Introduction: A well-known ‘flip flop’ phenomenon exists between whole-body scans (WBS) and 18FFDG PET imaging in differentiated thyroid cancer (DTC) such that cancer progression is typically associated with reduced iodine uptake and increased FDG avidity. Patients with FDG avidity have a poor clinical outcome while those with iodine avid lesions are more responsive to radioactive iodine therapy (RAI) and have a better prognosis. A spectrum however exists, as thyroid cancers become less well differentiated, when they will be both iodine and FDG avid. Current scoring systems in thyroid cancer are limited to a single imaging data set. We propose a new scoring system (I-PET) combining WBS and FDG findings to identify patients more likely to be refractory to RAI, and who may be ideal candidates for ‘re-differentiation’ before RAI treatment.

Methods: Retrospective analysis of 142 patients age > 18 with differentiated thyroid cancer who had a 18FFDG PET and WBS within a 6 month period of each other between 2010 and 2020. Initial pair of 18F FDG PET and WBS were reviewed by two independent nuclear medicine physicians and an IPET score was assigned: IPET [0]: Iodine –ve, FDG –ve, IPET [1]: Iodine +ve, FDG –ve, IPET [2]: Iodine +ve, FDG +ve and IPET [3]: Iodine –ve, FDG +ve. Patients with FDG +ve lesions (I-PET 2 and I-PET 3)
were further classified into group ‘a’ and ‘b’ if SUVmax was less than or greater than 5 respectively. Follow-up data was obtained by chart review. Progression was defined as either structural recurrence as per RECIST 1.1 or equivalent clinical assessment, or biochemical incomplete response with an unstimulated Tg > 1ug/L. The study was approved by IRB (ETH00674/ STE01494).

**Results:** Of the 142 patients included in the study 121 patients had follow up data available for review. At baseline, 49 patients were classified as IPET [0], 10 as IPET [1], 16 as IPET [2] and 46 as IPET [3]. Progression was identified in 49% (59/121) patients; of which 54 were structural and 5 biochemical. Patients classified as [2b] and [3b] had a recurrence rate of 88% (7/8) and 78% (25/32) respectively, while IPET [0] patients had 22% (11/49) recurrence (p < 0.001). Patients classified as IPET [3b] were 10.4 times more likely to commence on tyrosine kinase inhibitor therapy (p=0.005) and had a 8.1 times greater mortality rate (p=0.02) than patients in the other IPET groups.

**Conclusion:** IPET score is a novel scoring system incorporating WBS and 18FFDG PET imaging which predicts progression and death in patients with FDG avid thyroid cancer.

**Presentation:** Saturday, June 11, 2022 1:00 p.m. - 3:00 p.m., Saturday, June 11, 2022 1:48 p.m. - 1:53 p.m.