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PATHOLOGY: INTERNATIONAL SCIENTIFIC CONFERENCE ON MEDICINE AND HEALTH SCIENCES OF THE UNIVERSITY OF LATVIA, 2026

On 26 March 2026, the University of Latvia hosted the International Scientific Conference on Medicine and Health Sciences.

This section brings together abstracts illustrating the broad interface between pathology, clinical oncology, and data-informed decision-making. The contributions combine diagnostic evaluation, biomarker analysis, clinicopathological characterisation, recurrence modelling, and supportive care, reflecting a field in which pathological information increasingly serves as a foundation for prognosis, treatment selection, and longitudinal patient management.

A prominent thematic line concerns the diagnostic and predictive value of pathological and laboratory-derived markers. Two studies illustrate the continuing transition from descriptive pathology toward more clinically actionable prediction.

Another important area of focus is clinicopathological characterisation at the time of diagnosis and treatment. The section includes analysis of the presenting manifestations of primary brain tumours, highlighting the heterogeneity of neuro-oncological symptoms and the diagnostic relevance of focal neurological deficits.

The section also reflects the growing role of computational and statistical methods in pathology-related research. Machine learning approaches applied to breast cancer recurrence prediction demonstrate strong performance when combining routinely available biomarkers, haematological parameters, and tumour biological characteristics. In parallel, conventional statistical modelling confirms the prognostic relevance of BI-RADS and tumour size

Finally, the section extends beyond diagnosis and prediction to treatment pathways and supportive care. Overall, the abstracts in this section highlight the evolving role of pathology not only in diagnosis, but also in prediction, treatment guidance, and the broader continuum of patient-centred cancer care.

Ilmārs Stonāns

INCIDENCE AND APPLIED THERAPY OF UVEAL MELANOMA AT PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL FROM 2023 TO 2024

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Background. Uveal melanoma is the most common primary intraocular malignancy in adults, predominantly originating from the choroid. Despite advances in eye-preserving treatment modalities, the disease remains associated with a risk of distant metastases, mainly involving the liver. Data regarding the distribution, metastatic status, and applied treatment strategies of uveal melanoma in Latvia are limited.

Aim. The aim of this study was to describe the incidence, tumour localisation, metastatic status, and applied treatment modalities of patients diagnosed with uveal melanoma at Pauls Stradiņš Clinical University Hospital (PSCUH) between 2023 and 2024.

Methods. A retrospective descriptive study was conducted. Medical records of patients diagnosed and treated for uveal melanoma at PSCUH during 2023–2024 were reviewed. Data on patient demographics, tumour localisation, presence of distant metastases, and treatment modalities were collected. Descriptive statistical analysis was performed using Microsoft Excel.

Results. A total of 50 patients were included in the study, comprising 29 women (58%) and 21 men (42%), with a mean age of 66 years. The most common tumour localisation was choroidal melanoma (n = 39, 78%), followed by juxtapapillary choroidal melanoma (n = 4, 8%), iridociliary or iridociliochoroidal melanoma (n = 4, 8%), and conjunctival melanoma (n = 3, 6%). Distant metastases were identified in 10 patients (20%). The majority of patients received brachytherapy (n = 45, 90%), while stereotactic or robotic radiosurgery was applied in 2 patients (4%), enucleation was performed in 2 patients (4%). In 1 patient (2%), no definitive treatment was recorded during the study period. Local tumour recurrence during the study period was documented in 2 patients (4%), initially treated in 2023; both developed recurrence in 2024 and required repeat brachytherapy.

Conclusion. In this cohort, uveal melanoma most frequently originated from the choroid and primarily affected patients in the seventh decade of life. Brachytherapy was the predominant treatment modality, reflecting current eye-preserving therapeutic approaches. Although the proportion of patients with distant metastases was relatively low, continuous follow-up and multidisciplinary management remain essential for early detection and improved outcomes.

Acknowledgements. Special thanks to our supervisor Dr. Jurginauska for leading this research and providing much-needed guidance.

