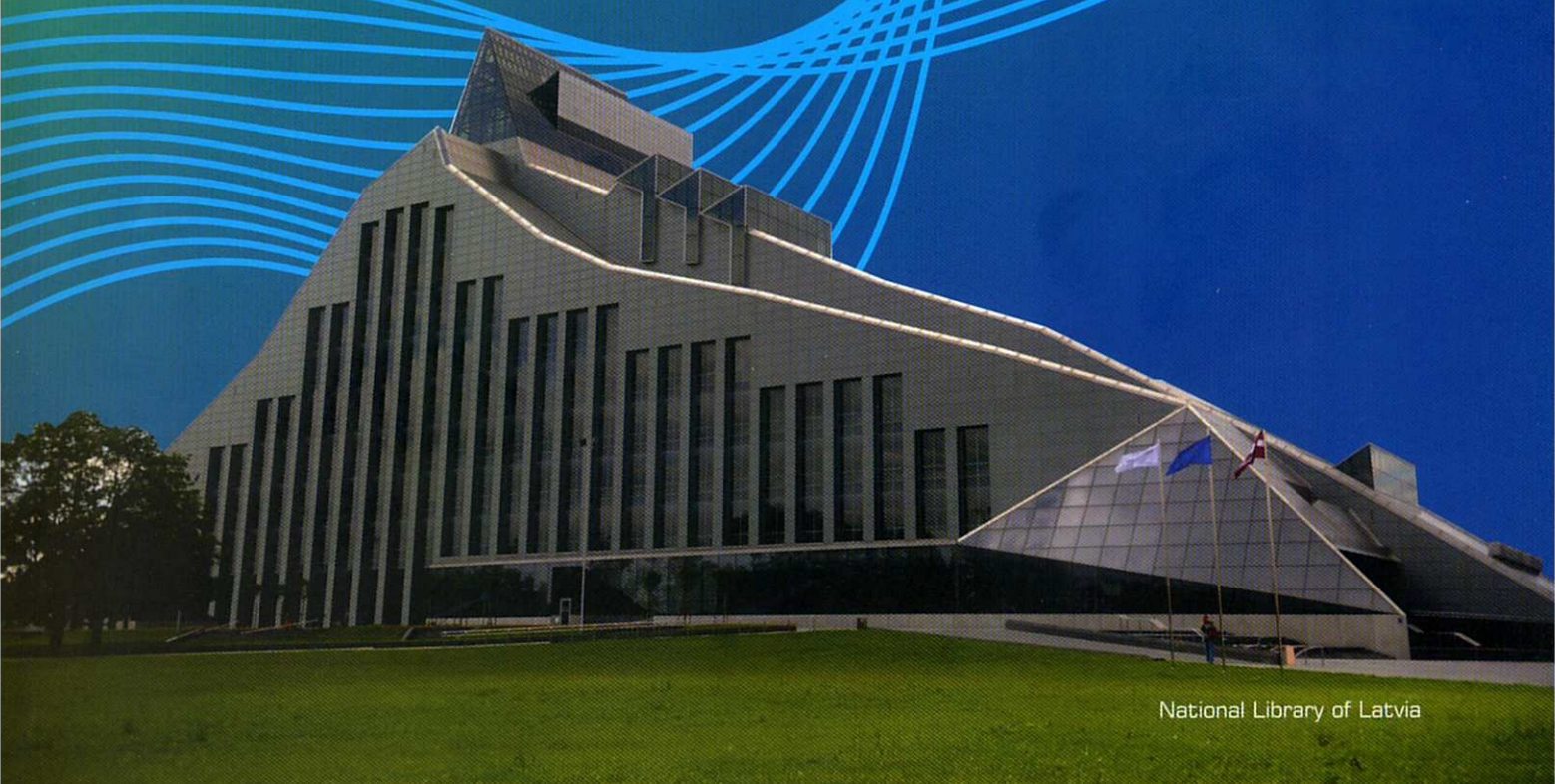**EFAD**

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A validation of the algorithm for automatic depth measurement of melanocytic skin tumors in ultrasound images

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Background. The histological depth of melanoma measured according to the Breslow index has a high prognostic value for staging and surgery planning. It is still unknown how to avoid the variation of tumor thickness measurements between pathologists and clinicians.

Objective. To evaluate the sensitivity and specificity of an automatic thickness measurement algorithm of melanocytic skin tumors (MST) in ultrasound images (US).

Methods. Clinically dysplastic 54 melanocytic nevi and 12 melanomas were prospectively included in the study. DUB - USB ultrasound system (*Taberna pro medicum, Germany*) equipped with a 22 MHz fundamental frequency transducer was used to measure the ultrasonic depth (T) of MST before excision. Ultrasound images were computed using an automatic US image processing algorithm developed for MST depth (Ta) estimation. The vertical tumour thickness (Breslow index, pT) was evaluated by a pathologist. All the measured values were expressed as mean values and standard deviation (SD). Statistical analyses included sensitivity, specificity, positive and negative predictive values, and the accuracy of the automatic thickness measurement algorithm when identifying lesions ≤ 0.5 mm in thickness. Pearson's (r) coefficient was used to determine the correlation between the parameters of Ta and pT.

Results. Automatic US thickness measurement algorithm failed in 40 MST (Tmis). The mean value of Tmis was 0.45 mm (SD: 0.26), while the mean value of pT in this group was 0.52 mm (SD: 0.42). The mean thickness of Ta (n=26) was 0.8 mm (SD: 0.64), and the mean pT – 1.2 mm (SD: 0.67, r=0.72). The sensitivity of the automatic US algorithm was 67%, specificity – 61%, negative predictive value – 93%, positive predictive value – 18%, and accuracy – 62%.