

# Machine learning model: Predicting prognosis in neuroendocrine tumor

## Background/Methods:

- ❖ Neuroendocrine tumors (NETs) have a heterogeneous clinical course.
- ❖ Ki-67 proliferative index and morphology help with the prognosis of the disease.
- ❖ The clinical course varies in patients with similar pathological characterization.

## Methods:

- ❖ A novel machine learning model for prognostication in NET was utilized ( Fig 1)
- ❖ 30 patients with well-differentiated NET with two time point of <sup>68</sup>Ga-DOTATATE PET/CT scanning were analyzed using TRAQinform IQ (AIQ Solutions) technology.
- ❖ 18/30 were female and 12/30 were male.
- ❖ 8/30 patients had pancreatic NET 16/30 had a small bowel NET and 6 had other primaries.
- ❖ 18/30 had G1 tumors and 12/30 had G2 tumors.
- ❖ The TRAQinform Profile was calculated to predict prognosis using a random survival forest previously trained on data from a study of 25 patients.
- ❖ The model performance was evaluated using the c-index.

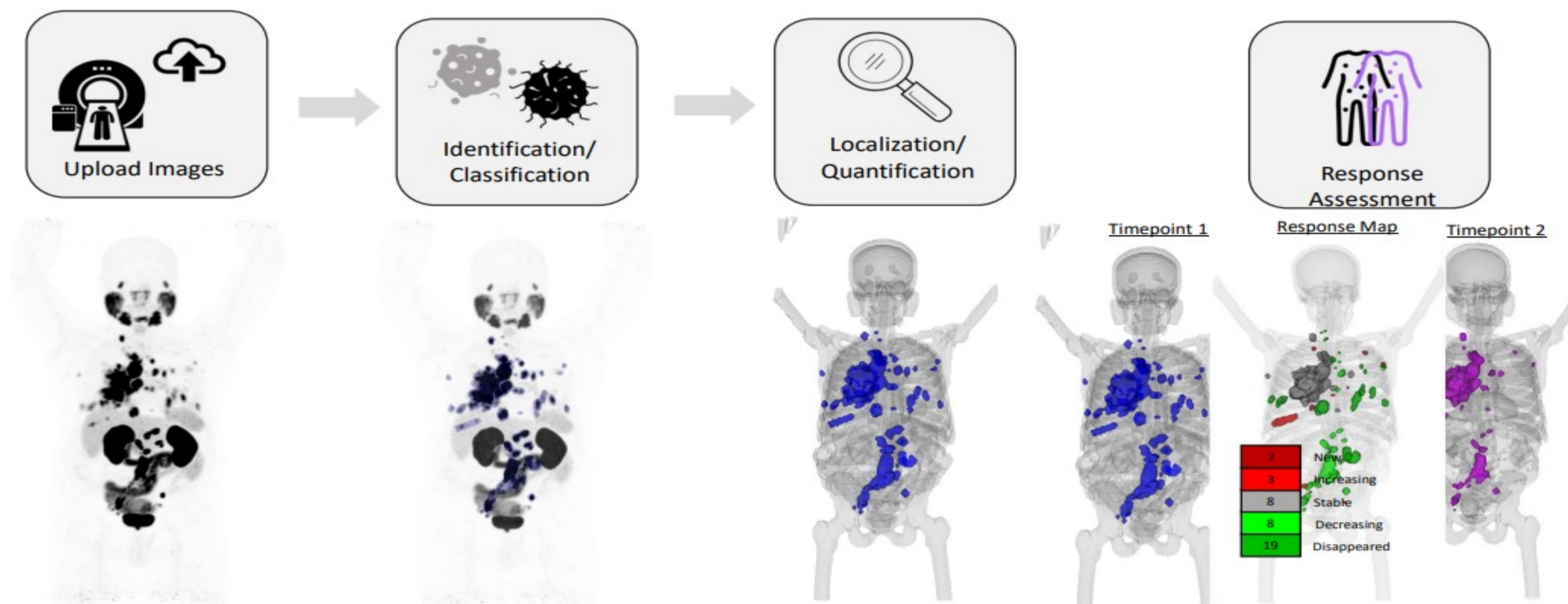


Fig 1. Methodology of the machine learning model ( AIQ profile)

