



BÖLÜM 20

Pankreas Kanseri ve Tedavisi

Alper ATA¹

Giriş

Pankreas kanserleri tüm kanserlere bağlı ölümlerin en sık dördüncü sebebidir ve eğer eğilim mevcut şekilde devam ederse 2030 yılında ikinci sıraya yükselmesi beklenmektedir (1, 2).

Pankreas kanserlerinin %90'ı pankreatik duktal adenokarsinomlardır (PDAC). En önemli risk faktörleri gen mutasyonlarına bağlı ailesel risk, kronik pankreatit, pankreatik kistler ve diabetes mellitustur (3, 4). Diğer risk faktörleri sigara, alkol, obezite, metabolik sendrom ve yaşlılıktır (5).

Hastaların önemli bir kısmına lokal ileri evre ya da metastatik safhada tanı konulur. Bu durumun en önemli sebebi hastalığın lokalizasyonuna bağlı olarak geç semptom vermesidir (6). Pankreas kanserlerinde 5 yıllık sağkalım beklentisi ne yazık ki %10'un altındadır (7). Hatta erken tanı alan ve rezeke edilen hastalarda 5 yıllık sağkalım %31'in altındadır (8). Hastalığın derin lokalizasyonu, agresifliği, tarama testlerinin yetersizliği yüksek mortalite-

nin en önemli sebepleridir.

Pankreas kanserinin tanısı görüntüleme yöntemleri ile konur (transabdominal ultrasonografi, bilgisayarlı tomografi, manyetik rezonans görüntüleme (MRI), pozitron emisyon tomografisi (PET), Endoskopik Retrograd Kolanjiyo Pankreatografi (ERCP) ve endoskopik ultrasonografi) (9). Bu yöntemlerin bazı kısıtlamaları vardır. Örneğin erken evre pankreas kanserinin tespiti, küçük metastazların tespiti veya peritoneal lezyonların tespiti güç olabilir (10). Karsinoembriyonik antijen (CEA) ve kanser antijeni 19-9 (CA19-9) gibi serum tümör belirteçleri klinik tanıda sıklıkla kullanılır. Ancak bu belirteçlerin pankreas kanseri için sensitivite ve spesifiteleri düşüktür (11). Kodlamayan bir RNA (non-coding RNA, ncRNA), bazı genetik belirteçler (Kirsten fare sarkoma virüs (KRAS), tümör protein 53 (TP53), SMAD4 (small mother against decapentaplegic4) ve sikline bağımlı kinaz inhibitörü 2A (CDKN2A)), dolaşımdaki tümör DNA'sı (ctDNA), dolaşımdaki tümör hücreleri (CTC) ve eksozomlar tümör belirteçleri olarak çalışılmaktadır. Bu belirteçlerin yakın

¹ Doç. Dr., İstinye Üniversitesi, Tıp Fakültesi Tıbbi Onkoloji AD, dralperata@yahoo.com

İmmünoterapiler

İmmün kontrol noktası (checkpoint) inhibitörleri özellikle yüksek tümör mutasyon yüküne (Tumor Mutational Burden, TMB) sahip hastalarda faydalıdır (64). Ancak bu ilaçların metastatik pankreas kanserindeki çalışmaları hayal kırıklığı yaratmıştır. Yanlış eşleşme onarım (mismatch repair, MMR) eksikliği pankreas kanserlerinde çok nadir izlenir (%1) (65). Pembrolizumab, MMR mutasyonu olan tüm solid tümörlerde FDA tarafından onaylanmıştır. Ancak pankreas kanserlerinin mikroçevresinde sitotoksik T hücre sayısı azdır bu sebeple immün checkpoint inhibitörleri başarılı sonuçlar vermemektedir (66). İmmünomodulator ajanlarla immün checkpoint inhibitörleri kombinasyonu çalışmaları devam etmektedir.

Aşılar

Günümüze kadar ileri evre pankreas kanseri tedavisinde çalışması olan iki aşı vardır; GVAXve CRS207 (66). Ancak bu aşuların kullanıldığı ilk çalışmalar olumlu sonuçlar vermemiştir. Bu aşuların immün checkpoint inhibitörleri ile kombine kullanımları konusundaki çalışmalar devam etmektedir.

