Personalized medicine-molecular targeted cancer therapy

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Treatment of cancers has been performed by surgery, radiation and chemotherapy. Metastatic or advanced cancers with limited effects of radiation and chemotherapy have been the challenging issue in recent cancer therapy. In this situation, the molecular target cancer therapy has been successfully accepted for various cancers. This type of therapy is to suppress the cell proliferation or induce apoptosis of cancer cells by targeting particular molecules which play critical role in cellular activities. These molecules are composed of (*i*) receptors on the cell membrane, (*ii*) tyrosine kinases on these receptors, (*iii*) proteins related signal transduction and (*iv*) others. These proteins can be detected by immunohistochemistry with appropriate quality control/assurance (QC/QA) and validation. Tyrosine kinase (TK) activities are induced by genetic alterations, such as amplification, mutation and translocation. The molecular targeted therapy is composed of two major approaches, (*i*) humanized monoclonal antibodies (hMoAb) and (*ii*) tyrosine kinase inhibitors (TKI). The hMoAbs include trastuzumab, bevacizumab, cetaximab and others. The TKIs include gefitinib, imatinib, nilotinib, dasatinib and many others (Table 1). Very recently, the therapy targeting one of the cell signal proteins, mTOR, has been introduced to renal cell carcinoma. The numbers of available therapeutic reagents are increasing for practical patient care.

Detection of the changes of target molecules has been done by various techniques such as immunohistochemistry, FISH, CISH or SISH. The techniques should be standardized by appropriate QC/QA and validation. Pre-analytical (specimen handling), analytical (detection method) and post-analytical (interpretation and reporting) QC is critical for the appropriate patient selection which can be directly related to the response to the therapy. ASCO/CAP has published a guideline for quality assurance in HER2 testing in breast cancers. In this developing new era of cancer treatment, the pathologists are expected to play active and essential role in the analysis, interpretation and recommendation for therapy.

This special issue in this journal is composed of the series of the following contributions.

1. Introduction
2. Oncologists' view of the roles of pathologists in molecular target cancer therapy
3. Overview of HER2 testing for breast cancers: updated guideline for practicing pathologists
4. 'Individualized medicine': oncologist's view
5. Predictive molecular testins for Erlotinib
6. Imatinib and other molecular targeted therapy for gastrointestinal stroma tumour (GIST)
7. Molecular targeted therapy for nueuroendocrine tumours
8. Role of pathologists for new drug development
9. HER2 testing in gastric cancers: experiences of a reference laboratories

We, as guest editors, hope that the series of special issue will update the information of molecular target cancer therapy and highlight the inevitable roles of pathologists.

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