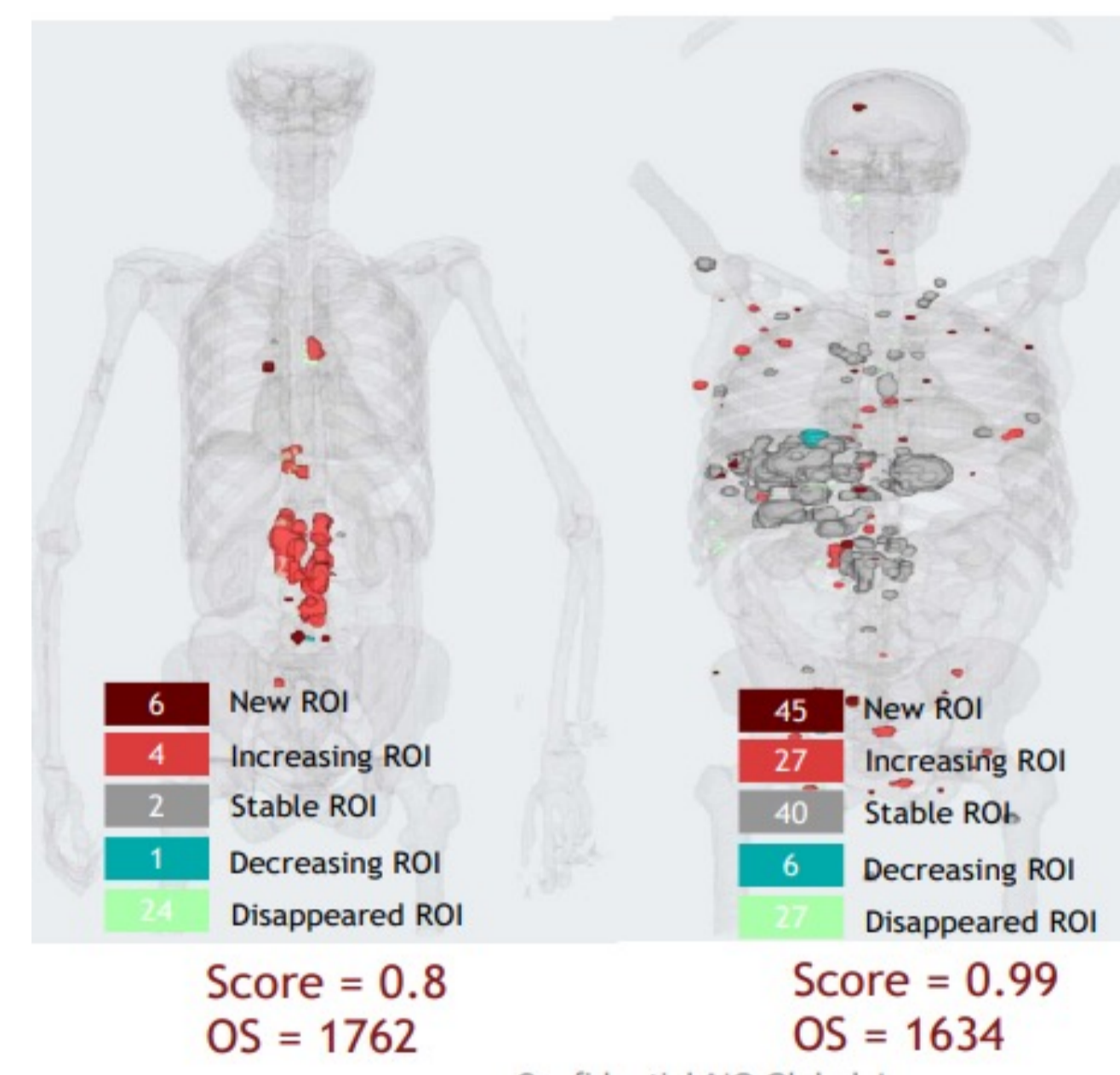


Fig 2. TRAQinform Profile of the patients with events in the cohort

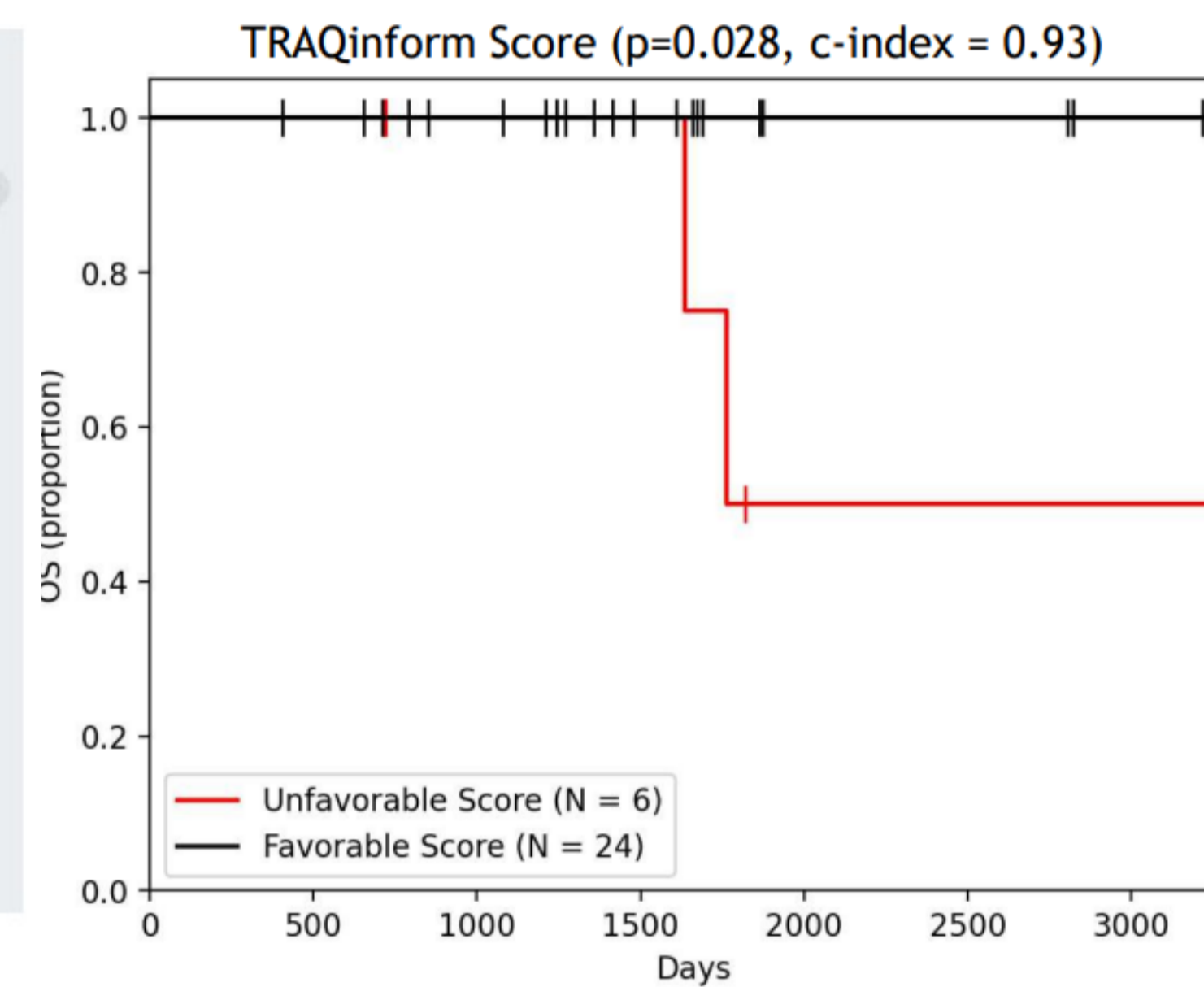


Fig 3. Graph of the patients with unfavorable TRAQinform score in the cohort

## Results/Graphs/Data:

- ❖ Even though only 2/30 patients (Fig 2) had events, the TRAQinform Profile showed a strong ability to identify patients with shorter survival (p value=0.028 and c-index of 0.93) (Fig 3).
- ❖ 6/30 patients were identified by the TRAQinform Profile as having an unfavorable prognosis.
- ❖ The grade was equally distributed between G1 and G2 lesions. Two patients had pancreatic NET, 3 had small bowel, and 1 had an unknown site. Patients had more than two sites of metastasis (mean=2.6, range=2-4).
- ❖ Treatment included surgery with a mean of 1.6 (range=0-4) surgeries, systemic therapy (CAPTEM and Everolimus), and PRRT.
- ❖ 4/6 patient's tumor had molecular profile performed (TSO 500; TruSight Oncology) and three patients had pathogenic variants identified in *CHECK2*, *BLM*, *HRAS*

## Future Directions for Research:

## Conclusions

- ❖ NET tumor pathology is utilized to assess the prognosis in NET but has *NOT* been absolute.
- ❖ The use of newer tools like NETPET score [combined reading of SSRT-PET (somatostatin receptor PET) and FDG-PET)] is being studied to predict the disease in NET.
- ❖ Here we present the use of a machine learning algorithm in predicting the disease prognosis from serial SSTR PET/CT imaging.