

Translational Science

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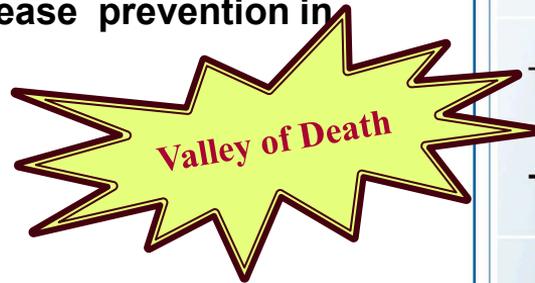
SCOPE of this talk

1. **Recognize:** the need for a 'science' of translation
2. **Identify:** roadblocks, processes or other factors that impede the conduct of translational research.
3. **Describe:** scientific priorities for translational science, and how to advance them.

National Center for Advancing Translational Science (NCATS) Definitions

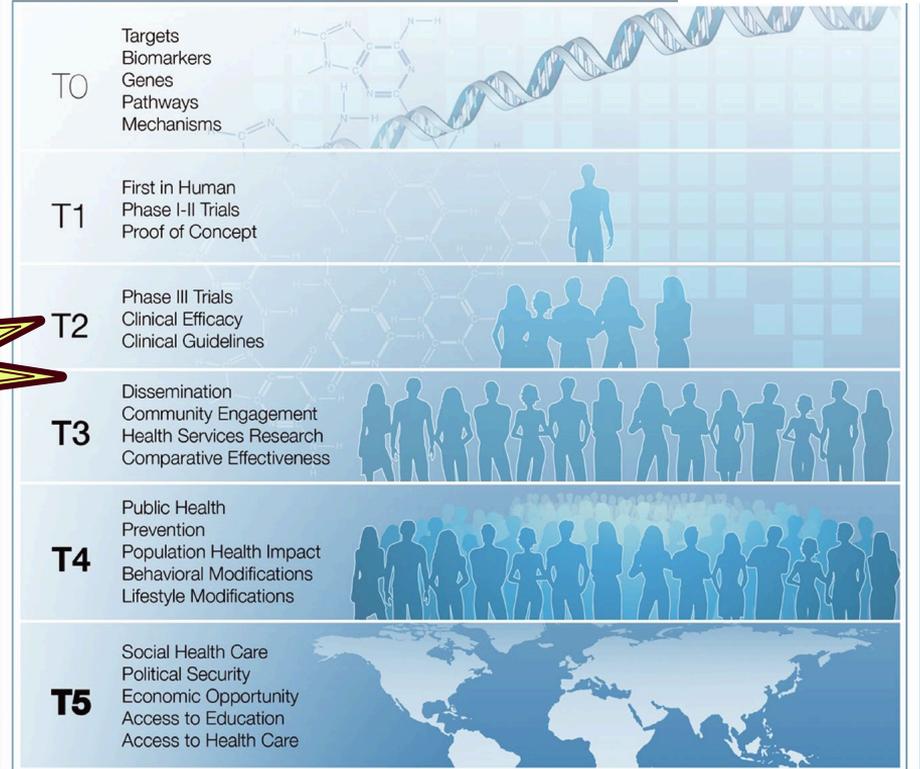
- **Translation:** The process of turning observations in the laboratory, clinic and community into interventions that improve the health of individuals and communities
 - from diagnostics, preventions, and treatments to medical procedures and behavioral changes.
- **Translational Research:** The endeavor to traverse a particular step of the translational process for a particular target or disease.
- **Translational Science:** is the field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process.

The current model for CTR can be seen as a continuum with discrete steps - T1–T5 focused on specific knowledge domains and algorithms required to advance laboratory innovation effectively from its introduction into humans through application to disease prevention in populations.



T4 translation goes to public health, prevention, and population health impact, and T5 extends to the social health model focusing on socio-structural systems to stimulate population wellness.

The Continuum of Clinical and Translational Research

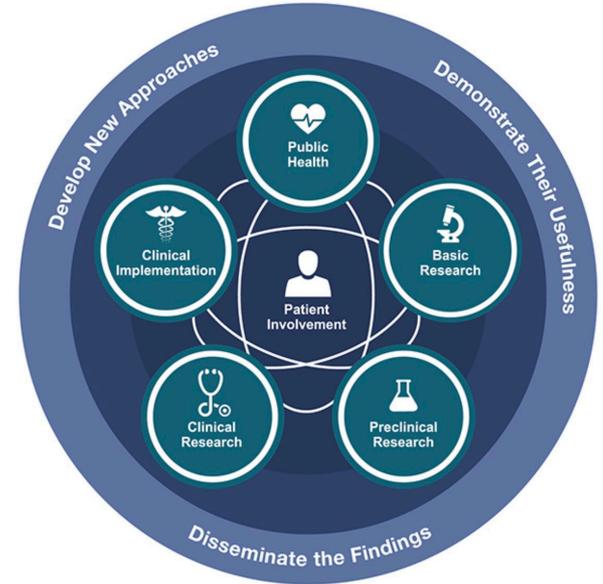


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The **NEED** for a *Science of Translation*

“to bring more treatments to more patients more quickly”

- **Translation Spectrum:**
 - The field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process.
- **This is an emerging field:**
 - The field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process.



