**Pancreatic Cancer**

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**Abstract:**

Pancreatic cancer is an increasingly aggressive and metastatic malignancy that has increasingly moved forward as one of the leading causes of cancer mortalities in the United States and worldwide. Being that pancreatic cancer is typically not diagnosed until the late stages of its progression, due to its minor or complete lack of symptoms, many who are cursed with such cancer are not likely seen to survive. With a low prognosis for its survival rate of 1-5 years after being diagnosed, pancreatic cancer is expected to become the second leading cause of cancer mortality in the United States, and the 7th leading cause of cancer mortality globally. The likelihood of a person being ailed with pancreatic cancer increases with age, gender, obesity, and the use of tobacco. As this malignancy continues to grow as a threat in the cancer community, scientists are becoming more eager to discover better methods of diagnosing pancreatic cancer at earlier rates to prevent it from metastasizing and attacking the body. The question stumping researchers and physicians is why pancreatic cancer is so difficult to diagnose and treat; the articles discussed in this microreview touch on the epidemiology of pancreatic cancer and the study of more efficient and lasting methods of diagnostics and treatment, as well as prevention.

**Key Words:**

Pancreatic Cancer, metastatic, mortality, malignant, adenocarcinoma

**Introduction**

Pancreatic cancer has increasingly become the second leading cause of cancer mortalities in the United States, as well as the 7th leading cause globally. Pancreatic cancer can occur as an adenocarcinoma, which is most common for this malignancy (85%), or as a neuroendocrine tumor.[[1]](#footnote-1) Pancreatic adenocarcinoma is where the cancer originates in the ductal lining of the pancreas. As the cancer begins to increase and grow in numbers, the cancer cells may metastasize and spread to surrounding tissues, cells, organs, and even the blood stream. Pancreatic cancer is not usually discovered until this stage because of its lack of symptoms in the early stages of this cancer. Because of its aggressive nature and how quickly it spreads, after it has reached other locations of the body, survival rate reduces to 20% and life-expectancy is usually around 5 years after diagnostics. These reasonings are why pancreatic cancer has become so alarming. Lack of diagnostic methods, preventions, and symptoms makes this disease one that has stumped researchers and physicians.

As of 2010, smoking and familial genetics are the number 2 highest risk factors seen in people who have acquired pancreatic cancer (Goggins, Michael et al.). As seen in several other cancers, smoking and tobacco use increases a person’s chances for cancers, as well as increases genetic mutations, making it more likely to pass these mutations and the likelihood of cancer down to other family members. Members of a family who have more than two primary family members who were diagnosed with pancreatic cancer are more likely to be diagnosed with the same illness but at a more alarming rate. Persons with familial pancreatic cancer are seen to develop the cancer at a younger age and have larger and more aggressive tumors than sporadic patients of pancreatic cancer. In addition to being genetically passed down, pancreatic cancer is seen in patients that are overweight, who are diabetic, and primarily in males aged 70 and older. Early onset pancreatic cancer is seen generally in people over the age of 50, [[2]](#footnote-2)who have a family history of this type of cancer. Knowing the risk factors of this malignant cancer, scientists have discovered that the best way to tackle it and to reduce mortality rates is to monitor patients who are at a higher risk of attaining pancreatic cancer.

The articles in which this microreview is based on, touch on the Epidemiology and diagnostic methods that could aid in reducing the progression this cancer has on society, and its increasingly high mortality rates. Being aware of the risk factors of pancreatic cancer will help scientists and doctors be able to diagnose this disease at its earlier stages rather than catching it after it has metastasized and spread throughout the body making it more difficult to treat and making it less likely for a patient to survive. Using methods such as CT scans, biomarkers, genetic testing, and explorative surgeries will result in reduced rates of pancreatic cancer deaths globally.

**Recent Discoveries**

The likelihood of a patient being diagnosed with pancreatic cancer increases with the patients age and as well as their lifestyle and them being diabetic, obese, and/or being a chronic smoker. The link between pancreatic cancer and diabetes are seen to greatly counteract with one another, as it was observed that patients over 50 who were recently diagnosed with diabetes, approximately 1% of these patients’ diagnosis was acquired due to them already being in the early stages of pancreatic cancer[[3]](#footnote-3). Studies show that those with diabetes type 2 are more likely to be diagnosed with pancreatic cancer. The onset of pancreatic cancer is very noticeably affected by a patient’s current health and their exposure to risk factors. Although pancreatic cancer generally targets males over the age of 70, if a patient is currently already at risk, then their likelihood of being diagnosed with pancreatic cancer increases and its onset is more likely expected to occur around the ages of 50, shooting pancreatic cancer's effect on the current patient by 20 years. Given that pancreatic cancer is very hard to diagnose, noticing and staying aware of risk factors and genetics biomarkers can improve the chances of catching the disease early onset.

Being aware that genetics plays a part in a person's likelihood to be diagnosed with pancreatic cancer is very important for scientists and their studies regarding this type of malignancy. Studies show that pancreatic cancers are more likely attributed to genetics by 5-10% than other risk factors.[[4]](#footnote-4) Mutations that are noted to effect and onset pancreatic cancer are seen on tumor suppressor genes STK11, BRCA2, TP53, and the KRAS oncogene. “KRAS mutations and telomere shortening are the earliest known genetic abnormalities recorded,” (Goggins, Michael et al.). These mutations in a patient's genetic coding are seen to greatly increase their rates of being diagnosed with pancreatic cancer as well as having a more metastasized and more aggressive form of the disease. Once it is realized that a patient has familial background of pancreatic cancer, it is then recommended that these patients undergo genetic testing to see their likelihood of acquiring pancreatic cancer in their future. Once this person has been flagged as high risk, it is recommended by researchers that this patient undergoes continuous and frequent testing for such cancer in order to catch it at earlier stages. Because pancreatic cancer is more aggressive in hereditary situations, it is primitive that a patient is screened regularly for this cancer in order to prevent them from missing the diagnosis and reducing their life expectancy.

