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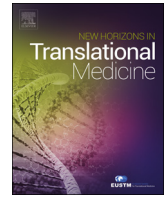
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## Translational Medicine definition by the European Society for Translational Medicine

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### ABSTRACT

Progress in the field of translational medicine (TM) within the last decade attests to the importance of the TM initiative in the context of more traditional academic health science centers. In many instances, these advancements have taken place without a clear definition of TM, which signifies the urgent need for a clear, consensus definition that would serve as an integrative blueprint for the various “versions” of TM definition. The various existing definitions are reflecting the diversity of institutional translational research and deployment programs. The European Society for Translational Medicine (EUSTM) is a global non-profit and neutral society whose principal objective is to enhance world-wide healthcare through the specific development and eventual clinical implementation and exploitation of TM-based approaches, resources and expertise. In this position article, the EUSTM defines TM as an *interdisciplinary branch of the biomedical field supported by three main pillars: benchside, bedside and community*. The goal of TM is to combine disciplines, resources, expertise, and techniques within these pillars to promote enhancements in prevention, diagnosis, and therapies. Accordingly, TM is a highly interdisciplinary field, the primary goal of which is to coalesce assets of various natures within the individual pillars in order to improve the global healthcare system significantly.

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Translational Medicine (TM) encompasses a large number of investigators whose expertise and activities span the full spectrum of biomedical and associated sciences or disciplines. TM's primary goal is to integrate the corresponding findings and capabilities for optimizing patient outcomes, prevention, screening and therapy of disease and improving health policy altogether. Translational Medicine is continuing to evolve rapidly as demonstrated by increased yearly publication numbers [1] (Fig. 1) and by multiple interpretations, definitions and concepts, each tailored through the lens of numerous diverse but inter-related specialties and institutions around the globe. The driving force for this evolution is the continued refinement of the overall aim and mission of TM, which are to promote and accelerate advancements in global healthcare through translational approaches as well as through the development of guidelines, tools, medical knowledge, expertise, products, pharmaceuticals and procedures.

Number of PubMed citations with keyword: Translational Medicine

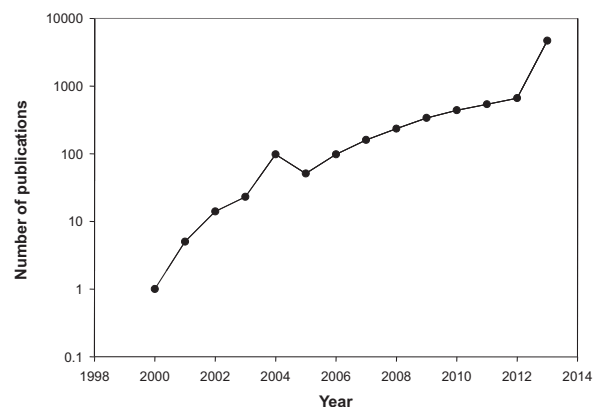


Fig. 1. Number of PubMed publications under the “translational medicine” keyword (logarithmic scale) Literature search of PubMed citations including keywords “Translational Medicine” showed a logarithmic increase in the number of publications, beginning in 2000 with one publication and extending to 2013 with 4679 publications.

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The historical “benchside” concept of TM emphasized translating laboratory discoveries into practical clinical applications that would benefit the patient [2] (Fig. 1). Such a unilateral concept focused on benchside expertise only and missed the crucial feedback from bedside, which is as equally important as benchside.

Translational medicine next evolved into a “two-way bridge” concept [3] (Fig. 2). This concept was really developed around 1999, when the overall scope of biomedical research became increasingly dependent on multi-disciplinary focus groups of biomedical/clinical/fundamental scientists and engineers together with emerging technologies. This was closely followed around 2001 by NIH beginning to emphasize the funding of approaches that were directed to the study of human disease with specific beneficial clinical outcomes. This effort was accompanied around 2003 by a shift in NIH funding toward broader “Center” constructs, multi-institutional contracts and public(e.g., academic)/private partnerships, with a scope of research that transcended the traditional investigator-initiated (e.g., R01) grant. Collectively, the goal was to define and avoid the typical hurdles, barriers and troubles in the pathway for taking scientific discovery into clinics. In addition to historical benchside concept, the benchside–bedside–benchside concept involves returning the clinical findings to research labs to redefine or create new hypothesis-driven research efforts which might result in innovative discoveries. This concept helped to point out potential troubles faced during traditional bedside-to-benchside pathways, when promising bedside discoveries failed to provide any significant bedside outcome. Since many clinicians are often overburdened or unfamiliar with research techniques and infrastructure, there can be a considerable communication and even cultural gap between clinicians and basic scientists. In addition to clinical trials data (when they are available), clinical publications in the form of case reports constitute a good resource to transmit bedside findings back to the bench, but this process is often difficult and case reports remain