MACHINE LEARNING-BASED PREDICTION OF BREAST CANCER RECURRENCE USING BLOOD BIOMARKERS, HAEMATOLOGICAL PARAMETERS, AND TUMOUR CHARACTERISTICS

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Background. Breast cancer is the most common type of malignancy in women worldwide. Despite advancements in oncological therapies, breast cancer still holds a substantial risk of recurrence in a significant number of patients due to residual cancer cells that can go clinically undetected for years. Currently, accurate prediction of recurrence remains challenging and prognostic tools are limited.

Aim. In this study, the aim was to compare and develop different machine learning models for predicting breast cancer recurrence using readily available blood tumour markers, haematological parameters, tumour biological characteristics and hormone receptor status.

Methods. A retrospective dataset was analysed including patients with and without breast cancer recurrence. The outcome variable was recurrence (yes/no). Predictors included serum tumour markers (CA15-3, CA125, CEA), haematological parameters (lymphocyte percentage, neutrophil percentage, platelet count), HER2 expression status, Ki-67 proliferation index, and hormone receptor status (oestrogen receptor [ER] and progesterone receptor [PR]). Missing data were excluded prior to analysis. To address class imbalance, the Synthetic Minority Oversampling Technique (SMOTE) was applied to achieve a balanced dataset. The final dataset consisted of 300 observations (150 recurrence, 150 non-recurrence). Four predictive models were trained

and evaluated: logistic regression, decision tree, random forest, and extreme gradient boosting (XGBoost). Data were split into training (80%) and testing (20%) sets. Model performance was assessed using accuracy, sensitivity, specificity, F1-score, and area under the receiver operating characteristic curve (ROC AUC).

Results. Among the evaluated models, ensemble machine learning approaches demonstrated superior predictive performance compared to logistic regression. The random forest model achieved the best overall results, with an accuracy of 0.93, sensitivity of 0.93, specificity of 0.93, F1-score of 0.93, and ROC AUC of 0.98. The XGBoost model showed comparable performance (accuracy 0.92, ROC AUC 0.96). The decision tree demonstrated moderate performance (accuracy 0.87, ROC AUC 0.81), while logistic regression showed the lowest predictive accuracy (0.78) and ROC AUC (0.86).

Conclusions. Machine learning models, particularly random forest and XGBoost, demonstrated high accuracy in predicting breast cancer recurrence using routinely available blood biomarkers, haematological parameters, and tumour biological features. These findings suggest that machine learning-based approaches may provide valuable support for recurrence risk stratification in clinical practice.

TREATMENT OPTIONS FOR UPPER LIMB LYMPHEDEMA IN BREAST CANCER PATIENTS AFTER BREAST CANCER SURGERY AT THE REHABILITATION MEDICINE CENTRE OF PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL IN 2025

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Background. According to the World Health Organization, in Latvia one of the most frequently diagnosed malignant tumours is breast cancer, and especially often are affected under 50 years olds women. Both in Europe and in the world increasing attention is being paid to the rehabilitation of oncological patients therefore, the development of rehabilitation procedures in Latvia is also important.

Aim. To analyse available rehabilitation methods and frequency of use for patients with arm lymphedema after breast cancer surgery at the Rehabilitation Medicine Centre of Pauls Stradiņš Clinical University Hospital during 2025.

Methods. Rehabilitation plans from the PSCUH electronic database, for all the patients treated with arm lymphedema were selected and further analysed.

Results. From January 2025 until December 2025 a total of 29 patients with arm lymphedema after breast cancer surgery went through rehabilitation and enrolled in the study. The average age of patients undergoing rehabilitation was 62 years old. All patients were women (n = 29). Approximately 97% (n = 28) of patients had physiotherapy sessions. A combination of 3 procedures was most used and accounted for 41.4% of the frequency. Just 2 procedures were enough for only 13.8% of women. In turn, in 10.3% of cases 6 procedures were used, which proves the complexity of lymphedema.