Pancreatic cancer's poor prognosis is what makes this disease critical to understand, study, and treat. Given that pancreatic cancer has low symptoms in its early stages it is not often discovered until it is sadly too late.

Biomarkers and genetic screening can be used to measure, study, and identify genetic mutations in pancreatic cancer and the genomes of potential high risk pancreatic cancer individuals. There is no specific pancreatic cancer biomarker[[5]](#footnote-5) that will identify or create preventative measures for this cancer, however, scientists have been able to identify certain genetic mutations and where they occur in the genome of an individual and of a pancreatic cancer cell. Other methods of diagnosing pancreatic cancer includes ultrasounds and CT screenings which tend to be the most effective when identifying or looking for pancreatic tumors in a patient. After screenings and diagnostics have been determined the next step in handling pancreatic cancer in individuals is treatment. Treatment can range from radiation therapy, chemotherapy, but most effectively, surgical extraction of pancreatic tumors. Surgical extraction of pancreatic tumors is most effective in earlier to mild stages of the cancer before the cancer has metastasized to other regions of the body. Once pancreatic cancer has reached its most aggressive and higher stages, many of the tumors are non-extractable because of their location in the body making them more difficult to locate and take out. Overall, what scientists have discovered is that screening and diagnosing an individual with pancreatic cancer in its early stages, and even before onset by discovering that the cancer can be hereditary, is the best method of preventing and treating pancreatic cancer. Furthermore, the most efficient method of tackling this cancer is by eliminating and reducing risk factors in the individual who is currently high risk. Once pancreatic cancer has begun it is very hard for an individual to beat it, especially with patients being over the age of 70, making them even more high risk for not surviving the cancer.

**Discussion**

Out of numerous types of cancer, pancreatic cancer is certainly one of the most challenging ones and arguably the hardest for a patient to overcome. As aggressive as pancreatic cancer becomes in its later stages, its earlier stages are quite mild, making it difficult to identify or even suspect in the individuals. However, it is imperative that an early diagnosis is made, in order to potentially save a life. As technology improves and research continues, the progress in treating and diagnosing pancreatic cancer is continuously advancing in the efforts of reducing its high mortality rate. Individuals who are diagnosed with pancreatic cancer, especially those being high risk and or those being over the age of 70, in its later stages have an 85% chance of not surviving the cancer past five years.[[6]](#footnote-6) Pancreatic cancer and its ability to metastasize and mutate in a genome makes this cancer extremely dangerous and critical when it comes to research, prevention, and treatment. Of the four articles used in this microreview, all of the researchers have concluded and advised that the best method for increasing survival rates for pancreatic cancer is identifying those who are high risk and those who the cancer affects hereditarily and reducing their level of a risk factor and genetically screening in order to catch the cancer at its earliest stages. Reducing risk factors and genetically screening individuals who have a history of pancreatic cancer in their family, and regularly screening these individuals for the cancer is the best method for treating pancreatic cancer for the time being.

As research continues and as researchers identify biomarkers and genetic mutations in the genomes of pancreatic cells and individuals who are high risk for pancreatic cancer, diagnostics of said cancer are expected to increase and improve overtime. But knowing what attributes to such an aggressive cancer is already leading science in a better direction. With pancreatic cancer increasingly approaching #2 as the highest mortality rate for a cancer in the United States, and #7 globally, it is imperative that scientists continue their research and their diligence in regard to breaking down pancreatic cancer. The research being performed has been no short of an essential. The research for pancreatic cancer continuously raises the question, “why is such an aggressive and dangerous cancer so quiet in its earliest stages when presenting symptoms,” and “why such a cancer progresses so quickly, and so hard to treat.” What better methods of diagnostics can be used or created to stop pancreatic cancer in its tracks before it becomes too dominant to treat? Until the solution is determined for better diagnostic methods, the best prevention for saving lives of cancer patients who are ailed with pancreatic adenocarcinoma is continuing the research, advancing in methods of screening and scans, and monitoring and reducing risk factors in high-risk individuals.

**Resources**

Jonathan D Mizrahi, Rachna T Shroff, Rishi Surana, Juan W Valle, “Pancreatic cancer,” *The Lancet,* Volume 395, Issue 10242, 2020, Pages 2008-2020, ISSN 0140-6736.

Michael Goggins, Joseph Herman, Ralph H Hruban, Rich Schulick, Audrey Vincent, “Pancreatic cancer,” *The Lancet*, Volume 378, Issue 9791, 2011, Pages 607-620, ISSN 0140-6736.

Rawla, Prashanth et al. “Epidemiology of Pancreatic Cancer: Global Trends, Etiology and Risk Factors.” *World journal of oncology* vol. 10,1 (2019): 10-27. doi:10.14740/wjon1166

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6. Jonathan D Mizrahi, Rachna T Shroff, Rishi Surana, Juan W Valle, “Pancreatic cancer,” The Lancet, Volume 395, Issue 10242, 2020, Pages 2008-2020, ISSN 0140-6736. [↑](#footnote-ref-6)