A review on Translational Research- Genesis and future stratagies.

Dhivya.V* and Sumitha.J[1]

***PG Department of Human Genetics and Molecular Biology,Bharathiar University,Palkalaiperur,Coimbatore,Tamilnadu,India.**

[1]PG Department of Micro Biology,JBAS College for Women,Teynampet,Chennai, Tamilnadu,India

***corresponding author email dhivi893@gmail.com**

.

Introduction:

The upcoming translational research has given the confidence of treating any diseases. The importance of a scientific finding requires both subjective judgment and foresight hence it depends upon the sizeable, practical, integrated and new (SPIN) that can be used individually or collectively to assess the importance of a finding (Arturo Casadevall, Ferric C. Fang., 2009). Implementation of the research findings into clinical application and send back the clinical issues to the laboratory is the process of translational research. Example, in the field of medicine, using the knowledge of biology of a disease to identify the chemical compounds in disease models, with selecting a candidate drug to advance into clinical trials (http://www.nature.com/subjects/translational-research).

The key role played is the basic scientists who are involved in improving human health and treating disease. The start was by the organization The Federation of American Societies for Experimental Biology (FASEB) which has more than 100,000 basic scientists who are trained to conduct the fundamental research. Engaging basic scientists in translational research is because they detail the inspiration and satisfaction when they translate discoveries and treatments for human diseases (Engaging Basic Scientists in Translational Research: Identifying Opportunities, Overcoming Obstacles.,2012) Translational research popularly called with a phrases as “bench to bedside” and “bedside to practice”.

The translational research has four phases:

T1 - Basic discovery into clinical application (bench to bedside)

T2 - Applying the basic discovery into practice.

T3 – The evidence-based guidelines developed in phase 2 moves into health practice.

T4 – The research to evaluate the health outcomes of the T1 development.

(https://www.michr.umich.edu/about/clinicaltranslationalresearch)

Present works on Translational research:

In present, there are many attempts to define the term translational research. One of the definition given as "the process of applying ideas, insights, and discoveries generated through basic scientific inquiry to the treatment or prevention of human disease" (Ferric, Arturo Casadevall. 2010). The interface between basic science and clinical medicine is to produce a new treatment that can be used clinically or commercialized. It was characterized as "effective translation of the new knowledge, mechanisms and techniques generated by advances in basic science research into new approaches for prevention, diagnosis, and treatment of disease is essential for improving health" (Travis.,2007). Since 2009, *American Journal of Translational Research* and the *Translational Research* were the journals dedicated to the translational research and its findings. The aim of the translational research projects is to understand the origin and development of the disease (http://www.germanbreastgroup.de/en/translational-research.html). The publication of new journal *Science Translational Medicine* was announced by American Association for the advancement of science (Ferric, Arturo Casadevall. 2010). The need for translational research is because in certain scientific fields the use of animal models does not always extrapolate to humans. The four parameters, size, practicality, integration, and newness differentiate basic science and translational science primarily in integration and practicality. The findings in translational study lead to the rise of fundamental research.