Conclusion. Lymphostasis is a serious complication that requires active rehabilitation using not only commonly applied combination of procedures, such as physiotherapy and lymphatic drainage massage, but demands more versatile and broader selection of procedures.

Acknowledgements. The study has absence of conflicts of interest.

COMPREHENSIVE MOLECULAR PROFILING OF SOLID TUMOURS USING MSI TESTING AND NGS ANALYSIS

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Background. Microsatellite instability (MSI) and next generation sequencing (NGS) are essential tools for detecting mismatch repair deficiency and pathogenic genomic alterations across solid tumours. Combining MSI screening with NGS enhances diagnostic precision and supports hereditary cancer risk stratification.

Aim. To assess MSI H prevalence across major tumour groups and to characterise pathogenic and likely pathogenic variants detected by NGS in a patient cohort.

Methods. A total of 1225 patients (2023–2026) underwent Idylla MSI testing and, where clinically indicated, further NGS analysis. Tumours were classified using ICD 10 codes, with C18–C21 grouped as colorectal cancer (CRC). MSI H proportions were calculated per tumour type.

Results. MSI H was most prevalent among endometrial cancers (C54: 20.9%; C54.1: 20.3%), followed by CRC (12.8%) and small bowel tumours (C17: 16.7%). Gastric (C16) and secondary gastrointestinal tumours (C78) demonstrated lower MSI H rates (6.2% and 6.1%).

NGS testing was available for a subset of patients (blood: n = 93; tissue: n = 16). Blood NGS identified 15 unique pathogenic or likely pathogenic variants, including APC c.904C>T, BLM c.1642C>T, CHEK2 c.444+1G>A, FANCC c.844 1GC, MLH1 c.381 2A>G, multiple MSH6 frameshift variants, PMS1/PMS2 pathogenic variants, TP53 c.535CG, MUTYH c.763AG, and variants in FANCM and CIITA. These alterations primarily involved mismatch repair (MMR) genes, tumour suppressor pathways, and DNA repair mechanisms.

Tissue NGS revealed > 16 unique variants, including APC frameshift deletions/duplications, several TP53 hotspot mutations (p.Arg280Gly, p.Arg282Trp, p.Val157Phe), PTEN frameshift deletions, MSH6 c.3261del, multiple RNF43 frameshift mutations, KRAS c.35G>A (G12D), and pathogenic alterations in PALB2, ATM, SMARCA4, F8, KDM6A, ASXL1, TGFBR2, and ERBB2. The identified variants encompassed classical driver mutations, MMR defects, DNA repair abnormalities, and tumour suppressor gene inactivation.

Conclusions. MSI H was most common in endometrial and CRC tumours. NGS revealed a broad and clinically relevant spectrum of pathogenic genomic alterations, particularly within MMR, DNA repair, and tumour suppressor gene pathways. High variant detection in tissue sequencing highlights its critical value for comprehensive tumour characterisation and precision oncology.

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ASSESSMENT OF BREAST CANCER RECURRENCE RISK BASED ON BI-RADS, TUMOUR SIZE, AND PATIENT AGE

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Background. Breast cancer is the most common malignancy among women worldwide. In Latvia approximately 1200 women are newly diagnosed with breast cancer every year. Despite advances in diagnosis and treatment, breast cancer recurrence remains a major clinical challenge, substantially affecting prognosis, quality of life and survival. Early identification of patients at higher risk of recurrence is crucial for improving follow-up and treatment strategies. The Breast Imaging Reporting Data System (BI-RADS), widely used to standardise radiological assessment and estimate malignancy risk, together with tumour size, may provide important prognostic information regarding disease

outcome and recurrence. In addition, patient age is a well-recognised factor influencing breast cancer prognosis.

Aim. To evaluate the risk of breast cancer recurrence in relation to BI-RADS, tumour size and patient age.

Methods. A retrospective analysis of clinical data was conducted. The study involved 310 patients. Data were collected anonymously and analy sed using the IBM SPSS Statistics v.29. Binary logistic regression analysis was performed to evaluate the association between breast cancer recurrence and BI-RADS category, tumour size, and patient age. In this study, breast cancer recurrence was defined as either local recurrence or distant metastatic disease. Statistical significance was set at $p < 0.05$.

