



Title

A Review Article on Pancreatic Cancer

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➤ Abstract

Pancreatic cancer is a malignant disease characterized by low survival and high recurrence rate, and patients are mostly at the stage of locally advanced or metastatic disease when first diagnosed. Early diagnosis is particularly important because prognostic/predictive markers help guide optimal individualized treatment regimens. So far, CA19-9 is the only biomarker for pancreatic cancer approved by the FDA, but its effectiveness is limited by low sensitivity and specificity. With recent advances in genomics, proteomics, metabolomics, and other analytical and sequencing technologies, the rapid acquisition and screening of biomarkers is now possible. Liquid biopsy also occupies a significant place due to its unique advantages. In this review, we systematically describe and evaluate the available biomarkers that have the greatest potential as vital tools in diagnosing and treating pancreatic cancer.

Keywords: Pancreatic Cancer, Chemotherapy, Treatment, Future Approches, Biopsy, Epidemiology, Symptoms.

➤ Introduction

Pancreatic Ductal Adenocarcinoma (PDAC) is one of the most aggressive nasty conditions with a current worldwide mortality-frequency rate of 94.2. More importantly, PDAC is projected to become the alternate most frequent cause of cancer deaths before 2030. PDAC is the most murderous type of pancreatic cancer. This type of cancer is refractory for the current treatments. The excrescence phenotype is a strong determinant of the medical response. Likewise, epigenomic chorographies are the main controllers of phenotype-motorist pathways.^[1] The most

common form of pancreatic cancer is “pancreatic ductal adenocarcinoma” (PDAC).^[2] This is responsible for some 85 of the cases, PDAC arises in the pancreatic tubes, which run through the middle of the organ and perform its main exocrine functions.^[3] Since this spread isn't long-distance, this is occasionally appertained to as “oligometastatic”.^[4] Pancreatic cancer (PC) is an aggressive malice and the seventh leading cause of global cancer deaths in industrialized countries and the third most common cause of cancer death in the United States.^[5] Advancing age is constantly stressed as the topmost trouble factor with 90 of cases diagnosed in grown-ups progressing > 55 times^[6] thus, as the population continues to both increase and age, pancreatic cancer is ready to rise to the third- leading cause of cancer- related death in Europe by 2025.^{[7]. [8]}

➤ Epidemiology

The prevalence of pancreatic cancer varies greatly across regions and populations. Prevalence rates for pancreatic cancer in 2012 were loftiest in Northern America (7.4 per 100,000 people) and Western Europe (7.3 per 100,000 people), followed by other regions in Europe and Australia/ New Zealand (inversely about 6.5 per 100,000 people). The smallest rates (about 1.0 per 100,000 people) were observed in Middle Africa and South-Central Asia. Differences in prevalence rates were twentyfold between the populations with the loftiest rate (Czech Republic 9.7) and the population with the smallest rate (Pakistan-0.5). Further than half of new cases (55.5) were registered in more developed regions. Slightly lower than half (41.0; 139363 of cases) of all new cases of pancreatic cancer in 2012 were recorded in the countries of Asia.^[9] The recent Cancer Statistics Review(CSR) reported increased pancreatic cancer prevalence from 1992 – 2013.^[10] Pancreatic cancer is presently the third leading cause of cancer mortality in the USA and protrusions to 2030 estimate that the complaint will become the alternate commanding cancer-related cause of death, after lung. ^[11] In 2016, an estimated 53,070 new cases of pancreatic cancer were diagnosed in the USA and 41,780 individuals were anticipated to die of the complaint. The threat of developing pancreatic cancer increases with age — 90 of cases are diagnosed after age 55 and the median age of opinion is 71 times. Cases with pancreatic cancer have veritably poor survival, with a relative 5-time survival rate of only 8.2. Pancreatic cancer rates are more advanced among males than ladies and among blacks compared with whites and other ethnical/ ethnical groups. Furthermore, than 90 of cases diagnosed are exocrine adenocarcinomas but pancreatic neuroendocrine cancer rates have been rising. Tobacco use, fat(including rotundity), and diabetes are all adjustable threat factors associated with pancreatic adenocarcinoma. ^[12]

➤ Risk factors

Studies have found the following risk factors for cancer of the pancreas:

