Background Cutaneous melanoma is one of the most aggressive forms of skin cancer with a high mortality rate. A prognosis improvement in cutaneous melanoma patients is crucial to better plan personalized treatments. Currently, clinical prognosis methods for the evaluation of the risk of recurrence includes multiple parameters, such as Breslow tumor thickness, mitotic rate, ulceration, local or nodal metastasis, which are at the basis of the American Joint Committee on Cancer (AJCC) pathologic tumor stage. Despite routinely applied in clinical practice, these methods have some pitfalls. Thus, predicting the risk of recurrence in melanoma patient is urgent.

Methods In this study, we propose a deep learning model, that exploits convolutional neural networks, which mimic the functioning of human brain, to extract features from hematoxylin and eosin (H&E) slide images with the final goal of predicting 1-year disease-free survival (DFS) in patients with I-III stage cutaneous melanoma. H&E images referred to a cohort of 43 patients from Clinical Proteomic Tumor Analysis Consortium Cutaneous Melanoma (CPTAC-CM) public database (31 DF cases, 12 non-DF cases) were firstly analyzed to design the predictive model (table 1). Then, the model was validated on H&E images referred to a validation cohort of 11 cutaneous melanoma patients (table 2), which was provided by our Institute (8 DF cases, 3 non-DF cases). Basically, we developed a computerized system to automatically extract information that are usually evaluated manually and visually by pathologists.

Results The median Area Under the Curve (AUC) and accuracy values in the patients from the CPTAC-CM public dataset were 69.5% and 72.7%, respectively, by implementing a 5-fold cross validation scheme for 3-rounds. AUC and accuracy values in the validation cohort of patients were 66.7% and 72.7%, respectively, by using the CPTAC-CM dataset as training set and the validation cohort as test set.

Conclusions Our model proved to be robust and generalizable. The promising results obtained in this preliminary work suggest that our proposal, after further validation on a larger cohort of patients, may have the potential to better define the risk of recurrence for each patient and better tailor adjuvant therapy.

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REFERENCES

Ethics Approval The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Scientific Board of Istituto Tumori ‘Giovanni Paolo II’ (Bari, Italy).

Consent This study was determined by the Scientific Board to not require written consent from subjects, as it is retrospective and involves minimal risk.

Abstract 1281 Table 1 Clinical data referred to CPTAC-CM public database for categorical variables, absolute (abs.) and percentage (%) counts are reported. For continuous variables, the median and standard deviation (sd.) values are indicated.

Abstract 1281 Table 2 Clinical data referred to the validation cohort. For categorical variables, absolute (abs.) and percentage (%) counts are reported. For continuous variables, the median and standard deviation (sd.) values are indicated.