activity relationship ((Q)SAR) models, chemical categories, grouping, read-across and physiologically-based (pharmaco)kinetic (PB(P)K) models, and 'big data' analysis.

biobank uk

Enabling scientific discoveries that improve human health

https://www.ukbiobank.ac.uk/

**UK Biobank is a large-scale biomedical database and research resource, containing in-depth genetic and health information from half a million UK participants. The database is regularly augmented with additional data and is globally accessible to approved researchers undertaking vital research into the most common and life-threatening diseases. It is a major contributor to the advancement of modern medicine and treatment and has enabled several scientific discoveries that improve human health.**




https://qsartoolbox.org/

What is the qsar Toolbox ?The Toolbox is **a software application intended to the use of governments, chemical industry and other stakeholders in filling gaps in (eco)toxicity data needed for assessing the hazards of chemicals**. It has been developed in close collaboration with the European Chemicals Agency.

# New Imaging Technologies

Considered by The New England Journal of Medicine “one of the most important medical developments of the past 1,000 years — ranking with the discovery of anaesthesia and antibiotics,” medical imaging is the digital microscope that enables physicians to see inside the body and inside cells to screen, diagnose and stage disease; monitor treatments and disease recurrence; and facilitate medical research in areas such as drug discovery.

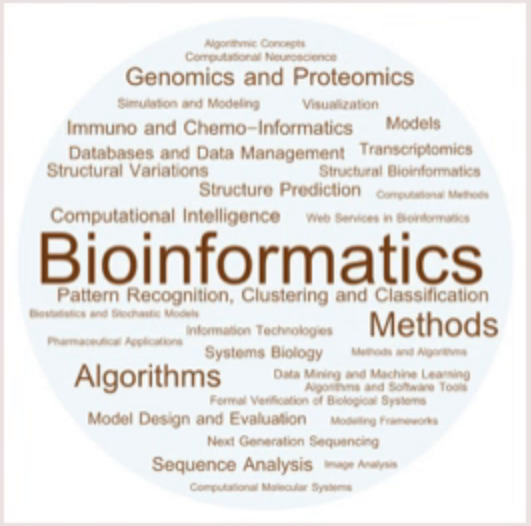
https://www.definitivehc.com/blog/future-trends-in-medical-imaging-2019

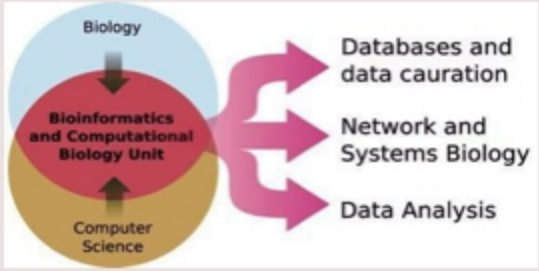
**What are the technologies used in medical imaging?Several types of medical imaging technologies are used in various facets of medicine.**

- **Computed Tomography. ...**
- **Magnetic Resonance Imaging. ...**
- **Vascular Interventional Radiography. ...**
- **Sonography. ...**
- **Computed Tomography Technologist. ...**
- **Magnetic Resonance Imaging Technologist. ...**
- **Vascular Interventional Radiographer. ...**
- **Sonographer.**

# Computational Bioinformatics

Computational biology and bioinformatics is an interdisciplinary field that develops and applies computational methods to analyse large collections of biological data, such as genetic sequences, cell populations or protein samples, to make new predictions or discover new biology. QSARs is the term often applied to this particular work.