Sonuç

Pankreas kanserlerinin görülme sıklığı ve mortalitesi son yıllardaki tanı ve tedavi alanındaki gelişmelere rağmen hala oldukça yüksektir. Hastalığın erken evrede yakalanma ihtimali düşüktür. Tek kür şansı cerrahidir ancak başarısı sınırlı olduğu için her hastaya adjuvan kemoterapi verilmelidir. Hastalık başlangıçta potansiyel olarak cerrahi şansına sahipse neoadjuvan tedavi düşünülebilir. Gemcitabin hakimiyetinde geçen uzun yıllar sonrası yeni kombinasyon rejimleri metasta-

tik hastalıkta yer bulmuşlardır. Yeni tedaviler ümit vericidir ancak henüz tedavi standartlarını değiştirememişlerdir. Her kanserde olduğu gibi multidisipliner yaklaşım son derece önemlidir.

Kaynaklar

1. CDC (2021). An Update on Cancer Deaths in the United States. (26.11.2021 tarihinde <https://www.cdc.gov/cancer/dcpc/research/update-on-cancer-deaths/index.htm> adresinden ulaşılmıştır).
2. Rahib L, Smith BD, Aizenberg R, et al. Projecting Cancer Incidence and Deaths to 2030: The Unexpected Burden of Thyroid, Liver, and Pancreas Cancers in the United States. *Cancer Res.* 2014;74(11):2913-2921.
3. Abe T, Blackford AL, Tamura K, et al. Deleterious germline mutations are a risk factor for neoplastic progression among high-risk individuals undergoing pancreatic surveillance. *J Clin Oncol.* 2019;37(13):1070-1080.
4. Kromrey ML, Bülow R, Hübner J, et al. Prospective study on the incidence, prevalence and 5-year pancreatic-related mortality of pancreatic cysts in a population-based study. *Gut.* 2018;67(1):138-145.
5. Kleeff J, Korc M, Apte M, et al. Pancreatic cancer. *Nat Rev Dis Primers.* 2016;2:16022.
6. Walter FM, Mills K, Mendonça SC, et al. Symptoms and patient factors associated with diagnostic intervals for pancreatic cancer (SYMPTOM pancreatic study): A prospective cohort study. *Lancet Gastroenterol Hepatol.* 2016;1:298-306.
7. NCI (2021). Cancer Stat Facts: Pancreatic Cancer. (26.11.2021 tarihinde <https://seer.cancer.gov/statfacts/html/pancreas.html> adresinden ulaşılmıştır).
8. Picozzi V J, Oh SY, Edwards A, et al. Five-year actual overall survival in resected pancreatic cancer: a contemporary single-institution experience from a multidisciplinary perspective. *Ann Surg Oncol.* 2017;24(6):1722-1730.
9. Kamisawa T, Wood LD, Itoi T, et al. Pancreatic cancer. *Lancet.* 2016;388:73-85.
10. Li HY, Cui ZM, Chen J, et al. Pancreatic cancer: diagnosis and treatments. *Tumour Biol.* 2015;36:1375-1384.
11. Manen L, Groen JV, Putter H, et al. Stage-specific value of carbohydrate antigen 19-9 and carcinoembryonic antigen serum levels on survival and recurrence in pancreatic cancer: a single center study and meta-analysis. *Cancers.*2020;12:2970.
12. Collisson EA, Sadanandam A, Olson P, et al. Subtypes of pancreatic ductal adenocarcinoma and their differing responses to therapy. *Nat Med.* 2011;17:500-503.
13. Moffitt RA, Marayati R, Flate EL, et al. Virtual microdissection identifies distinct tumor- and stroma-specific subtypes of pancreatic ductal adenocarcinoma. *Nat Genet.* 2015;47:1168-1178.