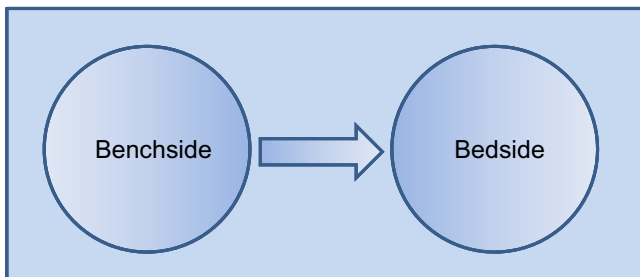


Fig. 2. Traditional translational model: unilateral benchside (lab) to bedside (clinical).

Table 1

EUSTM: core aims and mission.

European Society for Translational Medicine (EUSTM)	
<b>Aims</b>	<ul style="list-style-type: none"> <li>• The society facilitates cooperation and interaction among clinicians, scientists, academia, industry, governments, funding and regulatory agencies, investors and policy makers in order to develop and deliver high quality translational medicine programs and initiatives with overall aim to enhance the healthcare of global population</li> <li>• Standardization of TM practice including models, tools and expertise</li> <li>• Education and training</li> <li>• Accreditation of professionals/labs/centers</li> <li>• Dissemination of the TM knowledge</li> </ul>
<b>Mission</b>	The society's goal is to enhance research and development of novel and affordable diagnostic tools and treatments for the clinical disorders affecting global population.

Table 2

GTMC: aims, mission, approach and membership.

Global Translational Medicine consortium (GTMC)	
<b>Aims and mission:</b>	Global Translational Medicine Consortium (GTMC) mission is to enhance world-wide healthcare. Using translational medicine approaches and expertise, the Consortium's main aim is to identify and address critical clinical needs and means, thereby expediting translation of cutting edge research findings into novel and affordable diagnostic and therapeutic approaches.
<b>Approach</b>	<ul style="list-style-type: none"> <li>• Establish effective collaboration between stakeholders including academic institutions, industry partners, governments, NPOs, funding bodies and patient organizations from various geographical regions throughout the world</li> <li>• Initiate joint research projects and clinical trials</li> </ul>
<b>Members benefits</b>	<ul style="list-style-type: none"> <li>• Worldwide infrastructure and expertise for design and development of research studies and clinical trials</li> <li>• Networking opportunities with other groups/industry.</li> <li>• Early perspectives on potential commercialization of innovations and discoveries</li> <li>• Access to training programs and events to share knowledge and keep updated with current developments in the field</li> <li>• Opportunities to develop collaborative applications for funding</li> <li>• Opportunities to highlight research/services at EUSTM annual conferences.</li> <li>• Exchange program faculty/students.</li> <li>• Offer services to external clients.</li> <li>• Opportunities for joint authorship of journal articles, reviews and monographs</li> </ul>
<b>Current call for members</b>	GTMC is considering members for following specialty areas: <ul style="list-style-type: none"> <li>• Diabetes.</li> <li>• Orphans/rare diseases.</li> <li>• Vaccines</li> <li>• Infectious diseases.</li> <li>• Others.</li> </ul>
<b>Application</b>	Via online form at: <a href="http://www.eustranslationalmedicine.org/">www.eustranslationalmedicine.org/</a>

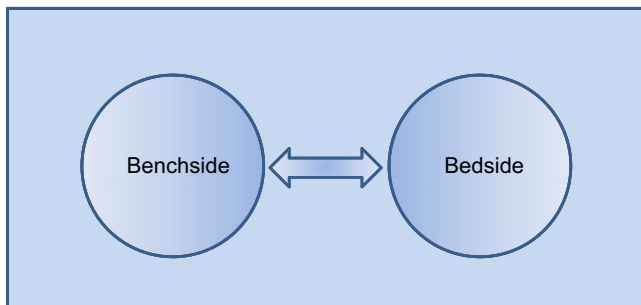
isolated in their clinical fields. While this two-way bridge terminology (bedside to benchside and back) is currently quite popular, it still misses an important aspect of the healthcare cycle, the community.