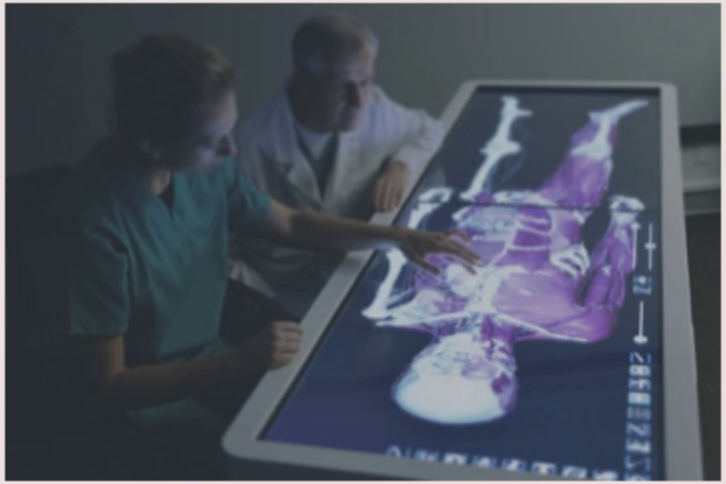





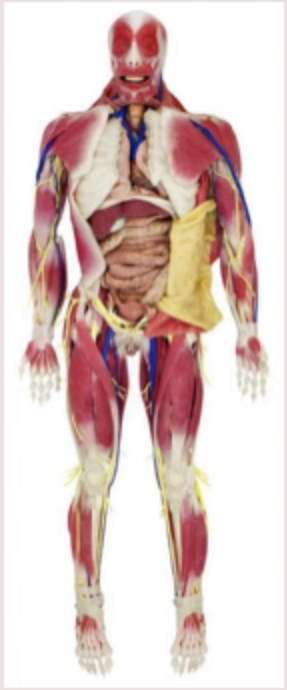
**click on the video to open the TED Talk**

# Human-Patient Simulators

Human Patient Simulators are life-size adult and infant patient simulators that replicate elements of human physiology like respiration, heart beat and pulse. They are mechanical and computer controlled simulators that mimic human appearance and display symptoms and disease processes as they present in a real patient. This also extends into veterinary science.



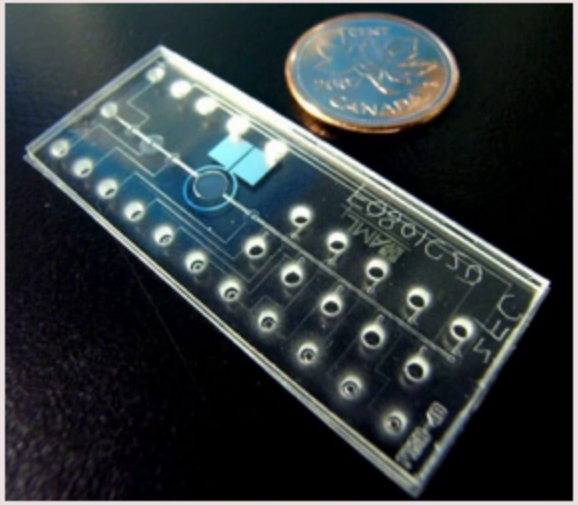
https://www.anatomage.com/table/



https://syndaver.com/

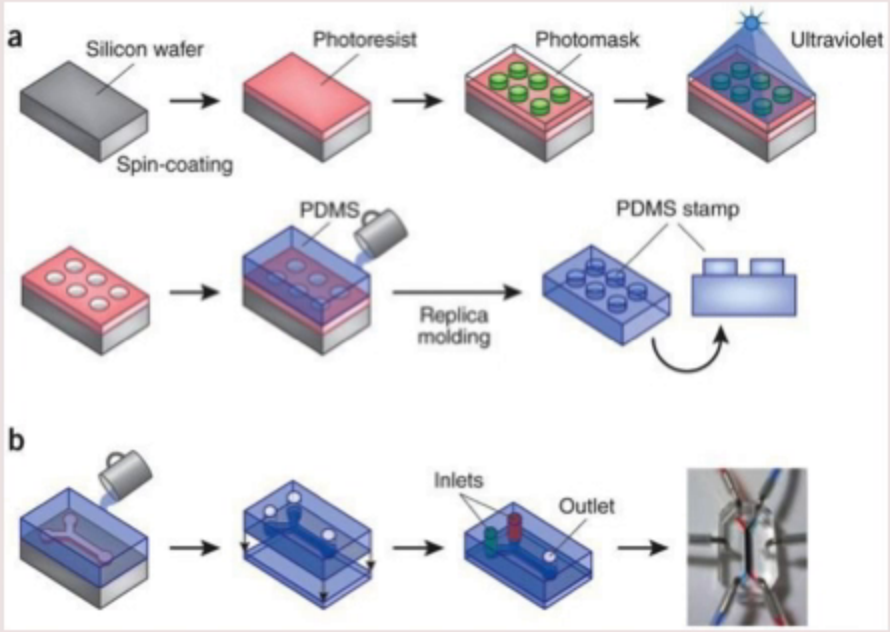
# Microfluidic chips

Microfluidics has been increasingly used in the biological sciences because precise and controlled experiments can be conducted at a lower cost and faster pace. Lab on a Chip devices use microfluidics for applications such as Point of Care testing of diseases, or Organ on a Chip studies.



