BIOMARKER TOOLKIT: Companion Diagnostics

What are Companion Diagnostics?

Companion diagnostics are assays (a test or measurement) intended to assist physicians in making treatment decisions for their patients. They do so by elucidating the efficacy and/or safety of a specific drug or class of drugs for a targeted patient group or sub-groups.

There are two main groups of companion diagnostics that include:

- Tests that have been developed after a drug has come to market
- Tests that are being developed in conjunction, or as a companion to the drug

Companion diagnostic co-development has the potential to significantly alter the drug development process and commercialization of drug candidates by yielding safer drugs with enhanced therapeutic efficacy in a faster, more cost-effective manner. This can be done by providing drug developers information on how a drug works in the body, before clinical signs and symptoms are evaluated in patients through trials. Since biomarkers need to be qualified in the context of their intended use, using them as part of the clinical trial process will provide evidence of the marker's clinical utility and the value of the diagnostic test.[i,ii,iii]

Companion Diagnostics in Oncology

Diagnostics is a rapidly advancing field in cancer care. Many companies developing targeted therapies for cancer have also begun to consider the potential benefits of developing a diagnostic to pair with that treatment.

To date, only a few companion diagnostics have been vetted and approved through the Food and Drug Administration (FDA). Pharmacogenomic information which has been incorporated into drug labels by the FDA provides no recommendations for specific action (i.e. genetic testing), only that the findings should be used for therapeutic decision making.[iv]

Drug-Diagnostic Co-Development

To ensure successful drug-diagnostic co-development, a number of questions will need to be addressed at the outset of the process, such as:

- What is the marker being used for?
- Is it a prognostic (related to disease outcome) or predictive biomarker (related to treatment outcome) and how does that impact the clinical development strategy?

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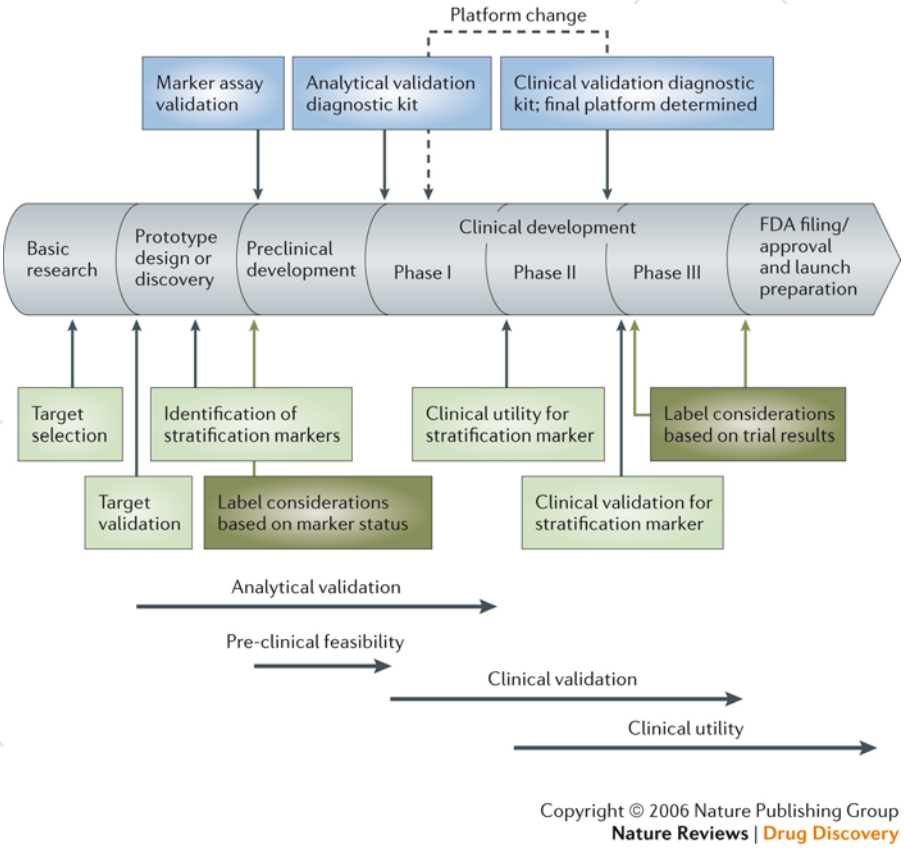
- How should the biomarker be used in the clinical trial setting?
- Should an enrichment or patient selection strategy be used?

There are also a number of additional factors outside of development that will impact the potential emergence of more companion diagnostics in clinical practice, including:

- **Regulatory environment:** Clear guidance and direction from regulatory bodies globally on what constitutes an acceptable companion diagnostic or biomarker.
- **Reimbursement:** Diagnostics have the potential to reduce system costs but until regulatory agencies take a position on companion diagnostics, payers may be hesitant to cover the test costs.
- **Clinical use:** Clinically related questions will emerge with companion diagnostics including: Who orders the test? At what stage of a patient's disease should they be tested? What do physicians do for non-responders who have no treatment alternatives?[1,2]

Prototype of an idealized approach to developing and regulating combined test–drug



[i] *Frueh FW. 2007 Cardiovascular Biomarkers and Surrogate Endpoints Symposium. October 19, 2007*
[ii] *Phillips KA, Bebber S, Issa A. Diagnostics and biomarker development: priming the pipeline. Nature Reviews Drug Discovery (2006) 5,463-469*
[iii] *Simon R. Validation of pharmacogenomic biomarker classifiers for treatment selection. Disease Markers (2005) 21:1-8*
[iv] *US Food and Drug Administration. Table of valid genomic biomarkers in the context of approved drug labels. Available at: http://www.fda.gov/cder/genomics/genomic_biomarkers_table.htm. Accessed October 21, 2008.*