Performance of 18-fluoro-2-deoxyglucose positron emission tomography for esophageal cancer screening

Masau Sekiguchi, Takashi Terauchi, Yasuo Kakugawa, Naoki Shimada, Yutaka Saito, and Takahisa Matsuda

Cancer Screening Center/ Endoscopy Division, National Cancer Center Hospital, Tokyo, Japan

Division of Screening Technology, Center for Public Health Sciences, National Cancer Center, Tokyo, Japan

5-1-1 Tsukiji, Chuo-ku, Tokyo, 104-0045, Japan

Tel: +81-3-3542-2511, Fax: +81-3-3542-3815

Email: masekigu@ncc.go.jp

Scientific research process

What did this study explore?

The high mortality of esophageal cancer (EC) is problematic worldwide and early detection of ECs in the screening setting is essential. Although 18-Fluoro-2-deoxyglucose positron emission tomography (FDG-PET) is used for cancer screening, the true performance of FDG-PET for EC screening is unknown. In this study, we examined the true performance of FDG-PET for EC screening.

How did the authors perform the study and process all data?

This is a single-center retrospective study. We retrospectively analyzed the data of consecutive asymptomatic individuals who underwent opportunistic cancer screening at the cancer screening division of the National Cancer Center, Tokyo from February 2004 to March 2013. During the study period, 25,120 screening esophagogastroduodenoscopies (EGDs) were performed for 13,128 individuals, including those who underwent more than one EGD in different years. Among them, 14,883 EGDs were performed simultaneously with FDG-PET examinations in 8,468 individuals. Excluding 6 individuals who refused to participate in the study and 24 individuals with a history of esophageal treatment, 14,790 EGDs and FDG-PETs performed for 8,438 individuals were included and retrospectively analyzed in this study. We compared the results of FDG-PET and EGD, considering the latter as the reference, and then examined the performance of FDG-PET for EC screening by calculating the sensitivity, specificity, positive predictive value (PPV), and negative predictive value of FDG-PET for EC lesions in the screening setting.

How did the authors deal with the pre-study hypothesis?

The diagnostic ability of FDG-PET for primary EC lesions have been evaluated in several previous studies. They have shown that EC that invades the submucosal layer or deeper can be detected, but more superficial ECs are difficult to detect. Based on this finding, it was hypothesized that FDG-PET is not suitable for EC screening. To examine this pre-study hypothesis, we evaluated the true performance of FDG-PET for EC screening in the above-mentioned method and concluded that FDG-PET is considered to be difficult to use as a screening modality for EC based on its very low screen sensitivity and PPV.

What are the novel findings of this study?

The present study first clarified the FDG-PET performance for EC screening by adopting an appropriate study method. The low sensitivity (3.6%) and low PPV (2.0%) of FDG-PET for EC in the screening setting were clearly shown. Based on these novel findings, it is considered that FDG-PET is not suitable for a screening modality for EC.