➤ TOBACCO USE



Fig:(1) Tobacco Use

Smoking is one of the most important threat factors for pancreatic cancer. People who smoke are nearly doubly as likely as those who have never smoked to develop pancreatic cancer. Cigarette smoking, vaping, and smokeless tobacco use also increase the threat. There's substantiation that formerly smoking has stopped, and the threat has decreased. However, there are numerous programs available to help you quit, so ask your doctor for recommendations, If you're a smoker. [13]

➤ DIABETES



Fig:(2)Diabetes

People with type 2 diabetes, also known as adult-onset diabetes, are more likely than others to develop pancreatic cancer over time. Type 2 diabetes is constantly linked to obesity. The connection between type 2 diabetes, obesity, and pancreatic cancer is not fully understood but is an active disquisition area. [13]

➤ OBESITY



Fig:(3) Obesity

People who are overweight or obese are slightly more likely than other people to develop pancreatic cancer. Obesity is defined as having a body mass index [BMI] of 30 or more. Research into obesity, inflammation, and pancreatic cancer has shown that obesity causes many genetic alterations in the pancreas, which may be one mechanism that accelerates tumor development. Obesity can also cause inflammation in the pancreas, which is another risk factor for developing cancer of the pancreas. [13]

➤ CHRONIC PANCREATITIS

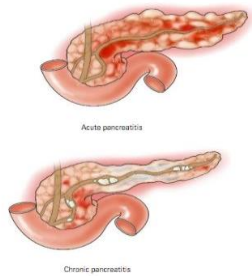


Fig:(4) Chronic Pancreatitis

Pancreatitis is inflammation of the pancreas, caused when digestive enzymes actuate while still in the pancreas, galling the cells of the pancreas and causing inflammation. Habitual pancreatitis, the long-term inflammation of the pancreas, is linked to an increased threat of pancreatic cancer. Habitual pancreatitis is frequently seen with heavy alcohol consumption and smoking. [13]

➤ FAMILY HISTORY



Fig:(5) Family History

Research shows that there is an increased risk for those with a familial history of pancreatic cancer. The risk is greater when there is a first-degree relative (parent, sibling, or child) who developed pancreatic cancer before the age of 50 or if there are two or more first-degree relatives who have been diagnosed with pancreatic cancer. Individuals with a family history of pancreatic cancer are advised to consider genetic counseling and genetic testing to see if they are at higher risk for pancreatic cancer and possibly other cancers. Genetic testing and counseling can lead to changes in medical management that can reduce the chance of developing cancer or lead to increased surveillance for cancer to detect cancer earlier when treatment options and outcomes are better. Although family history is a risk factor, most cases are not linked to family history. [13]

➤ RACE (ETHNICITY)



Fig:(6) Race (Ethnicity)

African Americans have a slightly advanced prevalence of pancreatic cancer compared to individuals of Asian, Hispanic, or Caucasian descent. The correlation isn't clear, still, non-Hispanic African Americans are more likely to be diagnosed with diabetes. There's also an advanced prevalence of pancreas cancer among Ashkenazi Jews,

conceivably due to a gene mutation involving the BRCA1 or BRCA2 heritable cancer predilection genes. [13]

➤ Etiology

Pancreatic cancer occurs when cells in your pancreas mutate(change) and multiply out of control, forming an excrescence. Your pancreas is a gland in your tummy(belly), between your chin and stomach. It makes hormones that control blood sugar situations and enzymes that aid in digestion. most pancreatic cancers start in the tubes of your pancreas. The main pancreatic conduit (the conduit of Wirsung) connects your pancreas to your common corrosiveness conduit. Early-stage pancreatic excrescences don't show up on imaging tests. For this reason, numerous people don't admit an opinion until the cancer has spread(metastasis). Pancreatic cancer is also resistant to numerous common cancer medicines, making it notoriously delicate to treat. [14]

➤ Symptoms

Signs and symptoms of pancreatic cancer often don't occur until the disease is advanced. They may include: [15]

- Abdominal pain that radiates to your back
- Loss of appetite or unintended weight loss
- Yellowing of your skin and the whites of your eyes (jaundice)
- Light-colored stools
- Dark-colored urine
- Itchy skin
- Blood clots
- Fatigue



PANCREATIC CANCER

14 WARNING SIGNS YOU SHOULD KNOW

PANCREATIC CANCER ACTION NETWORK

SYMPTOMS

Pancreatic cancer may only cause only vague symptoms. If you are experiencing one or more of these unexplained symptoms, the Pancreatic Cancer Action Network urges you to see your doctor.