Results. Among 310 patients, cancer recurrence was diagnosed in 11.3% of cases (n = 35). Of all recurrences, 75.9% were local and 24.1% were metastatic. BI-RADS category was a statistically significant predictor of recurrence risk (OR = 2.176, $p = 0.016$), indicating that each one-category increase in BI-RADS was associated with an approximately 2.2-fold increase in the odds of recurrence. Tumour size was also significantly associated with recurrence risk, with patients having tumours measuring 2–5 cm or > 5 cm showing substantially higher odds of recurrence compared to patients with tumours ≤ 2 cm (OR = 6.985, $p < 0.001$). In contrast, patient age did not reach statistical significance as a predictor of recurrence risk (OR = 1.033, $p = 0.054$), although a borderline trend toward increasing risk with increasing age was observed.

Conclusion. Overall, these findings indicate that BI-RADS and tumour size are significant predictors of breast cancer recurrence risk, whereas patient age did not reach statistical significance in this model.

Acknowledgements. The authors declare no conflict of interest.

PREDICTIVE ROLE OF CLINICAL AND BLOOD MARKERS IN MELANOMA TREATED WITH IMMUNE CHECKPOINT INHIBITORS AT THE LATVIAN ONCOLOGY CENTRE

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Background. Despite extensive research, the optimal choice of first-line systemic therapy for melanoma — targeted therapy or immunotherapy — remains unclear. Easily accessible and cost-effective predictive markers are needed.

Aim. This study aimed to identify clinically relevant clinical and laboratory factors predicting response to immune checkpoint inhibitor therapy in melanoma.

Methods. This retrospective study included 141 patients with cutaneous melanoma treated with immune checkpoint inhibitors at Rīga East Clinical University Hospital, Latvian Oncology Centre, between 2015 and 2025. Patients were followed from treatment initiation until completion, death, or 1 December 2025. Tumours were staged according to the UICC 8th edition. Treatment response was assessed by imaging and classified as complete response, partial response, or disease progression. Responders were metastatic melanoma patients achieving complete or partial response and adjuvant therapy patients without recurrence within six months. Clinical characteristics, prior BRAF/MEK inhibitor therapy, and laboratory markers — neutrophil-to-lymphocyte ratio (Neu/Ly), LDH, CRP, S-100 – LATVIA were analysed using Microsoft Excel and SPSSv.20.

Results. Mean patient age was 67.8 years (SD = 11.8). Most received anti-PD-1 —monotherapy (n = 119), 22 received combined anti-PD-1/anti-CTLA-4 therapy. Immunotherapy was adjuvant in 50 cases, for metastatic disease in 91. BRAF mutations were found in 54 cases and 13 of them previously treated with BRAF/MEK inhibitors. Overall, 69 patients (48.9%) were responders; response was observed in 19.8% of metastatic cases, recurrence during adjuvant therapy — 14%. Median time from diagnosis to treatment initiation was 466 days (IQR 133–1330 days). Baseline CRP differed between responders and non-responders ($p = 0.022$). Treatment-related changes in LDH, S-100 and Neu/Ly were significantly associated with outcomes ($p < 0.05$). Logistic regression identified S-100, Neu/Ly and prior BRAF/MEK inhibitor therapy as independent predictors, with S-100 showing the strongest association ($p = 0.005$).

Conclusions. In addition to LDH, S-100 and Neu/Ly are valuable, easily accessible predictors of immunotherapy efficacy in melanoma.

Acknowledgements. The author declares that there are no conflicts of interest related to this study. This research was conducted without external funding.

COMPARISON OF CYTOLOGY AND HISTOPATHOLOGY IN THE DIAGNOSIS OF BASAL CELL CARCINOMA: A RETROSPECTIVE STUDY

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Background. Non-invasive methods for screening and early diagnosis of basal cell carcinoma (BCC) are particularly important. Cytological tumour analysis is a rapid and minimally invasive diagnostic method compared with histopathological examination.