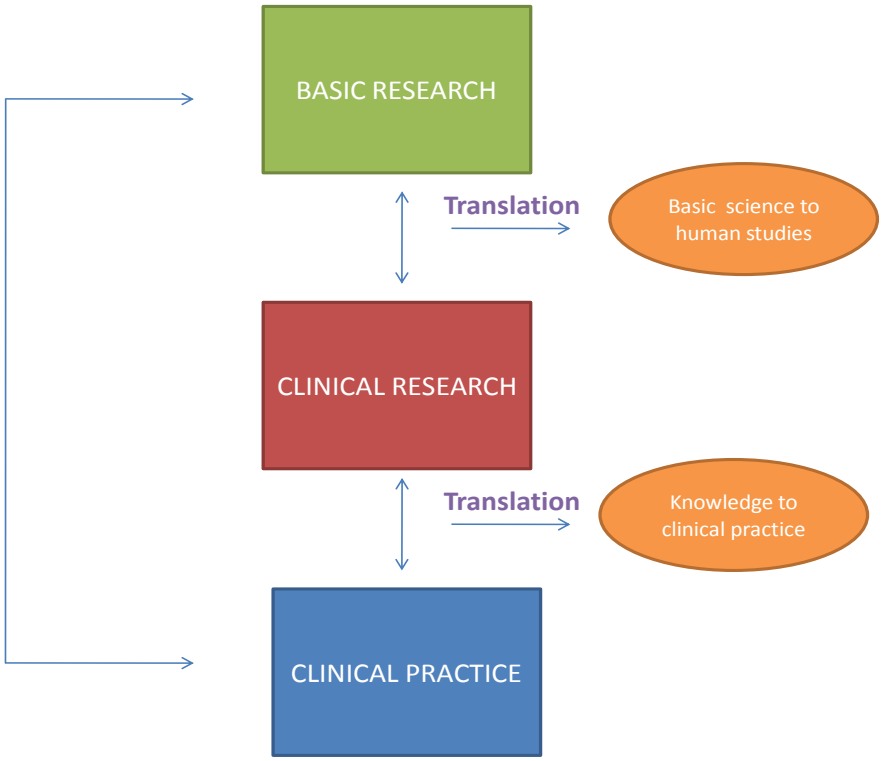

Fig1: Flowchart defines the Translational Research

As a result of successful translational research, there is an important progress in therapeutic area like one of the feared disease cancer. It is a complex disease which can be inherited or induced by environmental factors. Cancer therapy with radiation and chemotherapy suffered from lack of target specificity and lead to severe side effects. The translational cancer research seeks to identify the cancer-specific molecular changes and to prevent disease and improve therapy. Generally, from a clinical perspective, the research questions commonly used are the molecular subtypes of cancer, prognosis, molecular markers used in early detection, to find drugs and optimize therapy and drug combination (Jomol P Mathew., 2007). The effects of antibodies is less when based on the treatment of molecular knowledge of cancer (von Mehren M., 2003). U.S. Food & Drug Administration has a strategy Critical Path Initiative (CPI) for medical products to drive innovation in the scientific processes through which they are developed, evaluated and manufactured (http://www.fda.gov/ScienceResearch/SpecialTopics/CriticalPathInitiative/ucm076689.htm).

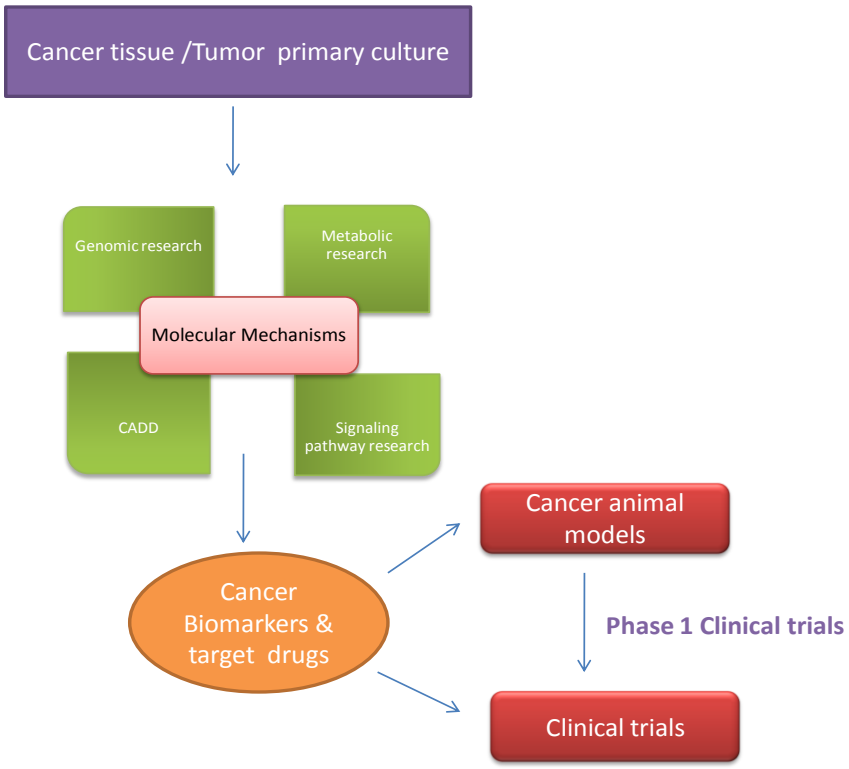

Fig2: Flowchart of translational oncology research process

When a new drug is initially introduced to human subjects it is estimated to have only 8% of chances reaching market (http://www.fda.gov/ScienceResearch/SpecialTopics/CriticalPathInitiative/ucm076689.htm). Development of safe and effective therapies at a reduced cost, requires therapeutic interaction with a range of targets and their effects on diverse cellular processes (Fabian MA.,2005).

Future strategies:

So far, this review on translational research described the origin and the process of one of the translational research in oncology. There are certain limitations and requires extensive research in diseases like Alzheimer's due to drawback in predictive animal model. There are certain future strategies which should be considered for the developing research. The discovery

of biomarkers is critical for the success of translational research (Giuseppe Lippi., 2007). The preclinical and clinical studies are the challenges to design, conduct and analyze before developing drugs. There should be an improvement in drug development with a focus of individual patient and to the economics of healthcare. There are also some non-scientific factors such as the funding, shortage of investigators, participants, databases, right of privacy and public support are some of the important concerns should be take care of.

Reference:

1. Arturo Casadevall , Ferric C. Fang; Important Science—It's All about the SPIN; 2009; Infection & Immunity; p. 4177–4180.
2. Engaging Basic Scientists in Translational Research: Identifying Opportunities, Overcoming Obstacles (2012)
3. Ferric C, Arturo Casadevall; Lost in Translation—Basic Science in the Era of Translational Research;2010; Infection & Immunity; p. 563–566.
4. Travis K. Translational research careers;2007; Science
5. Jomol P. Mathew et al; From Bytes to Bedside: Data Integration and Computational Biology for Translational Cancer Research; 2007; PLOS Computational Biology.
6. von Mehren M et al; Monoclonal antibody therapy for cancer; 2003; Annu Rev Med; 54:343-69
7. Fabian MA et al., A small molecule–kinase interaction map for clinical kinase inhibitors; 2005; Nature Biotecnology; p. 329 – 336.
8. http://www.nature.com/subjects/translational-research.
9. https://www.michr.umich.edu/about/clinicaltranslationalresearch.
10. http://www.germanbreastgroup.de/en/translational-research.html.
11. http://www.fda.gov/ScienceResearch/SpecialTopics/CriticalPathInitiative/ucm076689.htm.
12. http://www.fda.gov/ScienceResearch/SpecialTopics/CriticalPathInitiative/ucm076689.htm