- Abdominal and/or mid-to-upper back pain
- Nausea/loss of appetite
- Jaundice (yellowing of the skin and eyes)
- Weight loss
- Changes in stool (loose or watery)
- New-onset diabetes

RISK FACTORS

The exact causes of pancreatic cancer are not yet well understood, but research studies have identified certain risk factors.

- Risk may increase if at least one first-degree relative has had the disease.
- A diet high in red and processed meats may increase risk. A diet high in fruits and vegetables may decrease risk.
- People with obesity have a 20% increased risk of developing the disease, compared with people of healthy weight.
- Black Americans and Ashkenazi Jews have a higher incidence of pancreatic cancer.
- Smoking may cause about 20-30% of all existing pancreatic cancer cases.
- The chance of developing pancreatic cancer increases with age.
- Long-standing (over 5 years) diabetes increases risk.
- Chronic pancreatitis increases risk. Risk is even higher for people with hereditary pancreatitis.

Learn more about:
Risk factors at pancan.org/risk
Symptoms at pancan.org/symptoms

1500 Rosecrans Ave., Ste. 200, Manhattan Beach, CA 90266

Fig:(7) Symptoms

➤ Early detection of pancreatic cancer can be done.?

Pancreatic cancer is hard to diagnose beforehand. There's no standard individual tool or established early discovery system for pancreatic cancer in the general population yet. Still, there are imaging and blood-grounded tests that may be suitable to describe

pancreatic cancer in its early stages in people who are at an increased threat for the complaint. Early-stage pancreatic cancer is generally set up if the position of the cancer causes symptoms beforehand or if testing for unconnected medical conditions shows signs of the complaint. Still, most pancreatic cancer cases are diagnosed at stage IV. Experimenters across the world are working to develop early-discovery styles for pancreatic cancer. Those at high threat may consider exploration studies like surveillance programs. These programs use regular monitoring to look for the complaint with the stopgap of changing it before it does develop. [15]

➤ Test for pancreatic cancer

To be sure of a pancreatic cancer diagnosis, your doctors must get information from imaging tests and tumor tissue samples. Blood tests can also give them good information.

➤ Imaging Tests



Fig:(8) Imaging Test

Imaging studies give croakers visual information about the pancreas and girding napkins. They're the only way to see pancreatic excrescence. So, imaging tests are critical in diagnosing and covering pancreatic cancer. Croakers frequently use a reckoned tomography (CT) checkup to see if the cancer has spread to nearby organs. A CT checkup takes a detailed filmland of the body.

➤ Other Imaging Tests Include.

1. Glamorous Resonance Imaging (MRI)

It uses radio swells and attractions to take filmland of organs and structures inside the body by measuring their energy.

2. Positron Emission Tomography (PET)

Overlooks images grounded on the position of chemical responses passing in cells.

3. Endoscopic Retrograde Cholangiopancreatography (ERCP)

Takes x-ray film and after color is fitted through a thin tube.

4. Endoscopic Ultrasound (EUS)

A thin tube, called an endoscope, with an ultrasound inquiry, is passed through the case's mouth and into the stomach or duodenum to take film of the pancreas, corrosiveness conduit, and digestive tract. Laparoscopy A surgeon inserts a camera through a small cut in the tummy to look at the organs.

➤ Blood Tests and Tumor Markers for Pancreatic Exocrine Tumors

There are blood tests commercially available that can describe pancreatic exocrine excrescences, the most common type of pancreatic excrescence. The blood tests may describe DNA released from cancer cells, the vulnerable system's response to the excrescence, or other blood-grounded biomarkers, like CA 19-9. Pancreatic excrescence blocking the corrosiveness conduit can also beget advanced bilirubin and liver enzyme situations in the blood. High situations of these substances in the blood can to look for pancreatic cancer. Still, this doesn't happen in all pancreatic cancer cases. After opinion, two blood tests may help your croaker see if your excrescence is growing, staying the same, or responding well to treatment. These tests measure substances some pancreatic cancer cells release into your blood, including.

➤ Carbohydrate antigen 19-9 (CA 19-9)

Carcinoembryonic antigen (CEA) While blood tests may signify the possible presence of the complaint, they cannot lead to a definitive pancreatic cancer opinion. fresh tests, like imaging and necropsies, are necessary to confirm the opinion.

