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Opinion

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Review of Clinical Diagnosis, Epidemiology, Therapy, and Results for Pancreatic Cancer

Jacob Taylor*

Abstract

This review attempts to provide the most recent understanding of pancreatic adenocarcinoma risk, diagnosis, treatment, and outcomes, while highlighting any knowledge gaps that may serve as catalysts for additional study of this understudied cancer. A deadly disorder with an increasing incidence, pancreatic adenocarcinoma is expected to overtake lung cancer as the second biggest cause of cancer-related death in some areas. It frequently manifests at a late stage, which adds to low five-year survival rates of 2% to 9%, placing it at the bottom of the list of all cancer sites in terms of patient prognostic outcomes. For health professionals and the general public to be aware of potential preventive and/or early detection strategies, a better understanding of the risk factors and symptoms linked to this disease is crucial. It is critically necessary to identify high-risk patients who could benefit from screening to find pre-malignant diseases including pancreatic intraepithelial neoplasia, intraductal papillary mucinous neoplasms, and mucinous cystic neoplasms, but an appropriate screening test has not yet been found. With the emergence of novel surgical procedures and medical treatments such laparoscopic procedures and neo-adjuvant chemo radiotherapy, the management of pancreatic adenocarcinoma is changing, however the results have only slightly improved. To get to a precision medicine future when pancreatic cancer treatment can be personalized for each patient and needless treatments that have a detrimental impact on quality of life can be avoided for others, it is desirable to identify novel biomarkers. The creation of fresh agents and delivery mechanisms must be the main focus of research activities. In general, significant progress is needed to lessen the burden brought on by pancreatic cancer. Large consortia and research into pancreatic adenocarcinoma have recently received renewed funding, which is to be applauded. However, additional streams will be required to facilitate the momentum required to produce breakthroughs seen for other cancer sites.

Keywords: Pancreatic cancer; Pancreatic adenocarcinoma; Pancreatic cancer risk factors; Gene therapy

Introduction

An increasingly common and fatal illness, pancreatic adenocarcinoma has terrible prognoses. This review provides the most recent information on pancreatic cancer incidence, results, risk factors, pathophysiology, diagnostics, explored biomarkers, and therapies. Where possible, this review concentrates on pancreatic adenocarcinoma, but it should be recognized that pancreatic ductal adenocarcinomas comprise the majority of cases where the term "pancreatic cancer" is used. Case-control studies have historically been used to examine the risk variables that contribute to the development of pancreatic cancer because of its low incidence and poor prognosis. Sadly, these study designs do include flaws including recollection bias and selection bias. To solve the sample size problem in prospective research, consortiums are required, and these have been published increasingly frequently in recent years. Although more research is needed in this area, there is some early evidence that some of these lifestyle factors may affect survival.

Age: A common age group for pancreatic cancer is the elderly. Patients are almost never diagnosed before the age of 30, and 90% of those who are older than 55, with the bulk in their seventh and eighth decades of life. The age at which the incidence rises to its maximum differs per nation. For instance, the incidence of patients in India peaks in their sixth decade of life, but in the US, it peaks in their seventh.

Sex: Men are more likely than women to have pancreatic cancer globally (Age-standardized rate 5.5 in males compared to 4.0 in females). Higher development index countries seem to have a wider discrepancy. Despite the gender disparity, a systematic evaluation of 15 researches found no evidence linking reproductive variables to pancreatic cancer in women. These findings suggest that alternate reasons for the male preponderance may involve different exposures to environmental or genetic factors.

Ethnicity: Asian-Americans and Pacific Islanders have the lowest incidence rates of pancreatic cancer in the United States, while African-Americans have a 50% to 90% greater chance of developing the disease compared to Caucasians. There is evidence for underlying genetic or gene environment interactions to explain at least some of the observed differences in incidence between ethnic groups. The higher incidence rates within the African-American population are proposed to be linked to a greater exposure to other risk factors for pancreatic cancer, such as cigarette smoking, alcohol consumption, elevated body mass index, and higher incidence of diabetes.

Blood group: Numerous sizable epidemiological research have demonstrated a relationship between various ABO blood types and the likelihood of acquiring pancreatic cancer. Analysis of data from the renowned United States Nurse Health Study and Health Professionals Follow-up Study revealed that, in comparison to blood patients with blood group O, those with blood groups A, AB, or B had significantly higher risks of developing pancreatic adenocarcinoma (HR: 1.32, 95% CI: 1.02-1.72), 1.51 (95% CI: 1.02-2.23), and 1.72 (95% CI: 1.25-2. These findings were supported by the Pancreatic Cancer Cohort Consortium's results, which pooled information from 12 prospective cohort studies. The host inflammatory state and variations in glycosyltransferase specificity among the various ABO blood types are the suggested explanations for this.

Gut Microbiota: Numerous investigations into the role of the gut microbiota in pancreatic cancer have been conducted. An increased risk of pancreatic cancer is linked to lower levels of Neisseria elongate and Streptococcus mitis and greater levels of Porphyromonas gingivalis and Granulicatella adiacens, according to a systematic study. However,

***Corresponding author:** Jacob Taylor, Editorial Office, Clinical Oncology Case Report, United Kingdom E-mail: oncologyreport@escienceopen.com

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more research is required to confirm these findings and determine whether or not targeted treatment is a viable therapeutic option.

