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A 21-Year-Old Patient With a HER2-Positive Colorectal Cancer



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Colorectal cancer (CRC) is one of the most common cancers diagnosed in men and women worldwide. In the 15- to 29-year-old age group CRC accounts for about 2% of all malignancies.^{1,2} Like in adults, presenting symptoms are anemia, abdominal pain, bleeding, weight loss, and change in bowel habits.² The clinical presentation and the primary work-up with (total) colonoscopy and a confirmatory biopsy determine further treatment and surveillance strategies.³ In case of suspected or proven metastatic disease, additional staging by means of laboratory assessments including tumor marker carcinoembryonic antigen (CEA), computed tomography (CT) or magnetic resonance imaging (MRI) and molecular testing (eg, RAS, BRAF) are recommended. Molecular imaging by positron emission tomography (PET) can be of value in case of potentially surgically curable disease, but also in case of a clinical dilemma with unknown/unclear primary origin of tumor and/or metastases and assessment of the receptor status.⁴

Description of Technology

Trastuzumab, a monoclonal antibody interfering with human epidermal growth factor receptor 2 (HER2), was conjugated and labeled with the radionuclide zirconium-89 (⁸⁹Zr).^{5,6} Four days before performing the PET scan the tracer ⁸⁹Zr-trastuzumab was administered intravenously to the patient. After imaging reconstruction, a maximum intensity projection (MIP) as volume rendering method for 3D data was used for visualization (Video 1 and Figure 1).

Video Description

Here we show the images of a 21-year-old female patient, who was referred to our hospital with a symptomatic, by colonoscopy, and histology confirmed cancer of

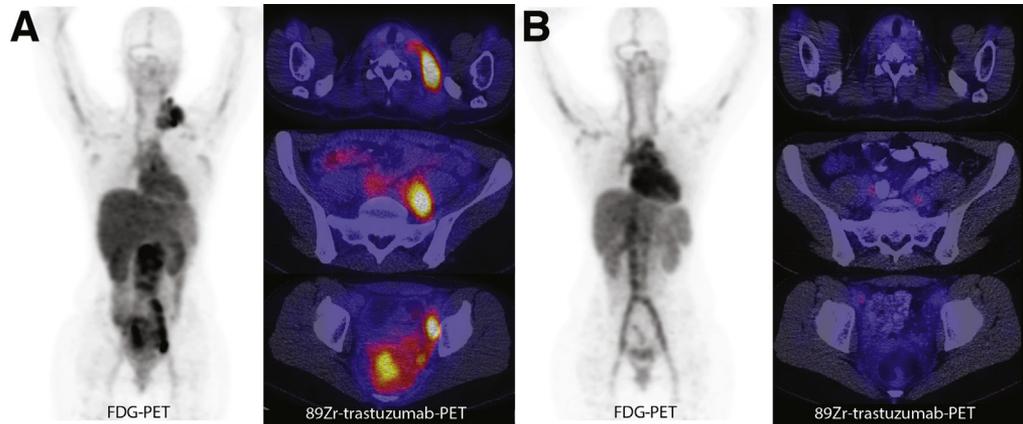
unknown primary origin with an apparent submucosal mass in the sigmoid colon, as well as cervical and supraclavicular lymph nodes. Histology of the submucosal mass revealed a low differentiated, strongly HER2-positive adenocarcinoma. On the ⁸⁹Zr-trastuzumab-PET scan, as an additional tool to solve this clinical dilemma, intense ⁸⁹Zr-trastuzumab uptake was seen in the mass in the lower pelvic cavity and in cervical, supraclavicular, paraesophageal, paraaortal and iliacal lymph nodes confirming the positive HER2 status of all tumor localizations seen on the FDG-PET (Video 1 and Figure 1A). There were no signs of primary breast, gastric or gynecological cancer, which was later confirmed by mammography, upper endoscopy and transvaginal ultrasound. As expected, in the circulation, in the liver, kidneys, oropharyngeal region, and intestine, ⁸⁹Zr-trastuzumab was enriched physiologically. Subsequently, the patient was treated with trastuzumab in combination with capecitabine and oxaliplatin (CAPOX-T), leading to a complete remission, already after 3 courses. After 6 courses of combination therapy no signs of residual disease could be seen on FDG- and also on ⁸⁹Zr-trastuzumab-PET (Figure 1B), and trastuzumab monotherapy was continued for another 9 months until disease progression.

Take Home Message

Obtaining up-to-date whole body information with information of not only the localization, but also molecular characteristics of the primary tumor and metastases within a patient might be of great value in a patient with a clinical dilemma. Furthermore, PET scan techniques are able to visualize certain molecular targets throughout the whole body, and may therefore - in a patient friendly way - provide comprehensive information on receptor status, which could

Abbreviations used in this paper: CAPOX-T, Capecitabine, oxaliplatin, trastuzumab; CEA, carcinoembryonic antigen; CRC, colorectal cancer; CT, computed tomography; HER2, human epidermal growth factor receptor 2; MIP, maximum intensity projection; MRI, magnetic resonance imaging; PET, positron emission tomography; ⁸⁹Zr, Zirconium-89.

Figure 1. (A) Whole body FDG-PET image and transversal ^{89}Zr -trastuzumab-PET scan images of lesions with intense ^{89}Zr -trastuzumab uptake cervical, mid-abdominal and in the sigmoid colon (top to bottom) at baseline. (B) FDG-PET and ^{89}Zr -trastuzumab-PET scan images after 6 courses of CAPOX-T.



also help with the optimal selection of the right treatment for the right patient.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Gastroenterology* at www.gastrojournal.org, and at <http://dx.doi.org/10.1053/j.gastro.2014.09.046>.

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Reprint requests

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Conflicts of interest

The authors disclose no conflicts.