ABSTRACT
Aim: This retrospective analysis of the scintimetric characterization of the primary tumors of various cancers using the dual phase PETCT scans thrives to establish the utility of the Rong’s Retention ratio and the Dr.Visa’s modification of RRI.

Methods: In the proven cases of various cancers the SUV max values were obtained in the Early and Delayed PETCT scans using the ROI method over the FDG avid primary sites. The PETCT scans were done using the GE Discovery IQ unit and 4 hours after the I.V injection of 5 to 10 mCi of F-18 FDG after overnight Fasting. The image analysis and the SUV were calculated using the Advantage 4.7 software provided by GE. Total of 19 primary sites at various locations were included and the calculated SUV max were used to arrive at the Rongs Retention Index (RRI). The values were tabulated and analyzed.

Results: The Rong’s retention ratio had a very narrow range with wide overlapping. However the Dr.Visa’s modification of RRI showed much wider values with a definite cut off level. The statistical evaluation of the data confirm that the Dr.Visa’s modification of RRI significantly correlates well with the Rong’s Retention Index (RRI).

Conclusion: It can be concluded that the scintimetric characterization of the primary tumors of various cancers is possible and might be useful in the identification of the primary malignancies.

KEYWORDS : Primary sites, Dual phase PETCT, Scintimetric Characterization, Rong’s Retention Index (RRI) , Dr.Visa’s modification of RRI.

INTRODUCTION
The utility and advantage of the dual phase PETCT evaluation in the tumor detection was reported by Kubo et al (1). The optimal time interval between the early and delayed phase PETCT scans had been proved to be 3 hr post injection by Chen Y.M et al (2). In our study protocol the delayed PETCT was conducted at 4 hours post injection due to logistic reasons.

Rong et.al reported a quantitative estimation to differentiate between the benign and malignant bone lesions using the dual phase PET evaluation termed as Rong’s Retention Index (3). The Rong’s retention index (RRI), computed as follows: RRI=(SUVmaxD−SUVmaxE)/100×SUVmaxE . The statement demonstrated significant difference between the benign and malignant bone lesions there was significant overlap between them. In order to make the process simple Dr.V.Siva’s modiﬁcation of RRI was introduced as follows: RRI= SUVmaxD / SUVmaxE × 100.

MATERIALS AND METHOD:
Patients
This study was initiated in May 2019, 19 patients (7 males, 27 females; age range, 9–76 years; median age, 46±18 years with positive metabolically active primary lesions of various cancers. Each research subject gave his or her consent before participating in the study for the 4 hr delayed PETCT without additional injection of F18-FDG.

F-18 FDG PET image acquisition and reconstruction The study protocol was approved by our institutional ethics committee and informed consent was obtained in all cases. Patients were fasted for at least 4–6 h before intravenous administration of 185–370 MBq of F-18 FDG (4 MBq/kg of body weight). A serum glucose concentration was obtained before the injection and the blood glucose levels were less than 200 mg/dl in all patients. The patients were at rest in a quiet room after the injection and the PET-CT scans were performed at 1 h (early) and 4 h (delayed) post injection with a PET/CT unit (Discovery PETCT ; Wipro GE Medical Systems). The CT image acquisition was performed by spiral CT at 0.75 s per rotation with 40 mAs and 120 kVp, a section thickness of 4 mm, and a 4-mm interval. No intravenous contrast agent was administered. The PET emission images (early images) were acquired from the proximal thigh to the mid cranium, typically requiring six to seven bed positions with a 2-min acquisition in each position. Delayed PET emission images of the abnormal areas were acquired at 4 h after the administration of F-18 FDG, using two or three bed positions with a 2-min acquisition in each position. All PET images were reconstructed using an LOR algorithm.
DISCUSSION:
The dual time point based quantifications of metabolic uprates in 18F-FDG PET had been reported by den hoff et.al (4). The potential diagnostic role of dual phase 18F-FDG PETCT scanning was reported by Jones c etal (5). This is the first study reporting the findings of the dual phase PETCT in the evaluation and characterization in various primary lesions. The Rong's Retention values showed a wide ranging values and no definite cut off value could be arrived at. But the Dr.V.Siva's modification of Rong's Retention ratio revealed that the cut off value to be 100 and above for confirming the malignant nature of the lesions. The statistical evaluation of the values by Student t Test showed good p value confirming the significance that the two values were identical as shown by the Image 1.

CONCLUSIONS
It can be concluded that the Scintimetric characterization of the primary lesions into benign and malignant types utilizing the Dr.V.Siva's modification of Rong's Retention ratio in the dual phase PETCT evaluation is worth pursuing. This concept must be put to critical analysis in various other conditions and it many other institutions to make this into a useful clinical entity.

REFERENCES:

The inclusion of the various primary malignancies in both the sexes adds advantage to the study. However the non-inclusion of primary benign lesions in the study is the greatest disadvantage. The other limitations being the single institutional study and the small number of patient population.

The Pearson correlation evaluation reveals there is a strong positive correlation, which means that high x variable scores go with high y variable scores and vice versa as shown in Image 2.