Microfluidic chips allow testing over a microscope of the properties of gases and liquids

**The** reduced turnaround time and increased productivity **with a small device footprint allows for ease of integration into a variety of experimental setups.**



# On a chip

A lab-on-a-chip is a miniaturized device that integrates into a single chip one or several analyses, which are usually done in a laboratory; analyses such as DNA sequencing or biochemical detection. Research on lab-on-a-chip focuses on several applications including human diagnostics, DNA analysis and, to a lesser extent, the synthesis of chemicals. The miniaturization of biochemical operations normally handled in a laboratory has numerous advantages, such as cost efficiency, parallelization, ergonomics, diagnostic speed and sensitivity. The emergence of the lab-on-a-chip field mainly relies on two core technologies: microfluidics and molecular biology. https://www.elveflow.com/microfluidic-reviews/general-microfluidics/introduction-to-lab-on-a-chip-review-history- and-future/

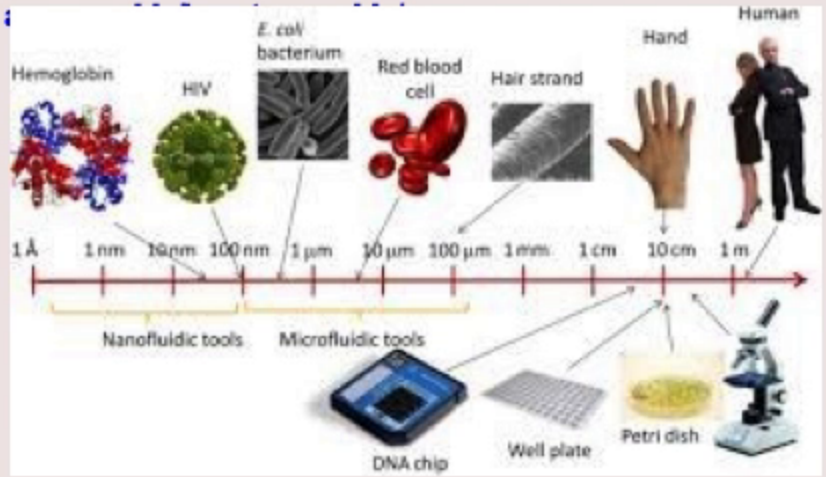
https://wyss.harvard.edu/news/the-immune-system-is-very-complicated-but-now-its-on-a-chip/

https://www.ufluidix.com/microfluidics-applications/org

https://cn-bio.com/liver-on-chip/

https://www.sciencedirect.com/science/article/abs/pii/S0142961222001715

https://wyss.harvard.edu/technology/human-organs-on-chips/



# 3D tissue models

**What is a tissue model?**
**Tissue Model Applications**
**Developed for a variety of tissues, including skin, liver, stomach, kidney, and lung, organotypic models display a realistic micro-anatomy, mimic organ function, and offer insight into cell-to-cell interactions.**

