AB002. Relationship between mitochondrial DNA copy number and maximum standard uptake value of ^{18}F-fluorodeoxyglucose positron emission tomography scan in esophageal squamous cell carcinoma

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Background: We appraised the relationship between mitochondrial DNA (mtDNA) copy number and maximum standard uptake value (SUV_{max}) of ^{18}F-fluorodeoxyglucose positron emission tomography (FDG-PET) scan in esophageal squamous cell carcinoma (ESCC).

Methods: Forty-five ESCC patients undergoing esophagectomy in Koo-Foundation Sun Yat-sen Cancer Center were retrospectively collected. Their non-cancerous esophageal mucosa (EM) and corresponding cancerous ESCC nest were laser micro-dissected for DNA extraction. The mtDNA copy numbers of EM ($mtDNA^{EM}$) and ESCC ($mtDNA^{ESCC}$) were analyzed by Q-PCR. The mtDNA copy ratio was defined as $mtDNA^{ESCC}$ copy number divided by $mtDNA^{EM}$ copy number. Twenty-seven of the 45 ESCC patients received pre-operative FDG-PET scan, and their SUV_{max} of the non-cancerous esophageal background (BG, SUV_{max}-BG) and the corresponding cancerous ESCC nest (SUV_{max}-ESCC) were recorded. The SUV_{max} ratio was defined as SUV_{max}-ESCC divided by SUV_{max}-BG.

Results: Resection margin invasion (P<0.001), advanced T-status (T1/T2/T3/T4, P=0.035), and advanced N-status (N0/N1/N2/N3, P=0.032) were poor prognostic variables. Invasive ESCC (T2/T3/T4 *vs.* T1) tended to have lower $mtDNA^{ESCC}$ copy number (P=0.001) and mtDNA copy ratio (P=0.012), but had higher SUV_{max}-ESCC (P<0.001) and SUV_{max} ratio (P=0.001). Longer ESCC tumor lengths were associated with lower $mtDNA^{ESCC}$ copy number [correlation coefficient (CC) =–0.295, P=0.049] and mtDNA copy ratio (CC =–0.343, P=0.021), but higher SUV_{max}-ESCC (CC =0.513, P=0.006) and SUV_{max} ratio (CC =0.575, P=0.002). Furthermore, lower $mtDNA^{ESCC}$ copy number and mtDNA copy ratio were associated with higher SUV_{max}-ESCC (CC =–0.448, P=0.019) and SUV_{max} ratio (CC =–0.563, P=0.002), respectively.

Conclusions: Decrease in the copy number and copy ratio of mtDNA with increased SUV_{max}-ESCC and SUV_{max} ratio in ESCC suggests a shift of glucose metabolism in ESCC.

Keywords: Mitochondrial DNA (mtDNA); positron emission tomography scan; glucose metabolic shift; esophageal squamous cell carcinoma (ESCC)

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