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Systematic Literature Review and Radiomics Quality Assessment for Lung, Adrenal, Thyroid and Pituitary Neuroendocrine Tumors

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BACKGROUND

Radiomic analysis has been an emerging diagnostic tool in tumor classification and treatment prediction with a growing volume of radiomics research studying neuroendocrine tumors (NETs). Current reviews have highlighted numerous issues in radiomics research leading to the development of the radiomics quality scoring (RQS) system. Literature summarizing radiomics work in the NET space has concentrated on gastroenteropancreatic NETs. This work will provide a review of the topic of radiomics, summarize the radiomics research studying non GEP-NET subtypes, and provide an analysis of radiomics workflows using RQS metrics.

METHODS

This IRB-approved multicenter NET registry uses REDCap (Research Electronic Data Capture) to collect over 200 variables for patients treated at Memorial Sloan Kettering Cancer Center (MSK) or the University of California, San Francisco (UCSF). Patients with a diagnosis of advanced NET and previous or current treatment with 177Lu-DOTATATE are eligible. Registry sections include: demographics and baseline clinicopathologic data, prior treatment history, radiologic results, and collection of data related to 177Lu-DOTATATE treatment (dosing, total cycles administered, treatment-related toxicities, radiologic response assessment). Data are continually updated.

RESULTS

A systematic literature review was conducted by extracting articles from PubMed, Scopus, and Embase database using unique search terms and boolean operators. Inclusion criteria (1) non GEP-NET and (2) radiomics workflow were used to extract articles of interest. Once the unique articles were identified the RQS questionnaire was used to evaluate the RQS score based on the radiomics workflow used in the study.

CONCLUSIONS

While research in radiomic analysis of non GEP-NETs has not been as extensive as those in GEP-NET, promising models have been developed. Future radiomic research in non GEP-NETs should focus on creating large multicenter prospective studies, implementing multimodal imaging strategies, using standardized segmentation/extraction techniques, and emphasizing external model validation to improve the quality of the resultant studies.

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