Journal of Orthopaedic Translation (2015) 3, 85—88

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://ees.elsevier.com/jot

PERSPECTIVES

Roles of contract research organizations in translational medicine

Mei-Shu Shih*

PharmaLegacy Laboratories (Shanghai), Co., Ltd., Shanghai, China

Received 23 July 2014; received in revised form 2 December 2014; accepted 2 January 2015
Available online 22 January 2015

KEYWORDS
collaboration;
CROs;
EBIS;
paradigm shift;
translational medicine

Summary Transitional medicine/science is shifting the medical research paradigm from compound-based to evidence-based drug/device discovery. It is increasing interdisciplinary collaborations, enhancing usage of advanced technologies, and facilitating therapeutics reaching patients faster. The fundamental theme of evidence-based discovery is to apply what is revealed in preclinical experimentation and to bring the resulting safety and efficacy to clinics. In the medical fields, a contract research organization (CRO) works like a hired agent who has corresponding knowledge and experience to conduct and complete tasks for a sponsor. The relationship is business, and the contract is for deliverables. The increasingly high volume of sponsored outsourcing work has made this for-profit business boom in the past decade. Location boundaries are being blurred under globalization in the sciences and cross-border regulatory reviews. Getting from bench to bedside is a winding road with many obstacles and high hurdles. Efficient teamwork becomes essential to materialize ideas and bring them to the market. The professionals within team communities include drug/device makers and CROs. It has become increasingly obvious that CROs play pivotal roles in the chain of discovery/design, developing product to market through *in vitro*, *in vivo*, and *ex vivo* testing during preclinical experimentations and clinical trials. Project management teams are responsible for nurturing the materialization in a collaborative manner and enhancing the productivity of the pipelines. CROs have many functional aspects and specialties, and no one organization is fully capable of serving, i.e., integrated services, with expertise in each step of the chain to the needs of a variety of sponsors. Instead of competition among the CROs themselves, the continuously expanding market demands can be shared by Expertise-Based Integrated Services among allied CROs, in contrast to the few large CROs. Empirically, the data generated from the chosen CROs should meet the regulatory requirements for approval. A quality assurance unit from the sponsor should be vigilant in performing audits and inspections of the candidate CROs prior to contracting. Subsequently, close monitoring and well-organized project management guard the path to the successful filing of the applications. A strategic alliance of translational medicine with CROs ensures proven therapeutics for disease treatment and prevention to be connected with patient populations in a timely and cost-effective manner. The unbiased data generated through CROs' services can be used for a patient-driven approach in drug discovery

* PharmaLegacy Laboratories (Shanghai), Co., Ltd., Building 7, Lane 388, Jialilue Road, Pudong, Shanghai 201203, China.
E-mail address: mei-shuh.shih@pharmalegacy.com.

http://dx.doi.org/10.1016/j.jot.2015.01.001

and device control design. Thereafter, findings from the merged efforts can promote and complete the feedback loop for refining existing medicines and exploring new medicines. A matchmaking business may emerge and evolve from the procurement department of the inventor in translational medicine and the business development sector of the CROs to generate a new landscape in translational medicine.

Paradigm shift

The course of a marketed drug/device after invention is long, winding, and treacherous, and requires significant monetary and intellectual investments. However, with the possibility of detours occurring at every turn, pouring a tremendous amount of time and manpower into this course does not guarantee a successful application's approval by regulatory agencies. Vast research through chemical libraries and a meticulous synthesis of protein to discover medicines have produced a large quantity of bioinformatics. Meanwhile, new and refined synthetic biomaterials for fabricating implantable devices have allowed much improved biocompatibility in the past 2 decades. The fusion between biologics and devices, such as drug-eluted stents and nanotechnology in formulation, has reduced the clear delineation of the two and increased their dependency on each other. Demands from regulatory reviews, clinical practices, and health care operations have pushed for revelation on the mechanism of actions of medicines because of safety concerns, accessibility, and economic considerations. In addition, value generation is a key factor for inventors to convince investors to continue their monetary support, which consequentially models the critical paths of choosing research and development (R&D) processes and setting business milestones. Under these circumstances, translational medicine emerges and therefore manifests the evolved evidence-based medicine [1—9]. Although the regulatory governed clinical trial phases remain the common themes for invention, paradigm shifting has occurred in the early stages of R&D, as illustrated in Fig. 1.

Productivity and valuation are closely related. Mergers and acquisitions (M&As) in the industry of medicine are intended to boost productivity and ultimately attain top-line growth [10]. Paradoxically, the evidence has shown that industry consolidation results in less investment in R&D. It is abundantly obvious that R&D outputs, if measured by new medicine approvals, suffer substantially from the reduced investment. Early-stage R&D suffers most from this negative impact owing to the lengthy period required to yield convincing data and the shift in monetary support to clinical trials. It is the attrition of human resources that has led M&As to create tremendous uprooting in organization stability and in scientific continuity. Minute but crucial pieces of information on know-how may be lost during personnel transitions. The remaining staff may face high hurdles in project management to move products in the pipelines. Outsourcing becomes the eminent solution, besides the ineffective cross-functional consortiums

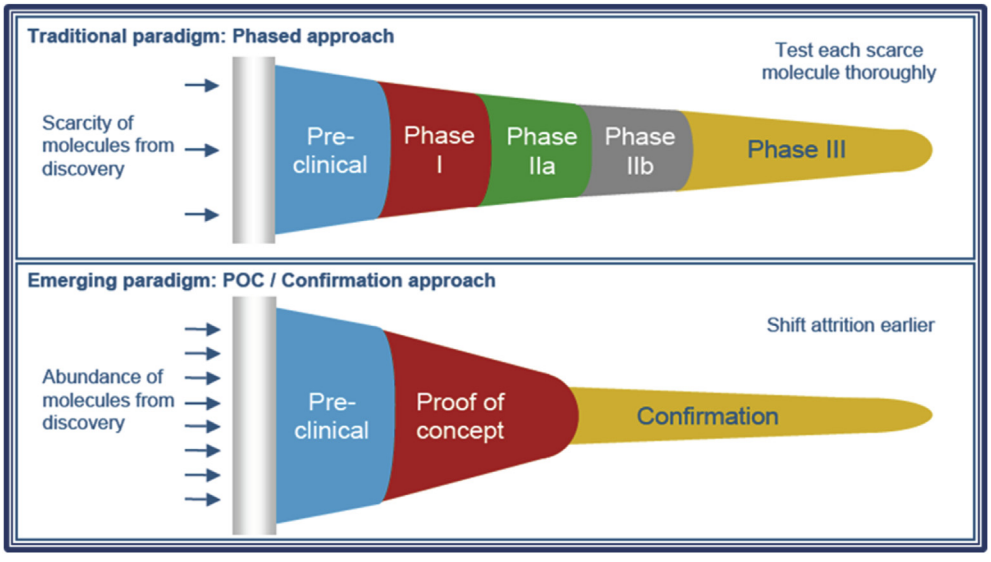

Figure 1 Paradigm shift in medicine. The massive searches in traditional approaches have changed to targeted disease mechanistic receptors in the emerging schemes. (Source: Adapted and modified from: John J. Orloff, MD, Norvartis Pharma AG, 12 October, 2006.).