14. Earl J, Galindo-Pumariño C, Encinas J, et al. A comprehensive analysis of candidate genes in familial pancreatic cancer families reveals a high frequency of potentially pathogenic germline variants. *EBioMedicine*. 2020;53:102675.
15. Mostafa ME, Erbarut-Seven I, Pehlivanoglu B, et al. Pathologic classification of “pancreatic cancers”: Current concepts and challenges. *Chin Clin Oncol*. 2017;6:59.
16. Shinde RS, Bhandare M, Chaudhari V, et al. Cutting-edge strategies for borderline resectable pancreatic cancer. *Ann Gastroenterol Surg*. 2019;3:368–372.
17. Groot VP, Rezaee N, Wu W, et al. Patterns, Timing, and Predictors of Recurrence Following Pancreatectomy for Pancreatic Ductal Adenocarcinoma. *Ann Surg*. 2018;267:936–945.
18. Bilimoria KY, Bentrem DJ, Ko CY, et al. National Failure to Operate on Early Stage Pancreatic Cancer. *Ann Surg*. 2007;246:173–180.
19. van der Gaag NA, Rauws EA, van Eijck CH, et al. Preoperative Biliary Drainage for Cancer of the Head of the Pancreas. *N Engl J Med*. 2010;362:129–137.
20. La Torre M, Ziparo V, Nigri G, et al. Malnutrition and Pancreatic Surgery: Prevalence and Outcomes. *J Surg Oncol*. 2013;107:702–708.
21. Perinel J, Mariette C, Dousset B, et al. Early Enteral Versus Total Parenteral Nutrition in Patients Undergoing Pancreatoduodenectomy: A Randomized Multicenter Controlled Trial (Nutri-DPC). *Ann Surg*. 2016;264:731–737.
22. Gerritsen A, Wennink RA, Besselink MG, et al. Early Oral Feeding After Pancreatoduodenectomy Enhances Recovery Without Increasing Morbidity. *HPB (Oxf)* 2014;16:656–664.
23. Robertson N, Gallacher PJ, Peel N, et al. Implementation of an Enhanced Recovery Programme Following Pancreatoduodenectomy. *HPB (Oxf)*. 2012;14:700–708.
24. Wu JM, Kuo TC, Chen HA, et al. Randomized Trial of Oral Versus Enteral Feeding for Patients With Postoperative Pancreatic Fistula After Pancreatoduodenectomy. *Br J Surg*. 2019;106:190–198.
25. Glazer ES, Hornbrook MC, Krouse RS. A Meta-Analysis of Randomized Trials: Immediate Stent Placement vs. Surgical Bypass in the Palliative Management of Malignant Biliary Obstruction. *J Pain Symptom Manage*. 2014;47:307–314.
26. Jeurnink SM, Steyerberg EW, van Hooft JE, et al. Surgical Gastrojejunostomy or Endoscopic Stent Placement for the Palliation of Malignant Gastric Outlet Obstruction (SUSTENT Study): A Multicenter Randomized Trial. *Gastrointest Endosc*. 2010;71:490–499.
27. Farnell MB, Pearson RK, Sarr MG, et al. A Prospective Randomized Trial Comparing Standard Pancreatoduodenectomy With Pancreatoduodenectomy With Extended Lymphadenectomy in Resectable Pancreatic Head Adenocarcinoma. *Surgery*. 2005;138:618–628.
28. Nathan H, Wolfgang CL, Edil BH, et al. Peri-Operative Mortality and Long-Term Survival After Total Pancreatectomy for Pancreatic Adenocarcinoma: A Population-Based Perspective. *J Surg Oncol*. 2009;99:87–92.
