BÖLÜM 7

AKCİĞER KANSERLERİNDE F-18 FDG PET/BT GÖRÜNTÜLEMENİN ROLÜ

Özge ULAŞ [1]
Gülhan GÜLER AVCI [2]

GİRİŞ

Akciğer kanseri, hem erkeklerde hem de kadınlarda dünya genelinde kansere bağlı ölümlerde ilk sırada yer alan ciddi bir hastalıktır (1). Dünya Sağlık Örgütü'nün (DSÖ) 2020 yılı verilerine göre, dünya genelinde akciğer kanseri insidansı ve mortalitesi sırasıyla %11,6 ve %18,4'tür (1, 2). Her ne kadar akciğer kanseri insidansında azalma gözlense de 2040 yılında da Amerika Birleşik Devletleri'nde kansere bağlı ölümler arasında ilk sırada yer alacağı öngörülmektedir (3). Tüm evreler için 5 yıllık yaşam süreleri son 20 yıldaki gelişmelere rağmen yaklaşık %14'tür. Akciğer kanseri veya bronkojenik karsinom terimi, hava yollarından veya akciğer parankiminden kaynaklanan maligniteleri ifade eder (1). Tüm akciğer kanserlerinin yaklaşık %95'i histolojik incelemeye dayalı olarak ya küçük hücreli akciğer kanseri (KHAK) ya da küçük hücreli dışı akciğer kanseri (KHDAK) olarak sınıflandırılır (1, 4). Diğer hücre tipleri, akciğerde ortaya çıkan malignitelerin yaklaşık %5'ini oluşturur (4). KHDAK, akciğer kanseri olgularının %80'den fazlasını temsil eder ve iki alt tip içerir: (a) skuamöz olmayan (%40 adenokarsinom, %5-10 büyük hücreli karsinom ve diğer alt tipler) ve (b) %30 skuamöz hücreli (epidermoid) karsinom (4). KHAK tüm akciğer kanseri olgularının %20'sinden azını temsil etmektedir (4). KHAK ve KHDAK'nin klinik seyri ve tedavisi birbirinden farklıdır (4).

1 Dr. Öğr. Üyesi, Tokat Gaziosmanpaşa Üniversitesi Tıp Fakültesi, Nükleer Tıp AD., ozgeulas23@gmail.com, ORCID iD: 0000-0002-8687-5769
2 Doç. Dr., Tokat Gaziosmanpaşa Üniversitesi Tıp Fakültesi, Radyasyon Onkolojisi AD., drgulhanguler@hotmail.com, ORCID iD: 0000-0001-6802-2984

DOI: 10.37609/akya.3837.c1124

sonu yanıt değerlendirmesinde ve rezidü/rekürren hastalığın saptanmasında da önemli bir role sahiptir (3, 7).

Kısacası, ^{18}F-FDG PET/BT, akciğer kanserinde bir yol haritası gibidir; sadece hastalığın nerede olduğunu (anatomik bilgi) değil, aynı zamanda ne kadar aktif olduğunu ve tedaviye nasıl tepki verdiğini (biyolojik bilgi) gösterir, bu da doktorların en doğru yolu seçmesine yardımcı olur.

Teknolojideki ilerlemelerle birlikte, hibrit tarama sistemleri ve PET cihazlarının çözünürlüğündeki gelişmeler, tanısal doğruluğu ve hasta yönetimini daha da geliştirecektir (7).

