The Realities of Genomic Medicine for Cancer 2　Somatic mutations

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Chapter1

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I am Seiji Yano of the Division of Medical Oncology at Kanazawa University's Cancer Research Institute.

The Realities of Genomic Medicine for Cancer 2　I would like to start by talking about somatic mutations.

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A genome is a neologism from the German word for gene, which is also gene, and the Greek suffix -ome, meaning body, that means a body (or set) of genes.　A genome refers to all genetic information from DNA.

Genomic medicine for cancer is the use of genomic information to provide medical care, i.e. diagnosis or treatment, to cancer patients and to prevent cancer.

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The most practical clinical setting for genomic medicine for cancer is treatment selection based on genomic information.

There are generally 2 types of treatment selection based on genomic information.

The first is when an approved treatment is available for use in routine practice.

In such an event, specific genetic abnormalities evident in cancer cells are identified.　Based on the genetic abnormalities identified, treatment that is covered by National Health Insurance is provided.

The second type of treatment selection is when no approved treatment exists.

In such an event, genetic abnormalities in cancer cells are comprehensively analyzed.　Based on the genetic abnormalities found, drugs that should be efficacious are identified.　If potential drugs are identified, treatment not covered by National Health Insurance, e.g. that provided in a clinical trial, is provided.　Here, a comprehensive analysis includes whole-genome analysis or whole-exome sequencing using next-generation sequencing or panel testing to analyze 100–200 genes.

In this lecture, I will provide information of use in a practical clinical setting, so I will describe approved treatments.

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Genomic medicine for cancer that is provided in routine practice, i.e. care that is covered by National

Health Insurance, can largely be divided into 3 types.

The first involves effective molecularly targeted drugs. Genetic abnormalities in cancer cells that will be targeted with a drug are identified and patients who are likely to respond are selected.

The second involves the identification of genetic abnormalities in cancer cells for which molecularly targeted drugs are ineffective. Patients who are unlikely to respond are excluded.

The third involves the identification of genetic abnormalities in normal cells that are associated with serious adverse reactions to anticancer agents. This information will be used to determine whether or not an anticancer agent is administered and the dose.

The theme of this lecture is Cancer Arising from Somatic Mutations, so the first and second types of genomic medicine are relevant. The third concerns changes in germ cells, so it is closely related to treatment with an anticancer agent. I will briefly touch on it in this lecture.

So let me explain each type in order.