

**Cancer**

* **Cancer Statistics**

Over the span of life, millions of people have suffered from cancer, which is the second chief cause of death in the world. In 2018, not only the number of new cases has dramatically increased to 18 million, while also the number of cancer-related death has reached 10 million1. Cancer can act on any part of the body such as lung, prostate, liver, and breast. Lung cancer is the most common type of cancer in males, while breast cancer is the most widely type of cancer in females. Around 15% of people progress cancer and 10% dies because of cancer according to the World Health Organization (WHO)2. Furthermore, the number of living cancer patients exceeds than 40 million. The annual cost of cancer is around one trillion dollar. Early cancer diagnosis can increase the survival percentage from 10% up to 90% in many cases. Thus far, there is not any clear method to neither diagnose nor treat cancer.

* **Cancer Physiology**

Cancer can be defined as genetic defect leads to cell dysfunctions especially growth and cell division, and it has the ability to spread all over the body. In normal cells, the nucleus receives chemical signals to start the process of division and other signals to stop the process; therefore, division is controllable process in normal cells. On the other hand, cancer cells have the ability to divide without receiving the starting chemical signals and rejecting the stop signals. Thus, cancer is uncontrollable division leads to up normal cells count and trauma. There is at least one genetic mutation in all cancer cases, thus cancer is a genetic disease. Therefore, Cancer can be defined as genetic defect leads to cell dysfunctions especially growth and cell division, and it has the ability to spread all over the body. There are two main categories of causes; genetic and environmental causes.

* **Cancer Causes**

Genetic factors are responsible for more than 90% of all cancer cases, while the remaining 10% are due to environmental factors3. Genetic factors mean the risk of developing the disease is related to the genetic information, as these DNA mutations can significantly develop cancer. On the other hand, environmental factors include chemicals, lifestyle behaviors such as obesity can enhance cancer progress. For instance, tobacco is responsible of 90% of lung cancer, which is one of the most offensive types of cancer4. Moreover, cancer can be developed due to infectious diseases such as hepatitis B and C.

* **Genetic Disorder**

Cancer

* **Cancer Classifications**

Cancer

* **Cancer Stages**

Cancer

* **Cancer Diagnosis Methods**
* **Biopsy**

Biopsy

* **Biomarkers**

Biomarker

* **Radiation Methods**

**Mammogram**

**MRI**

* **Downsides of Cancer Diagnosis Methods**
* **Biopsy**Biopsy
* **Biomarkers**

Biomarker

* **Radiation**

Radiation

* **Novel Cancer Diagnosis Method by Exosomes Detection**

**Exosomes**

Exosomes

* **Exosomes Contents**
* **Lipids Content**

Lipids

Exosomes

* **Exosomes Isolation**

There are two chief categories of exosomes isolation; immune-affinity techniques and ultracentrifuge. In immune-affinity approach, antibodies can be used to capture exosomes from the biological sample, while ultracentrifuge with G force more than 100000 g can be used to isolate and purify exosomes from other cells and protein. Ultracentrifuge provokes bulk quantities rather than immune-affinity techniques5. Furthermore, exosomes can be separated by a label free method by using microfluidic devices, as the microfluidic technologies significantly reduce the consumption of the biological samples. However, microfluidic devices are more complicated to be produced than other techniques. Therefore, ultracentrifuge can be considered the most suitable method for exosomes isolation at least for the moment.

* **Ultracentrifuge**

Exosomes have been successfully isolated from cell culture and numerous biological fluids such as plasma, serum, saliva, breast milk, and urine6. Differential centrifugation can be considered as the gold method for exosomes isolation.

* **Microfluidic Devices**

Micro

* **Exosomes Characterization**

Exosomes

* **Sphingomyelin in Exosomes**

Exosomes

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| **Mohammed Hesham Abdelaziz Submitted to: Dr Anwar Abd Elnaser** |