29. Winter, J.M., Brody, J.R., Abrams, R.A. (2015). Chapter 49: Cancer of the Pancreas. In DeVita, Hellman, and Rosenberg’s Cancer: Principles and Practice of Oncology (10th ed) DeVita, V.T., Lawrence, T.S., Rosenberg, S.A., Eds.; Lippincott Williams & Wilkins: Philadelphia, PA, USA.
30. Isaji S, Mizuno S, Windsor JA, et al. International consensus on definition and criteria of borderline resectable pancreatic ductal adenocarcinoma 2017. *Pancreatology*. 2018;18:2–11.
31. Vauthey JN, Dixon E. AHPBA/SSO/SSAT Consensus Conference on Resectable and Borderline Resectable Pancreatic Cancer: Rationale and Overview of the Conference. *Ann Surg Oncol*. 2009;16:1725–1726.
32. Tanaka M, Mihaljevic AL, Probst P, et al. Meta-analysis of recurrence pattern after resection for pancreatic cancer. *Br J Surg*. 2019;106:1590–1601.
33. Oettle H, Neuhaus P, Hochhaus A, et al. Adjuvant Chemotherapy With Gemcitabine and Long-Term Outcomes Among Patients with Resected Pancreatic Cancer: The CONKO-001 Randomized Trial. *JAMA*. 2013;310(14):1473–1481.
34. Neoptolemos J, Buchler M, Stocken DD, et al. ESPAC-3(v2): A multi-center, international, open-label, randomized, controlled phase III trial of adjuvant 5-fluorouracil/folinic acid (5-FU/FA) versus gemcitabine (GEM) in patients with resected pancreatic ductal adenocarcinoma. *J Clin Oncol*. 2009;27.
35. Valle JW, Palmer, D, Jackson R, et al. Optimal Duration and Timing of Adjuvant Chemotherapy After Definitive Surgery for Ductal Adenocarcinoma of the Pancreas: Ongoing Lessons From the ESPAC-3 Study. *J Clin Oncol*. 2014;32:504–512.
36. Neoptolemos JP, Palmer DH, Ghaneh P, et al. Comparison of adjuvant gemcitabine and capecitabine with gemcitabine monotherapy in patients with resected pancreatic cancer (ESPAC-4): A multi-centre, open-label, randomised, phase 3 trial. *Lancet*. 2017;389:1011–1024.
37. Tempero, M.A., Reni, M., Riess, H. (2019). AFACT: Phase III, multicenter, international, open-label, randomized trial of adjuvant nab-paclitaxel plus gemcitabine (nab-P/G) vs gemcitabine (G) for surgically resected pancreatic adenocarcinoma. *ASCO Annual Meeting I*. *J Clin Oncol*. 2019;37,4000.
38. Conroy, T., Hammel, P., Hebbar, M. (2018). Unicancer GI PRODIGE 24/CCTG PA.6 trial: A multicenter international randomized phase III trial of adjuvant mFOLFIRINOX versus gemcitabine (gem) in patients with resected pancreatic ductal adenocarcinomas. *2018 ASCO Annual Meeting II*. *J Clin Oncol*. 2018;36,LBA4001.
39. Neoptolemos JP, Stocken DD, Friess H, et al. A Randomized Trial of Chemoradiotherapy and Chemotherapy after Resection of Pancreatic Cancer. *N Engl J Med*. 2004;350:1200–1210.
40. Parmar AD, Vargas GM, Tamirisa NP, et al. Trajectory of care and use of multimodality therapy in ol-