KAYNAKLAR

1. WHO. (Ağustos 2025 tarihinde https://www3.paho.org/hq/index. php?option=com_docman&view=download&category_ slug=4-cancer-country-profiles-2020&alias=51561-global-cancer-profile 2020&Itemid=270&lang=en adresinden ulaşılmıştır).
2. Duma N, Santana-Davila R, Molina JR. Non-small cell lung cancer: epidemiology, screening, diagnosis, and treatment. Mayo Clin Proc 2019;94:1623-1640.
3. Rahib L, Wehner MR, Matrisian LM, et. al. Estimated projection of US cancer incidence and death to 2040. JAMA Netw Open 2021;4:e214708.
4. Postmus PE, Kerr KM, Oudkerk M, et al. Early and locally advanced non-small-cell lung cancer (NSCLC): ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2017;28(Suppl 4):iv1-iv21.
5. Le Pechoux C, Faivre-Finn C, Ramella S, et al. ESTRO ACROP guidelines for target volume definition in the thoracic radiation treatment of small cell lung cancer. Radiother Oncol 2020;152:89-95.
6. Nestle U, De Ruysscher D, Ricardi U, et al. ESTRO ACROP guidelines for target volume defnition in the treatment of locally advanced non-small cell lung cancer. Radiother Oncol 2018;127:1-5.
7. Vaz SC, Adam JA, Delgado Bolton RC, et al. Joint EANM/ SNMMI/ESTRO practice recommendations for the use of 2-[18F]FDG PET/CT external beam radiation treatment planning in lung cancer V1.0. Eur J Nucl Med Mol Imaging 2022;49:1386-1406.
8. Berberoğlu K. Use of Positron Emission Tomography/ Computed Tomography in Radiation Treatment Planning for Lung Cancer. Mol Imaging Radionucl Ther 2016;25:50-62.
9. Boellaard R, Delgado-Bolton R, Oyen WJ, et al. FDG PET/CT: EANM procedure guidelines for tumour imaging: version 2.0. Eur J Nucl Med Mol Imaging 2015;42:328-354.
10. Warburg O. The Metabolism of Tumors. New York, Smith RR, 1931.
11. van Tinteren H, Hoekstra OS, Smit EF, et al. Efectiveness of positron emission tomography in the preoperative assessment of patients with suspected non-small-cell lung cancer: the PLUS multicentre randomised trial. Lancet 2002;359:1388-1393.
12. Na F, Wang J, Li C, et. al. Primary tumor standardized uptake value measured on F18-Fluorodeoxyglucose positron emission tomography is of prediction value for survival and local control in non-small-cell lung cancer receiving radiotherapy: meta-analysis. J Thorac Oncol 2014;9:834-842.
13. MacManus MP, Hicks RJ, Matthews JP, et al. High rate of detection of unsuspected distant metastases by pet in apparent stage III non-small-cell lung cancer: implications for radical radiation therapy. Int J Radiat Oncol Biol Phys 2001;50:287-293.
14. Purdy JA. Current ICRU definitions of volumes: limitations and future directions. Semin Radiat Oncol 2004;14:27-40.
15. Kubota K, Matsuno S, Morioka N, et al. Impact of FDG-PET fndings on decisions regarding

patient management strategies: a multicenter trial in patients with lung cancer and other types of cancer. Ann Nucl Med 2015;29:431-441.
16. Martucci F, Pascale M, Valli MC, et al. Impact of 18F-FDG PET/ CT in staging patients with small cell lung cancer: a systematic review and meta-analysis. Front Med 2020;6:336.
17. Purdy JA. Current ICRU definitions of volumes: limitations and future directions. Semin Radiat Oncol 2004;14:27-40.
18. ICRU. Prescribing, Recording and Reporting Photon Beam Therapy. Report 50. Bethesda, MD: International Commission on Radiation Units and Measurements, 1999.
19. ICRU. Prescribing, Recording and Reporting Photon Beam Therapy (Supplement to ICRU Report 50). Report 62. Bethesda, MD: International Commission on Radiation Units and Measurements, 1999.
20. Konert T, Vogel W, MacManus MP, et al. PET/CT imaging for target volume delineation in curative intent radiotherapy of non-small cell lung cancer: IAEA consensus report 2014. Radiother Oncol 2015;116:27-34.
21. van Baardwijk A, Bosmans G, Boersma L, et al. PET-CT-based auto-contouring in nonsmall-cell lung cancer correlates with pathology and reduces interobserver variability in the delineation of the primary tumor and involved nodal volumes. Int J Radiat Oncol Biol Phys 2007;68:771-778.
22. Steenbakkers RJ, Duppen JC, Fitton I, et al. Reduction of observer variation using matched CT-PET for lung cancer delineation: a three-dimensional analysis. Int J Radiat Oncol Biol Phys 2006;64:435-448.
23. Chi A, Nguyen NP. The utility of positron emission tomography in the treatment planning of image-guided radiotherapy for non-small cell lung cancer. Front Oncol 2014;4:273.
24. Bradley J, Bae K, Choi N, et al. A phase II comparative study of gross tumor volume defnition with or without PET/CT fusion in dosimetric planning for nonsmall-cell lung cancer (NSCLC): primary analysis of Radiation Therapy Oncology Group (RTOG) 0515. Int J Radiat Oncol Biol Phys 2012;82:435-441. e1.
25. Nestle U, Kremp S, Schaefer-Schuler A, et al. Comparison of different methods for delineation of 18F-FDG PET-positive tissue for target volume definition in radiotherapy of patients with non-Small cell lung cancer. J Nucl Med 2005;46:1342-1348.
26. Duhaylongsod FG, Lowe VJ, Patz EF Jr, et. al. Detection of primary and recurrent lung cancer by means of F-18 fluorodeoxyglucose positron emission tomography (FDGPET). J Thorac Cardiovasc Surg 1995;110:130-139.
27. Paulino AC, Johnstone PA. FDG-PET in radiotherapy treatment planning: Pandora's box? Int Jradiat Oncol Biol Phys 2004;59:4-5.
28. Werner-Wasik M, Nelson AD, Choi W, et al. What is the best way to contour lung tumors on PET scans? Multiobserver validation of a gradient-based method using a NSCLC digital PET phantom. Int J Radiat Oncol Biol Phys 2012;82:1164-1171.
29. Bradley JD, Hu C, Komaki RR, et al. Long-term results of NRG oncology RTOG 0617: stand - ard- versus high-dose chemoradiotherapy with or without cetuximab for unresectable stage III non-small-cell lung cancer. J Clin Oncol 2020;38:706-714.
30. Lambin P, Petit SF, Aerts HJ, et al. From population to voxel-based radiotherapy: exploiting intra-tumour and intra-organ heterogeneity for advanced treatment of non-small cell lung cancer. Radiother Oncol 2009;2010:145-152.
31. Kong FM, Ten Haken RK, Schipper M, et al. Effect of Midtreatment PET/CT-Adapted Radiation Therapy With Concurrent Chemotherapy in Patients With Locally Advanced Non-Small-Cell Lung Cancer: A Phase 2 Clinical Trial. JAMA Oncol 2017;3:1358-1365.
32. Kong FM, HU C, Haken RT, et al. NRG-RTOG 1106/ACRIN 6697: A phase IIR trial of standard versus adaptive (mid-treatment PET-based) chemoradiotherapy for stage III NSCLC—Results and comparison to NRG-RTOG 0617 (non-personalized RT dose escalation). Journal of Clinical Oncology 2021;39:(Suppl 15).
33. Lee E, Zeng J, Miyaoka RS, et al. Functional lung avoidance and response-adaptive escalation (FLARE) RT: Multimodality plan dosimetry of a precision radiation oncology strategy. Med