Credit: National Center for Advancing Translational Sciences

Translational Science

- The goal: to develop generalizable principles to accelerate translational research” thereby turning “*science into health.*”
 - *In other words: to bring predictivity and efficiency to the development and dissemination of interventions that improve human health.*



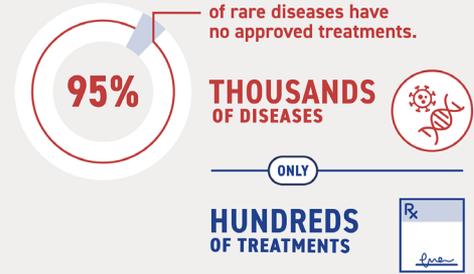
**“The Best and the Worst of Times”:
Scientific discovery far
outpacing actual health
accomplishments**

Roadblocks, processes or other factors that impede the conduct of translational research

- Clinical trials system is inefficient
- Clinical trials may not reflect diversity of affected communities
- Slow and variable dissemination, uptake among users: providers, health systems, etc
- Lack of a unifying approach to the many many conditions/diseases needing attention
- Predictive models are needed (eg., responses, toxicology)
- Patient adherence is suboptimal and limits health benefits

**MORE TREATMENTS,
MORE QUICKLY.**

That's the goal
of translational
science.



New treatments take far too long to develop:

require an average of
10-15 years



fail 95% of the time



**TRANSLATIONAL
SCIENCE IS
IMPROVING
THE PROCESS:**



Understanding what's
similar across diseases to
help develop multiple
treatments at a time



Developing models that
better predict a person's
reaction to a treatment



Enhancing the design and
conduct of clinical trials
so the results more
accurately reflect the
patient population



National Center
for Advancing
Translational Sciences

Learn more at:
ncats.nih.gov

Scientific priority areas for translational science

- Patient/Community engagement
- Biomarkers for human clinical response
- Disease natural history, registries, and clinical outcome criteria
- Clinical trial designs and efficiency
- Clinical trial networks

- Clinical trial participant recruitment, retention, and diversity
- Predictive efficacy
- Data interoperability
- Shortening of time of intervention adoption
- Predictive toxicology
- New methodologies to increase efficiency in pre-clinical development

Scientific and
operational
approaches to
translational science



Prioritize Initiatives That Address Unmet Needs



Produce Generalizable Solutions for Common and Persistent Challenges



Emphasize Creativity and Innovation



Leverage Cross-Disciplinary Team Science



Enhance the Efficiency and Speed of Translational Research



Utilize Boundary-Crossing Partnerships



Use Bold and Rigorous Research Approaches



Prioritize Diversity, Equity, Inclusion, and Accessibility (DEIA)

Similarities between TS and TR

Goal: Both share a common goal: to bridge the gap between scientific discoveries and practical applications. To facilitate the translation of knowledge from research into tangible benefits for human health & society

Interdisciplinary Nature: Both involve collaboration and integration across different disciplines. They bring together researchers from diverse backgrounds (basic science, clinical research, engineering, public health, and social sciences), to tackle complex problems and promote innovation.

Focus on Application: Both concepts emphasize the importance of applying scientific findings to address real-world challenges and improve outcomes. The ultimate aim → to positively impact individuals' lives and communities.

Differences: Scope and Context

TRANSLATIONAL SCIENCE

- A broader and more encompassing term that includes the entire spectrum of research activities involved in translating scientific knowledge into practical applications.
- Encompasses not only TR but also other related activities like implementation science, dissemination, and policy development.

TRANSLATIONAL RESEARCH

- Specifically focus on the scientific research process that moves discoveries from the laboratory to the clinic or real-world settings (applied research).
- Involves the systematic investigation of scientific findings with the goal of developing new therapies, diagnostics, or interventions for human or societal benefit.

Differences: Perspective

TRANSLATIONAL SCIENCE

- Holistic: recognizing that the translation of knowledge is a complex and multi-dimensional process that involves multiple stages and stakeholders.
- Considers the broader context of translating research into practice and the challenges that may arise during implementation.

TRANSLATIONAL RESEARCH

- More narrowly focused on the specific steps and methodologies used to translate scientific discoveries into tangible applications.
- May include preclinical, clinical trials, and other research that bridge the basic science and clinical applications gap.

Final thought

NCATS wants an explosion in the development of methods, resources, scaffolds, procedures that will facilitate translational science.