- der patients with pancreatic adenocarcinoma. *Surgery*. 2014;156:280–289.
41. Lu F, Soares KC, He J, et al. Neoadjuvant therapy prior to surgical resection for previously explored pancreatic cancer patients is associated with improved survival. *Hepatobiliary Surg Nutr*. 2017;6:144–153.
 42. Dhir M, Malhotra GK, Sohal DP, et al. Neoadjuvant treatment of pancreatic adenocarcinoma: A systematic review and meta-analysis of 5520 patients. *World J Surg Oncol*. 2017;15(1):183.
 43. Suker M, Beumer BR, Sadot E, et al. FOLFIRINOX for locally advanced pancreatic cancer: A systematic review and patient-level meta-analysis. *Lancet Oncol*. 2016;17:801–810.
 44. Versteijne E, Suker M, Groothuis K, et al. Preoperative Chemoradiotherapy Versus Immediate Surgery for Resectable and Borderline Resectable Pancreatic Cancer: Results of the Dutch Randomized Phase III PREOPANC Trial. *J Clin Oncol*. 2020;38:1763–1773.
 45. Ghaneh P, Palmer D.H., Cicconi S, et al. (2020). ESPAC-5F: Four-arm, prospective, multicenter, international randomized phase II trial of immediate surgery compared with neoadjuvant gemcitabine plus capecitabine (GEMCAP) or FOLFIRINOX or chemoradiotherapy (CRT) in patients with borderline resectable pancreatic cancer. *2020 ASCO Annual Meeting I*. *J Clin Oncol*. 2020;38:4505.
 46. Khorana AA, McKernin SE, Berlin J, et al. Potentially Curable Pancreatic Adenocarcinoma: ASCO Clinical Practice Guideline Update. *J Clin Oncol*. 2019;37:2082–2088.
 47. Tas F, Sen F, Keskin S, et al. Prognostic factors in metastatic pancreatic cancer: Older patients are associated with reduced overall survival. *Mol Clin Oncol*. 2013;1:788–792.
 48. Cunningham D, Chau I, Stocken DD, et al. Phase III Randomized Comparison of Gemcitabine Versus Gemcitabine Plus Capecitabine in Patients With Advanced Pancreatic Cancer. *J Clin Oncol*. 2009;27:5513–5518.
 49. Moore MJ, Goldstein D, Hamm J, et al. Erlotinib Plus Gemcitabine Compared With Gemcitabine Alone in Patients With Advanced Pancreatic Cancer: A Phase III Trial of the National Cancer Institute of Canada Clinical Trials Group. *J Clin Oncol*. 2007;25:1960–1966.
 50. Goldstein D, El Maraghi RH, Hammel P, et al. Updated survival from a randomized phase III trial (MPACT) of nab-paclitaxel plus gemcitabine versus gemcitabine alone for patients (pts) with meta-static adenocarcinoma of the pancreas. *J Clin Oncol*. 2014;32:178.
 51. Cao S, Rustum YM. Synergistic antitumor activity of irinotecan in combination with 5-fluorouracil in rats bearing advanced colorectal cancer: Role of drug sequence and dose. *Cancer Res*. 2000;60:3717–3721.
 52. Williet N, Saint A, Pointet AL, et al. Folfirinox versus gemcitabine/nab-paclitaxel as first-line therapy in patients with metastatic pancreatic cancer: A comparative propensity score study. *Therap Adv Gastroenterol*. 2019;12.
 53. National Comprehensive Cancer Network. (2021). (26.11.2021 tarihinde <https://www.nccn.org/about/news/ebulletin/ebulletindetail.aspx?ebulletinid=96> adresinden ulaşılmıştır).
 54. Wang-Gillam A, Hubner RA, Siveke JT, et al. NAPO-LI-1 phase 3 study of liposomal irinotecan in metastatic pancreatic cancer: Final overall survival analysis and characteristics of long-term survivors. *Eur J Cancer*. 2019;108:78–87.
 55. Nordh S, Ansari D, Andersson R. Hent1 Expression is Predictive of Gemcitabine Outcome in Pancreatic Cancer: A Systematic Review. *World J Gastroenterol*. 2014;20:8482–8490.
 56. Sparreboom A, van Asperen J, Mayer U, et al. Limited Oral Bioavailability and Active Epithelial Excretion of Paclitaxel (Taxol) Caused by P-Glycoprotein in the Intestine. *Proc Natl Acad Sci USA*. 1997;94:2031–2035.
 57. McCarroll JA, Sharbeen G, Liu J, et al. betaIII-Tubulin: A Novel Mediator of Chemoresistance and Metastases in Pancreatic Cancer. *Oncotarget*. 2015;6:2235–2249.
 58. Peters GJ, Backus HH, Freemantle S, et al. Induction of Thymidylate Synthase as a 5-Fluorouracil Resistance Mechanism. *Biochim Biophys Acta*. 2002;1587:194–205.
 59. Kent OA. Increased mutant KRAS gene dosage drives pancreatic cancer progression: Evidence for wild-type KRAS as a tumor suppressor? *Hepatobiliary Surg Nutr*. 2018;7:403–405.
 60. Okamura R, Boichard A, Kato S, et al. Analysis of NTRK Alterations in Pan-Cancer Adult and Pediatric Malignancies: Implications for NTRK-Targeted Therapeutics. *JCO Precis Oncol*. 2018;2:1–20.
 61. Yang J, Nie J, Ma X, et al. Targeting PI3K in cancer: Mechanisms and advances in clinical trials. *Mol Cancer*. 2019;18:1–28.
 62. Moore MJ, Goldstein D, Hamm J, et al. Erlotinib Plus Gemcitabine Compared With Gemcitabine Alone in Patients With Advanced Pancreatic Cancer: A Phase III Trial of the National Cancer Institute of Canada Clinical Trials Group. *J Clin Oncol*. 2007;25:1960–1966.
 63. Singhi AD, Ali SM, Lacy J, Hendifar A, et al. Identification of targetable ALK rearrangements in pancreatic ductal adenocarcinoma. *J Natl Compr Cancer Netw*. 2017;15:555–562.
 64. Goodman AM, Kato S, Bazhenova L, et al. Tumor Mutational Burden as an Independent Predictor of Response to Immunotherapy in Diverse Cancers. *Mol Cancer Ther*. 2017;16:2598–2608.
 65. Humphris JL, Patch AM, Nones K, et al. Hypermutation In Pancreatic Cancer. *Gastroenterology*. 2017;152:68–74.e2.
 66. Nevala-Plagemann C, Hidalgo M, Garrido-Laguna I. From state-of-the-art treatments to novel therapies for advanced-stage pancreatic cancer. *Nat Rev Clin Oncol*. 2020;17:108–123.c