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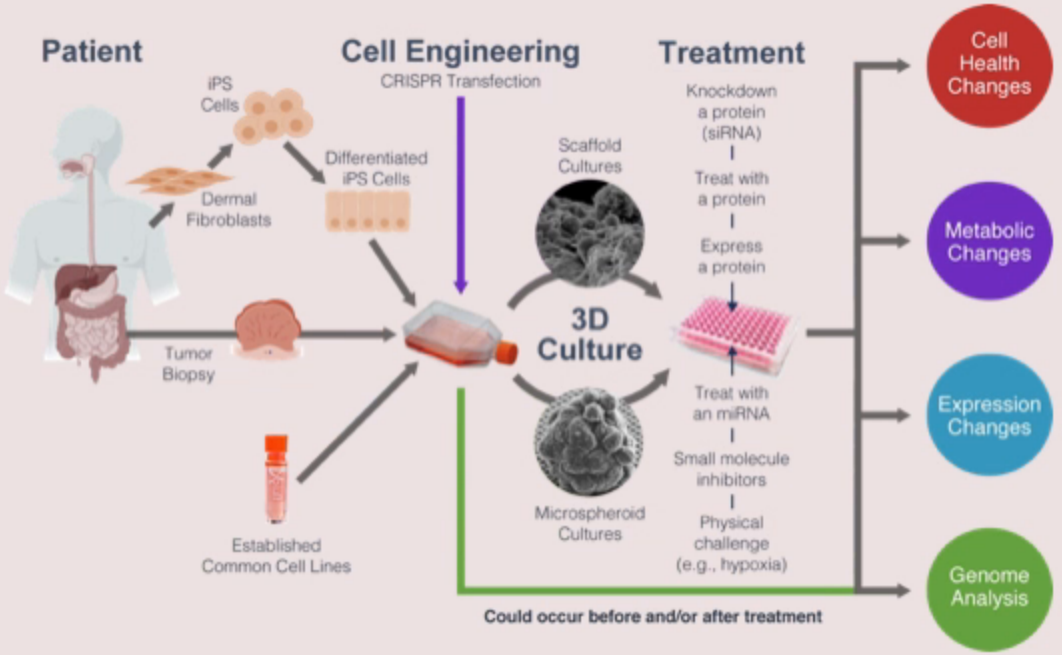
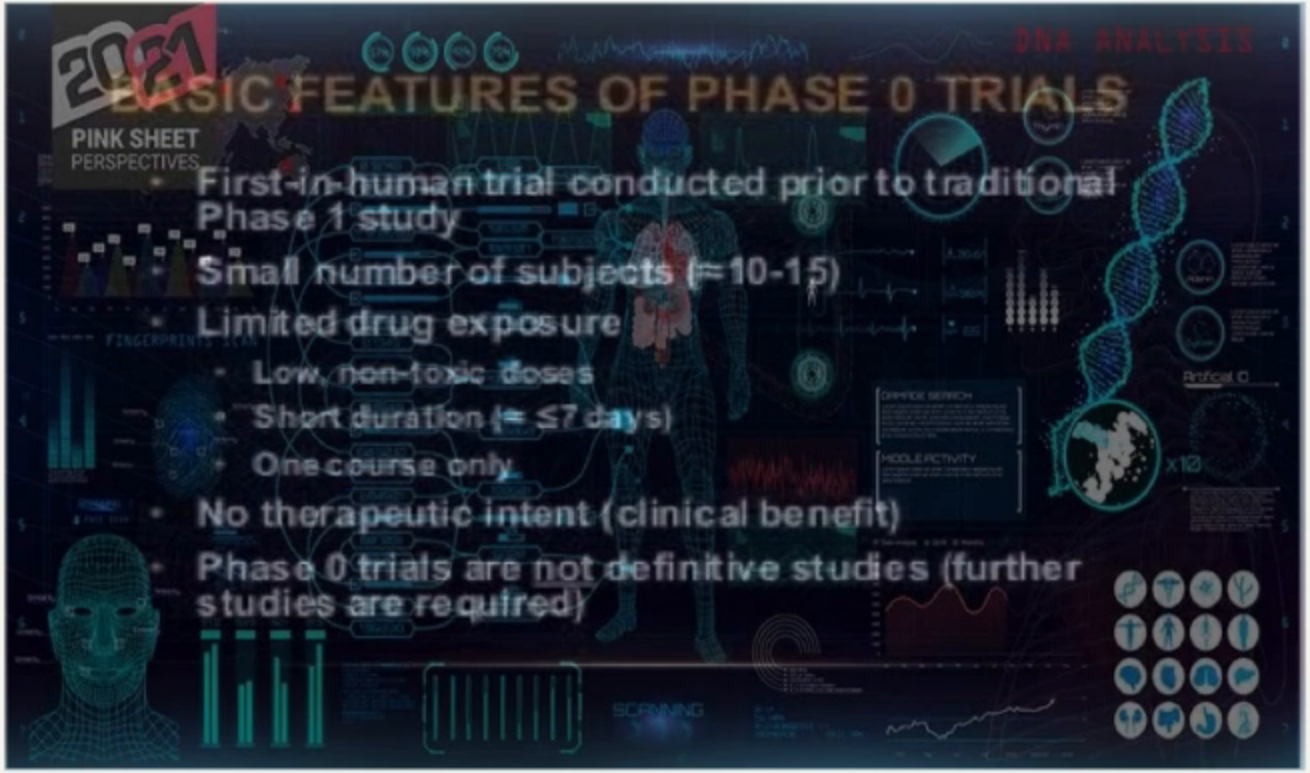


