Once a disease more prevalent in high-income countries, cancer is now a global health concern due to the improved control of communicable diseases and greater knowledge about its genetic basis. The completion of the Human Genome Project in 2003 accelerated a focus on precision medicine adding molecular-targeted therapies and immunotherapies to the traditional cancer treatments of surgery, radiation, and chemotherapy. The path to precision medicine has been longer than the completion of the Genome Project, however, as seen in Table 1. Oncology nurses are on the frontline of a rapidly changing cancer care environment with the implementation of precision medicine interventions. Understanding key concepts about cancer today and the advances in treatment that are underway prepares the oncology nurse to provide the appropriate care to patients as personalized care has always been the foundation of nursing.

Key Definitions for the Changing Landscape

Medical terms can often be confusing and that has been the case with precision medicine and personalized medicine. The term “personalized medicine” was the forerunner and implied that a unique treatment would be developed for each individual, based on genetics and other factors. However, the intent was not that every patient would have a one-of-a-kind treatment. Grouping individuals who have similar genetic mutations and respond to a specific treatment is now the focus, and precision medicine is the more commonly used term. They have been used interchangeably, and in the NCI Dictionary of Cancer Terms, they are described the same as, “A form of medicine that uses information about a person’s genes, proteins, and environment to prevent, diagnose, or treat disease.”

### Table 1: Key milestones in precision medicine

| Year | Key scientific discoveries |
|------|----------------------------|
| 1865 | Mendel presents his finding of plant hybridization |
| 1869 | Miescher identifies “nuclein”, DNA with associated proteins in the cell nucleus |
| 1953 | Crick and Watson discover the double helix of DNA |
| 1990 | Human Genome Project launched. First evidence of BRCA1 gene |
| 2003 | Human Genome Project completed |
| 2009 | 1st targeted drug approved - lung cancer |

Adapted from a brief history from Mendel to the Human Genome Project [https://unlockinglifescode.org/timeline?tid=4](https://unlockinglifescode.org/timeline?tid=4)

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diagnose, and treat disease. In cancer, precision medicine uses specific information about a person’s tumor to help diagnose, plan treatment, find out how well treatment is working, or make a prognosis” (https://www.cancer.gov/publications/dictionaries/cancer-terms).[1] This means that the genetic mutation is the basis of the diagnosis and the treatment. Cancer may be in different body organs but the treatment maybe the same as it is precise to the mutation. Today, precision medicine is the most commonly used term and in its broadest definition is the right treatment for the right person at the right time.[2]

Two other terms that sometimes are used interchangeably are genetics and genomics. Differentiating them is important for understanding diagnosis and treatments in cancer care. The NCI Dictionary of Cancer Terms is again a helpful resource. Genetics is the “study of genes and heredity” and how traits are passed from generation to generation. An example in cancer is the BRCA1 gene. Depending on mutations on this gene, an increased risk of breast cancer is possible. Genomics is “the study of the complete set of DNA (including all of its genes) in a person or other organism” and the interaction of the genes with each other. Genetic testing investigates a single gene or piece of genetic information whereas genomic testing is broader with no target. Genetics can inform about the potential or risk of a disease. Genomics provides characterization of the tumor, such as aggressiveness, and can identify what treatment would be beneficial.

Treatment has evolved from a single treatment for the cancer of a specific body organ to complex combinations of treatments determined tumor characteristics which now include genetic and genomic information. Combinations of treatments now include molecular targeted therapy and immunotherapy in addition to surgery, radiation, and chemotherapy. Table 2 shows a comparison of therapies.

### Table 2: Action of chemotherapy, molecular targeted therapy, and immunotherapy

| Chemotherapy                        | Molecular targeted therapy              | Immunotherapy                               |
|-------------------------------------|----------------------------------------|---------------------------------------------|
| Acts on rapidly dividing normal and | Act on specific molecular targets       | Uses own immune system to recognize and kill |
| cancer cells                        | associated with the cancer              | cancer cells                                |
| Developed because they kill the    | Developed to interact with a specific   | Developed to engage the immune system to     |
| cells                               | target                                   | fight cancer                                |
| Cytotoxic - destroys cells          | Cytostatic - blocks cell proliferation   | Various actions - slow or stop cancer cell  |
|                                    |                                        | growth, stop the spread of cancer cells,    |
|                                    |                                        | boost the immune system’s ability to respond|

### Table 3: Precision nursing care and the cancer trajectory

| Trajectory phase | Nursing practice                                      |
|------------------|-------------------------------------------------------|
| Prevention       | Public education                                      |
|                  | Genetics and cancer risks                             |
|                  | Behaviors/lifestyle changes to reduce risk            |
|                  | Cancer survivor education                             |
|                  | Ongoing surveillance, especially about 2nd cancer risk|
|                  | Behaviors/lifestyle changes to reduce risk            |
| Diagnosis        | Education about the genetic and genomic tests that may be ordered and how they may be used in determining treatment options. Listening and support for patients concerned with how their genetic information could be used |
| Cancer treatment | Education and differentiation of chemotherapy, targeted therapies, and immunotherapies |
|                  | Update patient education materials                     |
| Symptom management| Assess and monitor side effects. Educate patient and family about side effects and actions which can differ depending on the therapy being given even if the side effect is the same |

Precision Nursing Care

Cancer nurses personalize care of patients, but precision medicine will require precision nursing. Nursing care is built on the foundation of individualizing care to the person or person-centered care. The nursing process begins with a holistic assessment including physiological, psychosocial, economic, and lifestyle. More cancer diagnoses will change from being general to a specific profile based on genetic and genomic testing. Having a comprehensive understanding of the patient is even more essential now in order to support and care for patients on the newer treatments.

Oncology nurses have the opportunity to assess an individual’s understanding of cancer risk, when prediagnosis, or of the disease state once diagnosed. Giving a patient the opportunity to discuss personal health concerns or priorities is an important part of assessment. For example, someone may prefer a treatment that does not cause fatigue because they must work. Knowing whether the individual wants to have genetic test results presented privately or who would be present with them is important. If the results have implications for other family members, they may or may not want to be present to hear the test results. Table 3 outlines some implications for nursing practice.

Patient education is an integral component of nursing practice. Oncology nurses must understand the relationship between genomic tests and drug treatment decisions, especially because patients with the same clinical diagnosis may be prescribed different agents. Given the rapidly growing number of molecular targeted therapies and immunotherapy, keeping patient education materials up to date is critical.
Precision medicine is not the only factor influencing cancer care and creating the need for innovative models of providing care. Technology too is having an impact. Communicating with and teaching patients, a core responsibility of nursing, is being both supported and made complex by technology. Patients use the Internet to research their cancer diagnosis and treatments. They may use any one of the electronic devices that track their health. Apps have been developed to which patients can enter side effects and learn a course of action to take.

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References

1. NCI Dictionary of Cancer Terms. Available from: https://www.cancer.gov/publications/dictionaries/cancer-terms. [Last accessed on 2017 Dec 20].
2. Warner JL. Giving up on precision oncology? Not so fast! Clin Transl Sci 2017;10:128-9.