Aim. This study aimed to evaluate the diagnostic value of cytology for detecting BCC by comparing cytological findings with histopathological results. We hypothesised that cytology would demonstrate high sensitivity but moderate specificity compared with histopathology.

Methods. This retrospective study analysed anonymised data from 434 patients with clinically suspected BCC who underwent cytological examination followed by histopathological assessment during routine clinical care. Demographic data (age and sex), lesion localisation, and lesion characteristics — including maximum diameter, histologic subtype, type of differentiation, lymphocytic infiltration, desmoplasia, lymphovascular invasion, TNM stage, and depth of invasion — were extracted from existing records. Cytological and histopathological examinations were performed according to standard institutional protocols. Histopathology was used as the reference method. Agreement between cytology and histopathology was assessed using Cohen's kappa coefficient, and sensitivity and specificity of cytology were calculated.

Results. Cytology demonstrated a sensitivity of 94.2% and a specificity of 69.4% for BCC diagnosis. Agreement between cytology and histopathology was moderate (Cohen's $\kappa = 0.553$, $p < 0.001$).

Conclusion. In this retrospective analysis, cytology showed high sensitivity and moderate specificity for BCC, with moderate agreement compared with histopathology. Cytology may serve as a useful adjunctive diagnostic tool in evaluating suspected BCC, particularly where rapid or minimally invasive assessment is desirable. However, histopathological examination remains essential for definitive diagnosis and treatment planning.

Acknowledgements. The authors declare no conflicts of interest and no external funding.

CLINICAL MANIFESTATIONS AT THE TIME OF DIAGNOSIS IN PATIENTS WITH PRIMARY BRAIN TUMOURS AT PAULS STRADIŅŠ CLINICAL UNIVERSITY HOSPITAL IN 2023–2024

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Background. Primary brain tumours are a heterogeneous group of neuro-oncological diseases with diverse and often nonspecific clinical presentations. The symptomatology at the time of diagnosis significantly influences the timing of diagnosis, the choice of treatment strategy, and patient prognosis. In Latvia, available data on the initial clinical manifestations of primary brain tumours are limited.

Aim. To analyse and summarise the most common clinical manifestations at the time of diagnosis in patients with primary brain tumours treated at Pauls Stradiņš Clinical University Hospital during 2023–2024.

Methods. A retrospective study was conducted by analysing the medical records of patients treated at Pauls Stradiņš Clinical University Hospital. Patients with primary brain tumours diagnosed between 2023 and 2024 were included. Data on tumour type, World Health Organization (WHO) grade, IDH status, and clinical manifestations at the time of diagnosis were collected. Symptoms were grouped into 12 clinical categories. Data processing and descriptive statistical analysis were performed using Microsoft Excel. Only patients with available symptom data at the time of diagnosis were included in the symptom analysis.

Results. A total of 125 patients were included in the study, with symptom data available for 122 patients (97.6%). The study population was dominated by glial tumours, primarily glioblastomas (74%, n = 92), as well as astrocytomas, oligodendrogliomas, ependymomas, and gliosarcomas.

High-grade tumours (WHO grade IV) accounted for 76% of cases, and the majority of glial tumours exhibited an IDH-wildtype status (71.2%, n = 89). The most common symptoms at the time of diagnosis were hemiparesis or limb weakness (38.5%, n = 47), headache (36.9%, n = 45), and confusion or disorientation (23.0%, n = 28). Epileptic seizures were observed in 17.2% (n = 21) of patients, whereas visual (8.2%, n = 10) and sensory disturbances (5.7%, n = 7) were less frequent.

Conclusion. The clinical presentation of primary brain tumours at the time of diagnosis is heterogeneous; however, focal neurological deficits and headache are the most prevalent manifestations. Early recognition of these symptoms may contribute to earlier diagnosis and improved neuro-oncological patient care.

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