➤ Blood Tests and Tumor Markers for Pancreatic Neuroendocrine Tumors

Commercially available blood tests that describe multiple cancer types may also be suitable for finding pancreatic neuroendocrine excrescences (PNETs). Other tests that may help describe PNETs measure. Chromogranin A (CGA) A patch that's high in most people with PNETs. Pancreatic polypeptide (PP) is A hormone frequently high in people with PNETs. Specific hormones are made by pancreatic neuroendocrine tumors.

Croakers can use these blood tests along with imaging tests to get further information to diagnose pancreatic neuroendocrine excrescence.

➤ Biopsy



Fig:(9) Biopsy

The only way for your croaker to know if a mass or excrescence is cancer is to get a towel sample, called a vivisection. Your croaker can get vivisection through surgery or procedures like endoscopic ultrasound (EUS) or endoscopic cholangiopancreatography(ERCP). Also, a pathologist looks at the towel samples under a microscope. The shape, size, and arrangement of the cancer cells may help your croakers figure out the type of pancreatic cancer. [16]

➤ Standard Treatments

Pancreatic cancer treatment depends on the case's general health and the complaint stage. Carrying is the process doctors use to describe the cancer's size and position.

The U.S. Food and Drug Administration (FDA) approves treatments for specific conditions. Treatment accepted by medical experts as proper for a certain type of complaint and that's extensively used by healthcare professionals is called "standard of care."

Standard treatments for pancreatic cancer are surgery, chemotherapy, radiation, or a blend of these.

Some chemotherapy medicines are FDA-approved for treating pancreatic cancer. Others are being studied in clinical trials or have been studied in clinical trials in history.

The FDA has approved one targeted remedy medicine for pancreatic cancer and one immunotherapy for a small group of pancreatic cancer cases. still, these treatments aren't extensively used. utmost cases who admit targeted remedy or immunotherapy will get it through a clinical trial.

➤ Surgery

Commented [IB1]: Crockers= doctors



Fig:(10) Surgery

Although 20 percent of pancreatic cancer cases may be eligible for surgery, data shows that over half of those cases are told they're ineligible. The Pancreatic Cancer Action Network explosively recommends you see a surgeon who performs a high volume of pancreatic surgeries (further than 15 per time) to determine eligibility.

Commented [IB2]: Excrescences = tumors

For eligible cases, surgery is a stylish option for the long-term survival of pancreatic cancer. Data shows that high-volume surgeons at high-volume hospitals have advanced success rates and smaller complications. The Pancreatic Cancer Action Network explosively recommends you have a high-volume pancreatic surgeon (further than 15 surgeries per time) perform the surgery.

➤ Chemotherapy



Fig:(11) Chemotherapy

Chemotherapy uses medicines to kill cancer cells by stopping them from growing and dividing. These medicines travel through the bloodstream and damage cancer cells throughout the body.

Chemotherapy may shrink the excrescences or stop their growth. It can be given alone or with surgery, targeted remedy, radiation, or a blend of these.

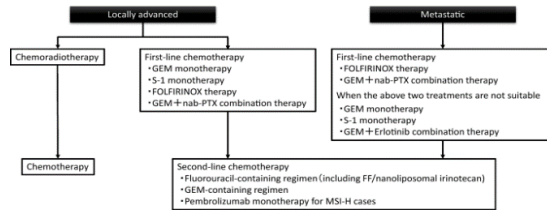


Fig:(12) Chemotherapy Treatment

➤ Radiation Therapy

Radiation therapy uses energy in the form of x-rays or electromagnetic waves. It can damage cancer cells to stop them from growing and dividing. A large machine directs the radiation through the body into the tumor. Radiation aims to stop the tumor from growing or shrinking while not harming the healthy organs or tissue nearby. Doctors may use radiation therapy to relieve pain the tumor causes. Try to shrink the tumor before surgery. Destroy cancer cells that may be in the area after surgery.

➤ Immunotherapy

Immunotherapy is a treatment that helps your immune system attack cancer cells. Your immune system helps your body fight germs and sickness. But it frequently doesn't know if cancer cells are dangerous, or it cannot get to them. Immunotherapy helps your body find and fight the cancer cells like it fights another sickness.

There's one FDA-approved immunotherapy medicine for pancreatic cancer cases with certain inheritable mutations. But it's only an option for a small number of cases. Most immunotherapy medicines for pancreatic cancer are in clinical trials.

