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IMAGE OF THE MONTH

Transformation of diffuse large B cell lymphoma into dendritic sarcoma under CAR T cell therapy detected on ^{18}F-FDG PET/CT

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Chimeric antigen receptor (CAR) T cell immunotherapy uses patient-derived tumor antigen-directed T cells for targeted elimination of cancer cells [1]. The most common form applies modified T cells expressing a CAR specific for the CD19 antigen to treat relapsed or refractory lymphoma [2] and leukemia [3].

We present a 60-year-old female patient with refractory diffuse large B cell lymphoma (DLBCL) who underwent CAR T cell therapy. During treatment, all lesions decreased in size with a complete metabolic response (Deauville score 1) in ^{18}F-FDG PET/CT imaging obtained 3 months after CAR T cell infusion (A). At the same time, multiple newly enlarged and hypermetabolic cervical lymph nodes (SUVmax value = 31) were detected in a previously unaffected location (B). These new lesions (red circles and arrows) showed a morphological dedifferentiation with a large central hypodensity compared with nodal DLBCL target lesions at baseline CT (blue circles and arrows). This was also reflected by differences in the radiomic features entropy and uniformity (C). These circumstances triggered a repeat histological workup that determined the transformation of the DLBCL (D; high CD20 expression) into a sarcoma of the dendritic cells (E; high S100 expression) without residual lymphomatous tissue. Based on high PD-L1 expression, checkpoint inhibition with pembrolizumab was initiated.

Rare cases of transformation into histiocytic and dendritic cell neoplasms have been reported in patients with follicular lymphoma and DLBCL [4, 5]. This case underlines the diagnostic potential in the interlesional comparison of morphologic and metabolic features to raise the suspicion of clonal dedifferentiation. Future studies that correlate radiomic features from imaging and pathologic features from biopsies may not only lead to diagnostic improvements but also a better understanding of tumor biology in patients undergoing CAR T cell therapy.

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Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

Informed consent Written informed consent was obtained from the patient. The ethical committee of LMU Munich waives additional approval for case reports from clinical practice.

This article is part of the Topical Collection on Image of the month

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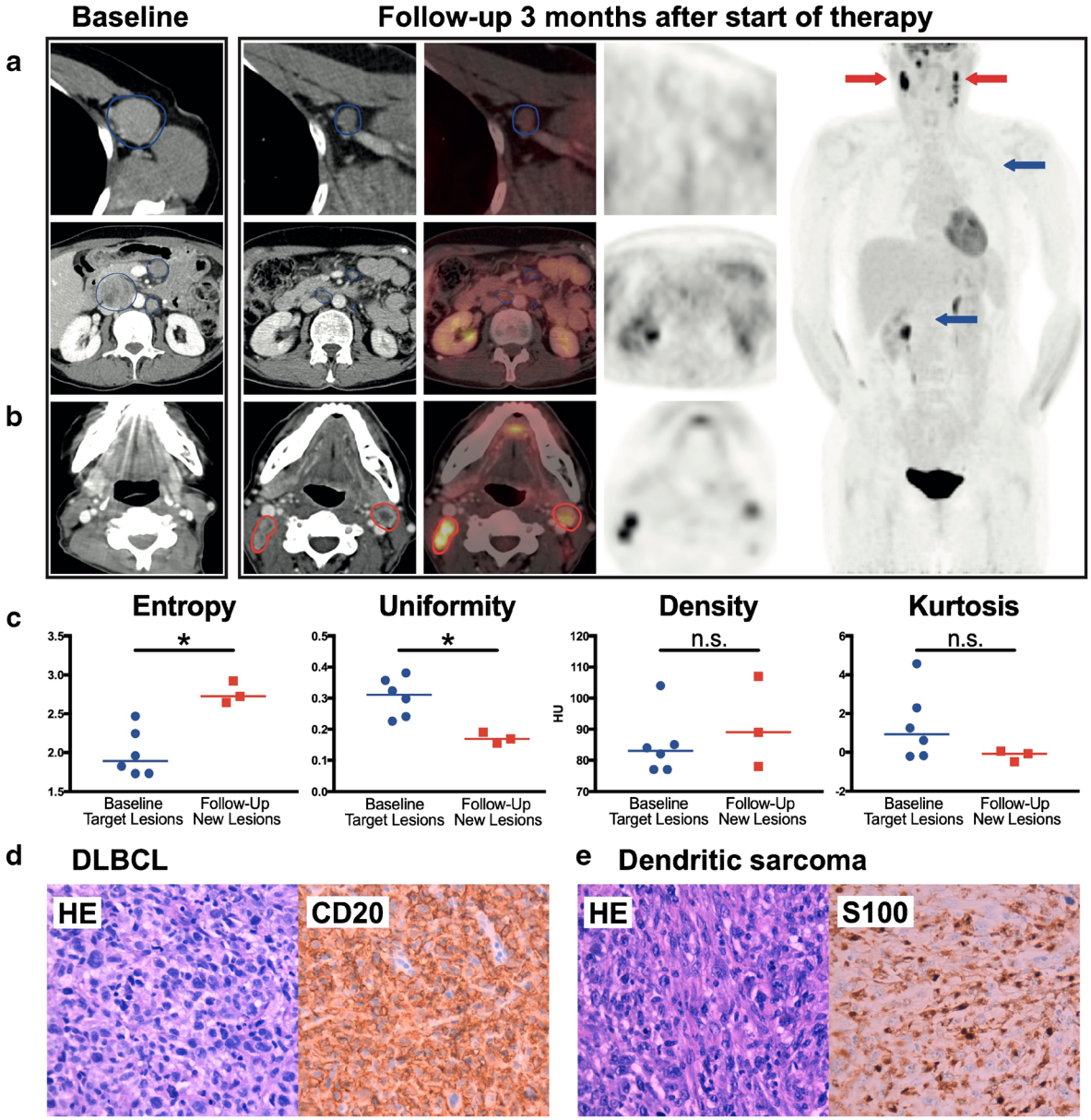

References

1. June CH, Sadelain M. Chimeric antigen receptor therapy. N Engl J Med. 2018;379:64–73. https://doi.org/10.1056/NEJMra1706169.
2. Neelapu SS, Locke FL, Bartlett NL, Lekakis LJ, Miklos DB, Jacobson CA, et al. Axicabtagene ciloleucel CAR T-cell therapy in refractory large B-cell lymphoma. N Engl J Med. 2017;377:2531–44. https://doi.org/10.1056/NEJMoa1707447.
3. Maude SL, Frey N, Shaw PA, Aplenc R, Barrett DM, Bunin NJ, et al. Chimeric antigen receptor T cells for sustained remissions in leukemia. N Engl J Med. 2014;371:1507–17. https://doi.org/10.1056/NEJMoa1407222.
4. Feldman AL, Arber DA, Pittaluga S, Martinez A, Burke JS, Raffeld M, et al. Clonally related follicular lymphomas and histiocytic/dendritic cell sarcomas: evidence for transdifferentiation of the follicular lymphoma clone. Blood. 2008;111:5433–9. https://doi.org/10.1182/blood-2007-11-124792.
5. Ochi Y, Hiramoto N, Yoshizato T, Ono Y, Takeda J, Shiozawa Y, et al. Clonally related diffuse large B-cell lymphoma and interdigitating dendritic cell sarcoma sharing MYC translocation. Haematologica. 2018;103:e553–e6. https://doi.org/10.3324/haematol.2018.193490.