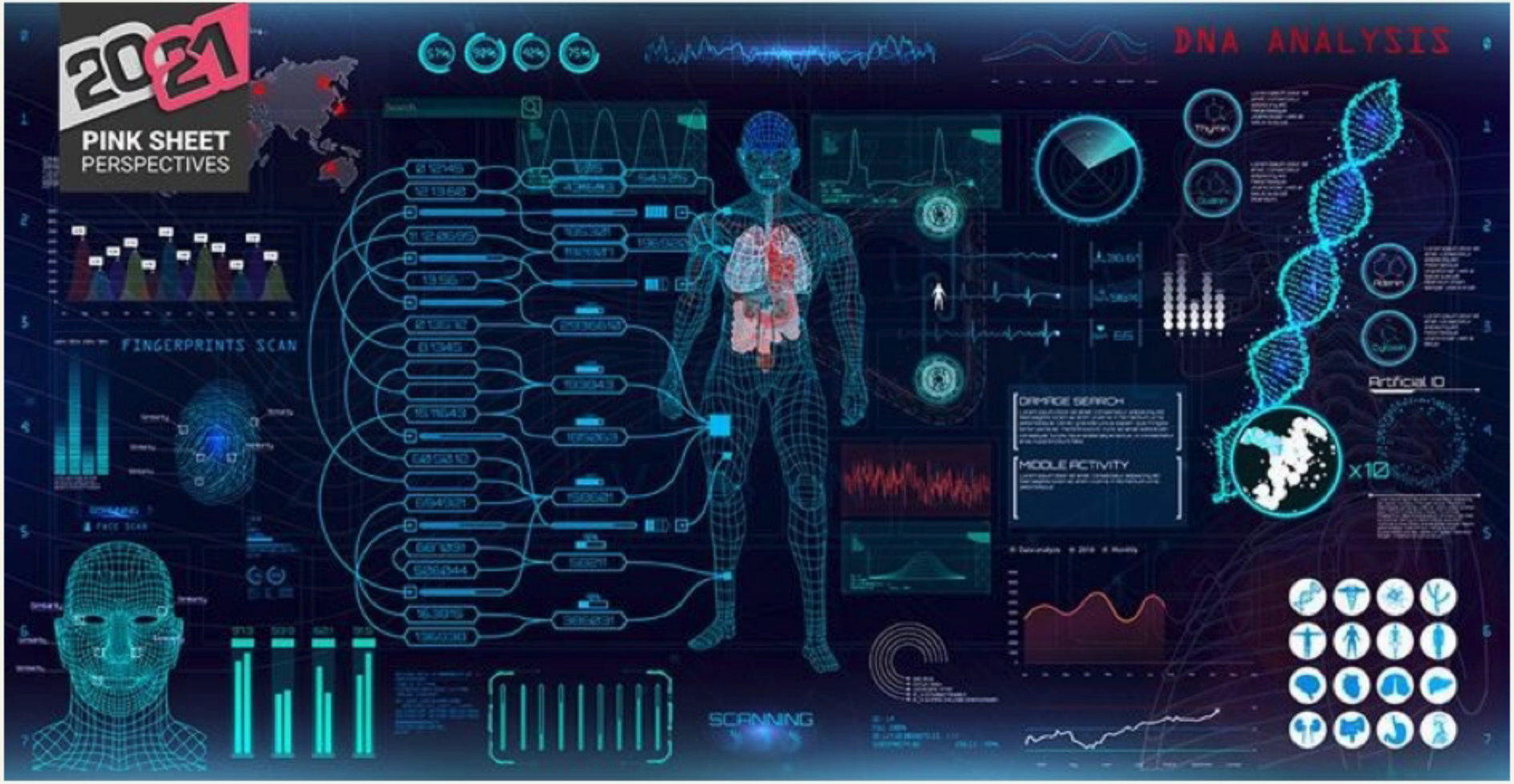
# Microdosing

A method called "microdosing" can provide vital information on the safety of an experimental drug and how it is metabolized in humans prior to large-scale human trials. Volunteers are given an extremely small one-time drug dose, and sophisticated imaging techniques are used to monitor how the drug behaves in the body. Microdosing can replace certain tests on animals and help screen out drug compounds that won't work in humans so that they are never tested in animals.

**Too low concentrations of drug at the target organ for lesser time can lead to efficacy failures, while wrong concentrations reaching wrong targets for longer time may lead to toxicity. Thus, a new experimental approach has been developed, known as Phase 0 or microdosing studies, to address issues pertaining to drug metabolism and pharmacokinetics.**

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3025138/


2021
PINK SHEET
PERSPECTIVES
BASIC FEATURES OF PHASE 0 TRIALS
First-in-human trial conducted prior to traditional Phase 1 study
Small number of subjects (≈10-15)
Limited drug exposure
Low, non-toxic doses
Short duration (≈ ≤7 days)
One course only
No therapeutic intent (clinical benefit)
Phase 0 trials are not definitive studies (further studies are required)
DNA ANALYSIS
SCANNING


2021
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