*BioImpacts*, **2011**, 1(1), 3-5

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# Integration of Molecular, Cellular and Translational Researches in *BioImpacts*

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**ARTICLE INFO**

***Article Type:***
Editorial

***Article History:***
Received: 1 June 2011
Accepted: 5 June 2011
ePublished: 9 June 2011

***Keywords:***
Integrative Research
Molecular, Cellular Research
Nanobiotechnology
Translational Medicine
*BioImpacts*

**SUMMARY**

Integration of molecular cellular biology with advanced technologies (e.g., bioinformatics, omics, biophotonics and nanobiosensing) has significantly improved the translational medicine field. The integrative research in various biomedical sciences has also fastened the progression of drug discovery and development. Aiming to meet the highest standards of publication, the newly established multidisciplinary open access journal "*BioImpacts"* grants a free platform for all authors and readers to facilitate the integration of different scientific domains in biomedical sciences.

Although there have been numerous advances in many scientific fields throughout the biosciences in the recent years, we still need to tackle many biological predicaments to unveil the actual mechanisms at molecular and cellular levels. Such scientific expeditions, *per se*, have so far resulted in fruitful corollaries such as detection of new markers involved in various diseases/disorders, upon which the quality of life has been significantly improved. These challenges have also raised new insights towards integration of several different technologies and emergence of de novo technologies in imaging, sensing and targeting at molecular/cellular levels.

Integration of powerful global screening techniques in the fields of genomics, metabolomics and proteomics (Chesler and Baker 2010; Lum *et al.* 2009) along with biophotonics and electrochemical sensing approaches with cell biology and stem cell researches (Jensen *et al.* 2009; Lou and Liang 2011; Rubin and Haston 2011) has enabled us to accomplish many scientific dreams of past years – yesterday's fictions are today's scientific achievements. Application of translational bioinformatics and modeling (e.g., bioCFD, numerical analysis) has empowered us examine/simulate many intricate hypotheses in drug discovery (Buchan *et al.* 2011). While molecular, cellular and whole animal imaging provides better understanding (Ahn 2011; Bullen 2008; Dufort *et al.* 2010; Watson 2009), detection of co-localized biomarkers by means of techniques such as fluorescence/bioluminescence resonance energy transfer (FRET/BRET) as well as fluorescence loss in photobleaching (FLIP) and fluorescence recovery after photobleaching (FRAP) has conferred new mechanistic insights of diseases (Kumar *et al.* 2011). In short, incorporation of nanotechnology and biotechnology with biomedical sciences has advanced: 1) drug targeting towards improved molecular medicines/therapy and personalized medicines, 2) transferring desired genes into target cells/tissues, 3) producing recombinant proteins (e.g. monoclonal antibodies and nanobodies), 4) engineering artificial cells, 5) constructing genetically-engineered cells/tissues towards regenerative medicines, and 6) creating transgenic plants/animals. For example, the desired genes can be transferred to target cells/tissues to cover a genomic malfunction/deficit. Ideally such attempts should confer maximal efficiency and minimal toxicity; nonetheless the current gene therapy methods are predisposed to some disadvantages that may result in less clinical success. In fact, the clinical translation of gene therapy may be significantly limited by various factors such as lack of suitable delivery system and paucity in direct extrapolation of animal models to

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human studies since the animal models often fail to satisfactorily mimic the major manifestations of the corresponding human diseases. Accordingly, the gene therapy is unlikely to be replaced with conventional treatment modalities for humans' diseases even though it might eventually become an integral part of treatment strategies (Connell and Weichselbaum 2003; Laurencot and Ruppel 2009; Young *et al.* 2006). This also means that we need to resolve all the possible insinuations (scientific and ethical issues) prior to implementing any translational research that demands huge financial resources as well as immense experts' efforts. Fig. 1 represents the typical flowchart for drug discovery and development. Successful accomplishment of each step is largely dependent on various experimental, technical, ethical and legal issues.