The community, represented by healthy populations and patients as well as by medical practitioners, is a vital entity in TM. The community along with public health can enrich TM by providing valuable input which can qualify and enhance existing tools and treatments along with providing general background on public health that can help frame novel hypotheses. In addition, the community can provide the impetus to engage patients groups and healthy volunteers in clinical trials, as well as help shape policies through natural links with the public bodies. Finally, community involvement also provides a valuable alternate source of funding through grants, endowments and general fundraising activities.

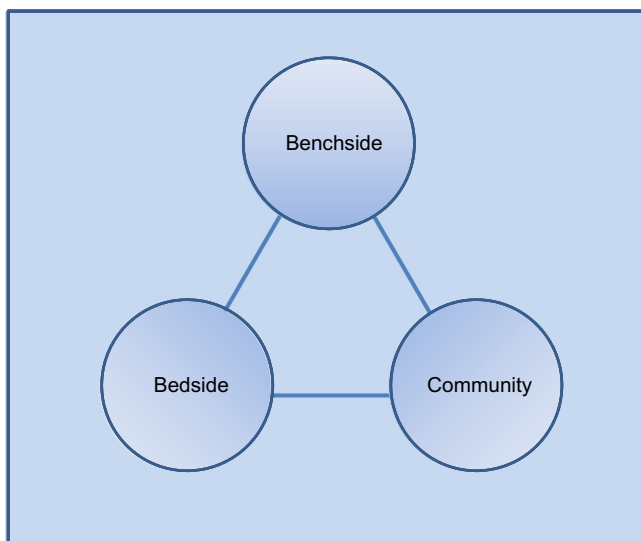
By design, the European Society for Translational Medicine (EUSTM) is a global non-profit and neutral platform whose principal objective is to enhance world-wide healthcare by using translational medicine approaches, resources and expertise [4] (Table 1). To attain this objective, EUSTM operates various programs and initiatives, the best examples of which are the Global Translational Medicine Consortium [5] (GTMC; Table 2) and the Academy of Translational Medicine Professionals [5] (ATMP; Table 3). GTMC's main goal is to regroup under a common umbrella international TM resources and expertise for fostering

**Table 3**  
ATMP: TM professional training and certification programs.

Professional certification programs	
Offered by	Academy of Translational Medicine Professionals (ATMP)
Current certification programs	<ul style="list-style-type: none"> <li>Professional Certification in Translational Medicine (PCTM).</li> <li>Professional Certification in Public Health (PCPH).</li> <li>Professional Certification in Biomarkers (PCB).</li> <li>Professional Certification in Clinical Bioinformatics (PCCB).</li> </ul>
Certification accreditation	Programs are accredited by the European Society for Translational Medicine (EUSTM) and the Global Translational Medicine Consortium (GTMC)
Certification preparatory courses	Offered regularly
Application and further information	Available at: <a href="http://www.eustranslationalmedicine.org/atmp-academy">www.eustranslationalmedicine.org/atmp-academy</a>



**Fig. 3.** Updated translational model: bi-lateral “two-way” iteration between benchside and bedside, both for improving a particular translation and promoting novel hypotheses.



**Fig. 4.** EUSTM translational medicine model: the “community” as another key pillar.

collaborations and assisting with multi-site or multi-national clinical trials as a necessary component of global TM. In addition to offering a collegial umbrella focused on TM, one of ATMP's main goals is also to ensure that all TM professionals can be provided with the means and training for the related tasks, with corresponding demonstration through professional certifications.

From the start, EUSTM realized the need for a clear, comprehensive and concise definition of Translational Medicine that would also apply globally, across nations, markets and disciplines. Accordingly, EUSTM defines Translational Medicine as *an interdisciplinary branch of the biomedical field supported by three main pillars: benchside, bedside and community*. The goal of TM is to combine disciplines, resources, expertise, and techniques within these pillars to promote enhancements in prevention, diagnosis, and therapies. While benchside and bedside are already well understood, EUSTM puts an equal emphasis on the “community” pillar, as community is the actual end user for all TM interventions (Fig. 3) and thus a key stakeholder.

Based on this definition and its associated entities, EUSTM is also working on developing further consensus for ideal translational medicine model(s), on accreditation guidelines for confirming labs/centres competency in carrying out translational medicine projects and on job specifications for translational medicine professionals Fig. 4.

### Contributions

This is a position article by the European Society for Translational Medicine (EUSTM). Representatives from EUSTM executive boards, advisory boards and expert panels have taken part in discussions, writing and reviewing the article, namely: Randall J. Chors, Tyler Martin, Parviz Ghahramani, Luc Bidaut, Paul J. Higgins and Aamir Shahzad.

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