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Animal research fails to predict 'pharmaceutical outcomes' in humans

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News

Animal research attempts to mimic human disease symptoms but due to the fundamental species difference, the results are often misleading, writes Emily McIvor.

Ironically, Kirk Leech exposes his own misunderstanding and misrepresentation in his article "Ill-informed arguments perpetuate 'misunderstanding and misrepresentation' of animal research [1]".

He asserts that animals are not used to test the efficacy of pharmaceuticals. It's hard to tell whether this profound untruth is simply an amateurish mistake from a misinformed lobby group promoting the use of animals in research, or something more sinister.

Defending the use of animals is one thing, but being an animal research denier is quite another. So let's be clear, animals are used to asses both the safety and the efficacy of pharmaceuticals.

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> promising in animals only to fail, sometimes dangerously, in human trials"

Millions of mice, monkeys, dogs, rabbits and other species are used in pre-clinical animal studies in the drug discovery and development process. Their use is ethically and scientifically controversial, not least because in an age where we understand better than ever the need to achieve high quality translational medicine, the inability of animals to reliably predict pharmaceutical outcomes in humans is a big problem.

The pharmaceutical industry is all too aware of this problem. Vast amounts of time and money are wasted on pursuing therapies that appear promising in animals only to fail, sometimes dangerously, in human trials.

For example, a 2007 survey of nearly 300 animal test studies of six experimental drugs showed that pharmaceutical companies were overstating the effectiveness of drugs based on animal studies.

The history of stroke drug research is another example of this problem. Despite nearly 200 years of stroke research on animals, and more than a thousand candidate drugs tested for efficacy in animal models, only two stroke drugs are considered safe and effective.

One of those is aspirin, but its value in preventing a second stroke was not identified through animal studies but through patient observations.

For as long as health research relies on questionable animal ‘models’ of often uniquely human illnesses, we will see fewer new drugs becoming available than might otherwise be possible. On average, to develop and deliver a single drug to market now costs €1bn and takes 10-13 years. Misleading animal test results are a significant factor in raising the cost and extending the time of drug discovery and development.

We need a paradigm shift towards understanding human disease pathways, using advanced human biology-based in-vitro and computational tools. Disease pathways are disruptions of normal pathways at the gene, protein, cell and tissue level.

They unlock why and how human illness occurs. Animal studies try to mimic disease symptoms but the fundamental species differences in disease susceptibility, symptoms and response to drugs makes this fraught with difficulty.

These inherent weaknesses, and the myriad advantages of human biology-based systems, have inspired an explosion in state-of-the-art technologies that will define our future medical research. Inventions such as the human lung on a microchip, exemplify how science is leapfrogging what now seem like extraordinarily defunct animal tests.

The micro-lung absorbs oxygen like a normal human lung and transmits it to blood cells. Its creators at the Wyss institute are working on replicating other human organs and tissues such as the kidney and liver. The aim is to connect them all to create a complete human-body-on-a-chip.

This video [2] from the Wyss scientists is a fascinating primer on this scientific revolution and portends why animal models are falling out of favour in pharmaceutical research and development.

About the author

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[1] https://www.theparliamentmagazine.eu/articles/opinion/ill-informed-arguments-perpetuate-misunderstandin--and-misrepresentation-animal#.Uz6P8YXwpuI
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