Phys 2017;44:3418-3429.
34. Liu J, Dong M, Sun X, et. al. Prognostic Value of 18F-FDG PET/CT in Surgical Non-Small Cell Lung Cancer: A Meta-Analysis. PLoS One 2016;11:e0146195.
35. Eisenhauer EA, Therasse P, Bogaerts J, et al. New response evaluation criteria in solid tumours: revised RECIST guideline (version 1.1). Eur J Cancer 2009;45:228-247.
36. Cliffe H, Patel C, Prestwich R, et. al. Radiotherapy response evaluation using FDG PET-CT-established and emerging applications. Br J Radiol 2017;90:20160764.
37. Decazes P, Thureau S, Dubray B, et. al. How to use PET/CT in the evaluation of response to radiotherapy. Q J Nucl Med Mol Imaging 2018;62:152-164.
38. Piperdi H, Portal D, Neibart SS, et. al. Adaptive Radiation Therapy in the Treatment of Lung Cancer: An Overview of the Current State of the Field. Front Oncol 2021;11:770382.
39. Torun N. PET/CT in the Evaluation of Radiotherapy Response. Nucl Med Semin 2021;7:212-219.
40. NCCN Guidelines Version 2.2023. Non-Small Cell Lung Cancer. Available at: https://www.nccn.org/professionals/ physician_gls/pdf/nscl.pdf
41. Im HJ, Bradshaw T, Solaiyappan M, et. al. Current Methods to Define Metabolic Tumor Volume in Positron Emission Tomography: Which One is Better? Nucl Med Mol Imaging 2018;52:5-15.
42. Machtay M, Duan F, Siegel BA, et al. Prediction of survival by [18F]fluorodeoxyglucose positron emission tomography in patients with locally advanced non-small-cell lung cancer undergoing definitive chemoradiation therapy: results of the ACRIN 6668/RTOG 0235 trial. J Clin Oncol 2013;31:3823-3830.
43. Markovina S, Duan F, Snyder BS, et. al. Regional Lymph Node Uptake of [(20) F] Fluorodeoxyglucose After Definitive Chemoradiation Therapy Predicts Local-Regional Failure of Locally Advanced NonSmall Cell Lung Cancer: Results of ACRIN 6668/RTOG 0235. Int J Radiat Oncol Biol Phys 2015;93:597-560.