Family history and genetic susceptibility: Two or more first-degree relatives must have previously been diagnosed with the disease for pancreatic cancer to be termed familial, which accounts for 5% to 10% of new cases. Patients at risk for pancreatic cancer have a nine-fold increased risk compared to those without familial risk factors; this risk rises to a thirty-two-fold increased risk if three or more first-degree relatives have already been diagnosed. According to a meta-analysis of nine studies, those with a family history of pancreatic cancer still have an 80% higher chance of acquiring pancreatic adenocarcinoma than people without a known family history, even if only one first-degree relative has the disease (RR: 1.8, 95% CI: 1.48-2.12). This suggests that a subgroup of affected people has a high hereditary predisposition to pancreatic cancer. The chance of developing familial pancreatic cancer increases exponentially with the number of first-degree relatives who are affected; BRCA2 and PALB mutations are the most frequently identified in this group. Compared to the general population, several disorders are also linked to an elevated risk of pancreatic cancer.

Discussion

The 5-year survival rate for people with pancreatic cancer is roughly 6% worldwide, but published literature varies this from 2% to 9%. Age, sex, the quality of the healthcare system, the existence of co-morbidities, and lifestyle choices are all factors that have an impact on survival; some of these factors explain why survival rates vary throughout nations. The stage of the tumor at the time of diagnosis, however, has the greatest impact on the course of the disease. Only 20% of patients with pancreatic cancer had surgically respectable disease at time of presentation, which is unfortunate given that pancreatic cancer frequently presents late. The 5-year survival rate for individuals who can have a successful surgical resection is reported to be 27%, whereas the median survival times for patients with locally progressed or metastatic illness are, respectively, six to eleven months and two and six months. The 5-year survival rates for pancreatic cancer have barely improved despite improvements in surgical and medicinal treatment. For instance, population-based statistics from the Northern Ireland cancer registry showed very modest increases in the five-year survival rate from cases diagnosed between 1993 and 1999 to cases diagnosed between 2005 and 2009, from 2.5% to 5.2%. The increasing prevalence and persistently low survival rates underscore the need to establish procedures for screening people who are at high risk, create procedures for early detection, and enhance both surgical and medicinal therapy of these patients.

90% of pancreatic carcinomas are pancreatic adenocarcinomas and their variations. The pathology of pancreatic adenocarcinoma, its variations, and precursor lesions will be briefly discussed in this section. Readers are referred elsewhere for information on non-ductal tumors like acinar cell carcinomas and neuroendocrine neoplasms, which will not be covered here. The head of the pancreas is where 60% to 70% of pancreatic adenocarcinomas develop, with the tail and body of the pancreas each accounting for 15% to 20% of cases. Most pancreatic adenocarcinomas are already outside of the pancreas when they are diagnosed, and nodal metastases are not unusual. The World Health Organization recognizes morphological variants of pancreatic adenocarcinomas, and these tumors have different histological characteristics from traditional pancreatic adenocarcinomas. Additionally, these variations have varied prognoses and can have a different molecular signature.

The shortcomings of the available pancreatic cancer therapy options further highlight the necessity to investigate new research directions in order to make potentially ground-breaking discoveries. In various pre-clinical and early-phase clinical trials, novel therapeutic methods such oncolytic virus therapy and gene editing technology have been found to be promising. An excellent overview of the current state of these experimental treatments is given by the recent review of various therapeutic approaches. In developed nations, pancreatic cancer is more prevalent, which may be due to lifestyle factors. To further understand the risk factors linked to pancreatic cancer, additional large prospective studies are required because the etiology is still poorly known.

Potential screening targets include people who have a familial pancreatic ductal adenocarcinoma risk. However, there is disagreement over the ideal age, the interval at which screening should be done, or the appropriate imaging method. Additional retrospective and prospective studies that track these familial pancreatic cancer patients over time will assist better understand the course of this illness and allow the development of efficient detection and treatment techniques. Neo-adjuvant therapy has increased survival in some individuals, whereas unrespectable disease has emerged in certain patients with previously respectable illness during treatment. In order to determine which patients may benefit from this strategy the most, additional randomized studies are essential. The identification of novel biomarkers may aid in decision-making and allow for the development of personalized treatments and precision medicine. The cornerstone of curative pancreatic cancer treatment continues to be surgical resection. Venous resection makes it possible to establish clear margins; however it is unclear what advantage this has for survival. Future guidelines will be formulated with the help of more retrospective studies that identify people who have had this treatment and the results of it.

Conclusion

The epidemiology and treatment of pancreatic ductal adenocarcinoma are fully described in this article. Although therapy possibilities are constantly evolving, there are still significant gaps in our understanding of this condition, as described in the summary section above. Large consortia and specialized research into pancreatic ductal adenocarcinoma have recently received funding, but much work remains to be done before similar discoveries as observed for other cancer locations are possible.

Author Affiliations Top

Editorial Office, Clinical Oncology Case Report, United Kingdom