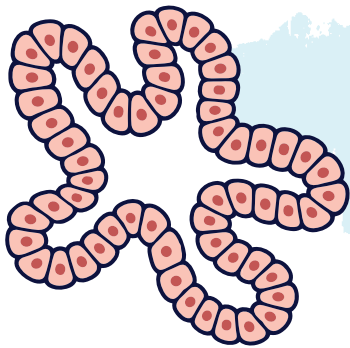




NAMs: ARE WE THERE YET?

A BEHIND THE HEADLINES UPDATE



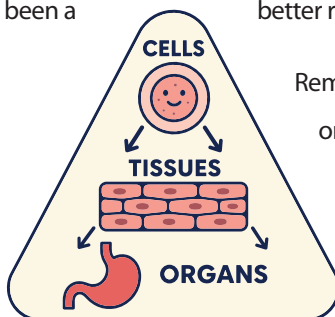
Science in the lab → Science at the bedside

WHAT ARE NAMs?

The term NAM generally is used in the context of biomedical research to mean a “new alternative method” or “novel approach methodology” that can reduce or even replace some animal use in research. Some even use the term NAM to mean any non-animal model. There has not been a universal standardization of terminology.

Examples of NAMs include a wide range of approaches, from non-living methods such as computer modeling and simulations, to living models growing in vitro (growing

outside the living body and in an artificial environment). The in vitro models include simple ones such as dishes of individual cells (animal or human), to complex in vitro models that allow individual cells to accumulate into tissues and mini-organs, to better reproduce functions in the body.

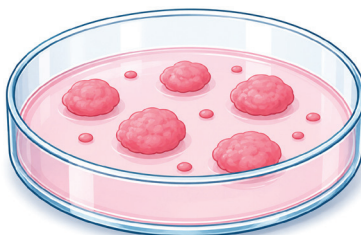


Remember, cells create tissues and tissues create organs. And now scientists can grow tiny versions of these organs in labs! They might not look just like the organ at its actual size, but they grow and behave just like one!

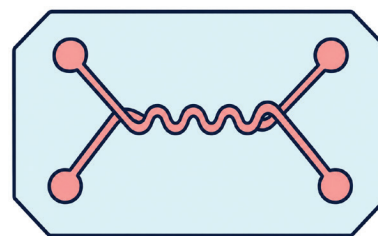
Computer Models



In Vitro



Organs on a Chip



RECENT ADVANCES INCLUDE more powerful computers, machine learning and artificial intelligence to advance non-living NAMs. In vitro (outside the body) approaches have benefitted from our ability to grow human cells in complex systems, creating artificial tissues and organs. These include approaches such as organ-on-a-chip, stem cell technology and organoids. The advances in these human-based (and thus termed human-relevant) systems are considered major steps to advance our understanding of human biology and disease using this new toolbox of models.



WHY ARE NAMs IN THE NEWS?

Haven't we been using alternative methods for many years?

NAMs are in the news because the FDA has very recently changed its regulations to allow therapies to be developed without necessarily testing them in animal models. Instead, if appropriate and justified, scientists can use NAMs as the test systems to demonstrate safety and efficacy.

This is helpful because:



It is very time consuming and expensive to develop therapies (drugs, vaccines and devices) using standard approaches with animal models.



There is often a lack of consistency between what works in an animal and what works in people.

The hope is that human relevant NAMs will prove to be a superior approach in some instances. Other government agencies such as the EPA and NIH also are trying to reduce their dependency on animals.

CAN WE JUST ELIMINATE ANIMAL RESEARCH NOW THAT WE HAVE NAMs?



NO. While elimination of animals in research remains an aspirational goal for all scientists, the reality is that many important uses of animals cannot be replaced in the near term or perhaps even longer.

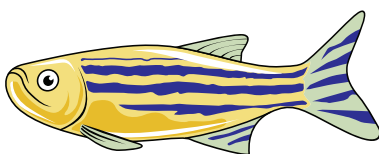
Animal models still have vital systemic features and complexity that cannot be adequately modeled with NAMs. The power of NAMs will come from integrating these new model systems in conjunction with animal models.

Remember, science takes time. And this time is important because this is how we reliably deliver our newest and best technologies to patients!

COMMONLY USED ANIMAL MODELS



Mouse



Zebrafish

Science always has developed new advances and ever more sophisticated technology. The last decade has brought progress at an exponential rate with the advent of some new and powerful techniques that have allowed us to make major advances in the aspirational quest to eliminate the use of animals in research and testing.