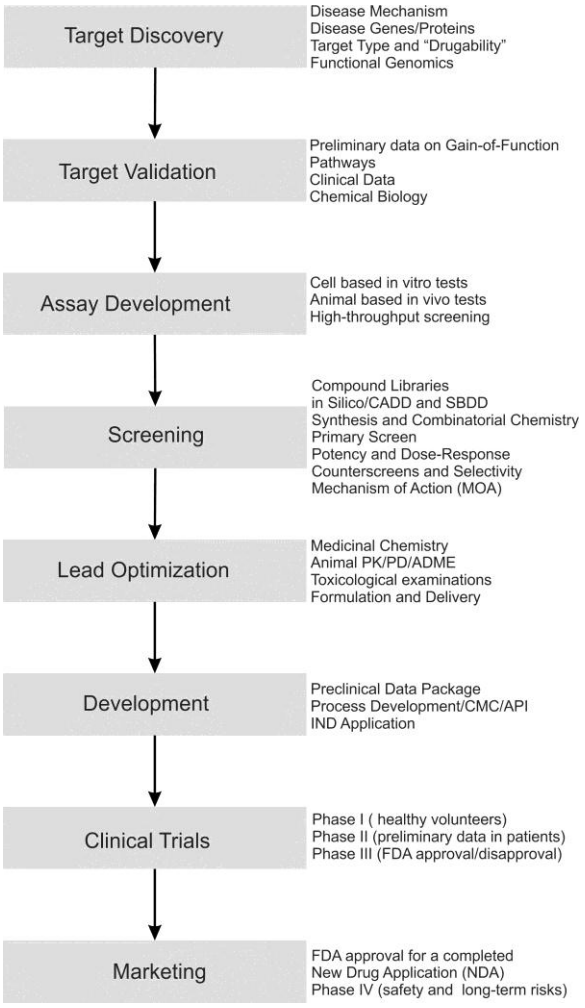


**Fig. 1.** Typical flowchart for drug discovery and development. CADD: computer-aided drug design. SBDD: structure-based drug design. PK: pharmacokinetics. PD: pharmacodynamics. CMC: Chemistry, Manufacturing and Controls. API: active pharmaceutical ingredient. IND: investigational new drug. ADME: absorption, distribution, metabolism, and excretion.

The translational research (from basic science to pharmacological investigations) itself is a process that should ideally grant sustainable solutions for public health problems, industry demands using the basic sciences together with the evidence based medicine in a proof of the concept manner with maximum efficiency and cost effectiveness. However, the cost of developing a new drug in pharmaceutical pipeline appears to be astronomical since translation of a new pharmaceutical into clinical use costs many hundreds of millions to billion dollars over 10-20 years. This clearly implies that many activities should be merged and accordingly several joint ventures should be undertaken by different expert authorized sectors. To pursue such mission, in the last two decades, many pharmaceutical companies have successfully adopted several integrated multidisciplinary approaches to cut the costs of drug discovery and development (Bhogal and Balls 2008; Dickson and Gagnon 2004; Littman 2011; Zambrowicz *et al.* 2003; Zhou and Gallo 2011).

Despite these huge achievements, still there is big scientific debate over improvement in making correct decisions on integrative road maps of different disciplines. Still scientists like to see their fruitful enterprise in the final pipelines (as reported for innovative and affordable approaches to managing HIV infection (Hawes 2005)), which would be a matter of the intellectual properties for inventors and investors. This intricate process necessitates many legitimacies and consensus from scratch. This is deemed to be a hard task while the growing scientific community, particularly in developing countries, needs to perform more focused objective studies to help the progression of scientific activities towards its translation. To pursue such enterprising goal, our scientific community desire more devotion and dedication not only from educational centers but also from governmental investors, charities and private sectors. Even young scientists deserve to be rewarded for their scientific enterprise. This has led us to think of a free scientific platform for publication – and thus the newly-established journal was entitled as "*BioImpacts*" to present the impacts of scientists who wish to publish their works for free to readers who wish to read for free. Owing to the respected internationally well-known scientists who are either associate editors or members of editorial/advisory board, *BioImpacts* aims to meet the highest standards of publication in short period. What is more, *BioImpacts* sponsors have guaranteed to reward the selected authors whose published paper in *BioImpacts* gets the highest citations a year after publication. We believe this would assist us in scientific improvement towards sharing knowledge, information and scientific findings more efficiently. Recently, the Committee on Publication Ethics (COPE) has also approved *BioImpacts* membership – this surely would

 

facilitate development of good research and publication practice, particularly within young scientists. The utmost goal of *BioImpacts* is attainment of the right platform for right sciences.

## Ethical Issues

None to be declared.

## Conflict of interests

The authors declare no conflict of interests.

## Acknowledgement

Author expresses his sincere gratitude to all Associate Editors and members of Editorial Board and Editorial Office of the *BioImpacts* as well as the authors of the first issue.

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