➤ Targeted Therapy

Targeted therapy uses medicines to attack unique aspects of cancer cells with little damage to healthy cells. Targeted therapies frequently block the process that changes normal cells into cancer, stopping the tumor's growth. There are several targeted therapies approved by the Food and Drug Administration for certain groups of pancreatic cancer cases, based on testing. Other targeted therapies for pancreatic cancer are still being studied in the laboratory or clinical trials.

➤ Precision Medicine



Fig:(13) Precision Medicine

Every pancreatic cancer case is different. Cases who admit treatment grounded on their biology can live longer. The Pancreatic Cancer Action Network explosively recommends all pancreatic cancer cases get inheritable testing for inherited mutations as soon as possible after opinion and biomarker testing of their excrescence towel to help determine the stylish treatment options. The information from these tests can help your croaker find treatments that may be stylish for you. This is called a perfect drug. These may be standard treatments, clinical trials, or off-marker treatments.

Off-marker treatments are FDA-approved to treat another cancer, not pancreatic cancer. Still, these treatments have shown pledges in some pancreatic cancer cases or in cases with other cancer types whose excrescences have the same mutations. A croaker can define them when it makes sense for the case.

Cases should discuss inheritable testing for inherited mutations and excrescence towel biomarker testing with their healthcare platoon.^[17]

➤ Future approaches

1. Precision Medicine and Genomic Profiling:

Advances in genomic profiling and molecular characterization of pancreatic tumors will continue to play a pivotal role in tailoring treatment strategies. Identifying actionable mutations and targeted therapies will be a key focus.^[18]

2. Immunotherapy and Immunomodulatory Approaches:

Researchers are investigating various immunotherapies, including immune checkpoint inhibitors and cancer vaccines, to enhance the immune response against pancreatic cancer cells. ^[19]

3. Targeted Therapies:

The development of targeted therapies that focus on specific molecular pathways involved in pancreatic cancer growth and progression continues to be a promising avenue. ^[20]

4. Early Detection and Screening: Through Innovation

Research into biomarkers, liquid biopsies, and imaging technologies for early detection and screening aims to improve the chances of diagnosing pancreatic cancer at a more treatable stage. ^[21]

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5. Personalized Medicine and Clinical Trials:

Clinical trials will continue to evaluate novel therapeutic approaches, and efforts will be made to match patients with the most suitable treatments based on their genetic profiles. [22]

6. Minimally Invasive Surgery and Radiation Techniques:

Advancements in minimally invasive surgical procedures and radiation therapy techniques will aim to improve patient outcomes and reduce the invasiveness of treatment. [23]

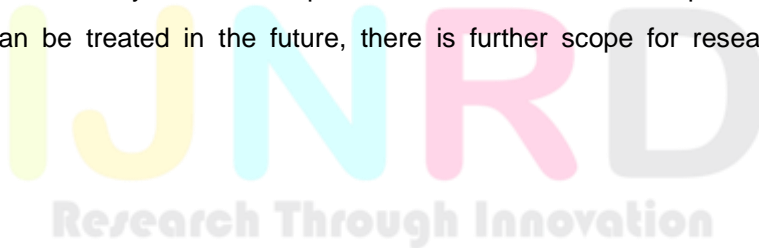
7. Risk Assessment and Prevention:

Identifying individuals at high risk for pancreatic cancer through genetic counseling and testing will continue to be important for early surveillance and preventive strategies. [24]

➤ Conclusion

Pancreatic cancer is a ruinous complaint. No effective treatment exists for the maturity of cases who don't have localized complaints, and 50 of all cases die within 6 months of opinion. There's presently no population webbing for this cancer. Because the early onset of the complaint is largely asymptomatic, there are many openings to diagnose this cancer at early stages. The etiology of pancreatic cancer is inadequately understood, and many openings for forestallment are presently available. The cessation of cigarette smoking is the only extensively accepted behavioral change that can reduce the threat of pancreatic cancer. In recent times, accumulated data have suggested that longstanding type 2 diabetes and rotundity increase the threat of pancreatic cancer. As a result of the absence of early discovery, the difficulty of the individual challenge, the deficit of treatment options, poor survival, and a lack of understanding of its etiology, pancreatic cancer is a major public health challenge. The tobacco epidemic in developing countries and the worldwide rotundity epidemic will only increase the public health burden of this complaint.

This cancer can be treated in the future, there is further scope for research on its treatment.



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