little data available on the influence of the variant allele frequency of a KRAS mutation on the prognosis of solid tumors or specific tumor characteristics.
Methods: The VAF of a KRAS mutation was analyzed in 482 patients with solid tumors treated at our center between 2020 and 2024. The assessment of VAF was performed using NGS technique. In addition, patient and tumor characteristics, as well as data on the course of the disease, were collected. The VAF of KRAS was categorized in quartiles to investigate the association between VAF and disease prognosis.
Results: The VAF of a KRAS mutation could be determined in 482 patients with solid tumors harboring a KRAS mutation. 37 % of the cases were adenocarcinomas of the lung, followed by 25 % colorectal carcinomas and 20 % with pancreatic cancer. In 320 patients the VAF of the KRAS mutations was examined in samples from the primary tumor and in 162 cases in samples from metastatic lesions. The mean VAF was 30.0 % and varied significantly across different tumor types, with the lowest VAF observed in pancreatic adenocarcinomas (23.3 %). The VAF was significantly higher when tested in a sample from a metastatic lesion. Similarly, the VAF was significantly higher in cases of palliative disease – irrespective of the location of the sample. There is a positive correlation between VAF and the tumor cell percentage.
The VAF of a KRAS mutation has no influence on prognosis in the overall cohort. The influence of the VAF of KRAS on prognosis across individual tumor types is inconsistent: There is a trend toward shorter survival with a VAF < 5 % for lung adenocarcinomas and colorectal carcinomas, whereas longer survival is observed with a VAF < 5 % in pancreatic carcinomas.
Conclusions: The VAF of a KRAS mutation influences tumor characteristics in patients with solid tumors. There is no impact of the VAF on prognosis in the overall cohort. With wider use of targeted therapies, both the prognostic and predictive value of the VAF of a given mutation should be further investigated. Wider understanding on the classification of subclonal mutations is necessary.

V106

Effects of Pharmaceutical Coating-derived Nanoplastics on Human Immune Cell Composition and Function

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Introduction: Polymeric coating of solid oral dosage forms is a widespread pharmaceutical strategy to improve drug stability, bioavailability and controlled release. Acrylic ester copolymers such as Eudragit RS and Eudragit NM are widely used in delayed or sustained-release coating formulations, including colon-targeted micro- and nanoparticle delivery systems [1]. However, these materials may also constitute a source of primary and secondary nanoplastics capable of crossing the intestinal barrier and entering systemic circulation. The present study investigated the effects of acrylic ester-based Eudragit nanoplastics on primary human immune cells.
Methods: In this study, the influence of the Eudragit nanoplastics on the peripheral white blood cells (WBCs) was elucidated. It was achieved by isolating WBCs from healthy donors and coincubating them with positively charged Eudragit RS and neutrally charged Eudragit NM nanoparticles, with a size range of 30-300 nm. The nanoparticle-induced alterations in immune cell composition, apoptosis induction, and T-cell activation were analysed by means of flow cytometry. Furthermore, the nanoparticle uptake and morphological changes in WBCs were assessed by means of fluorescence microscopy and May-Grünwald-Giemsa staining.
Results: The microplastic particles of larger size exhibited the strongest toxic effects on WBCs derived from three independent healthy donors compared with smaller particles (30 nm and 50 nm). In contrast, neutrally charged Eudragit nanoparticles showed minimal effects on immune cells, whereas positively charged Eudragit RS nanoparticles induced pronounced cellular alterations. Interestingly, smaller nanoparticle sizes were associated with significantly enhanced T-cell activation. Furthermore, nanoplastic exposure differentially affected distinct leukocyte populations, most prominently resulting in an increased NK-T-cell fraction and a reduced monocyte fraction. Cytospin analyses additionally revealed enhanced monocyte granulation.
Conclusions: In summary, acrylic ester-based nanoplastics significantly affected immune cell viability and composition in a size- and charge-dependent manner. These findings indicate potential immunomodulatory effects of pharmaceutical coating-derived nanoplastics following systemic exposure and necessitate further investigation.

Reference:

1. Porter, S.C., *Chapter 27 - Coating of pharmaceutical dosage forms*, in *Remington*, A. Adejare, Editor. 2021, Academic Press. p. 551-564.

Freier Vortrag

Mammakarzinom

V107

Breast Cancer Early Detection based on Peripheral Blood Mononuclear Cells (PBMCs) Gene Expression using Machine Learning

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Introduction: Breast cancer is one of the most common cancers affecting women worldwide. Early diagnosis plays a crucial role in improving outcomes, increasing patients' survival and decreasing cancer's impact on healthcare systems. In this direction, the aim of this study was the development of a screening method able to detect cancer at the earliest stage, even before any symptoms appear. PBMCs are the first line of defense against cancer cells. Upon encounter with a cancer cell, immune cells become activated against cancer peptides and their gene expression changes. PBMC gene expression profiles were used for the discrimination between healthy and breast cancer samples of stage I, utilizing advanced statistical methods namely Machine Learning (ML) models.
Methods: A dataset of expressions of over 60 genes was generated, including common oncogenes, anti-oncogenes and genes related to important cellular processes. Particularly, for 58 healthy individuals and 51 breast cancer stage I patients, blood samples were analyzed to identify the gene expression profile of PBMCs. Then, the performance of 4 hyper-optimized ML classifiers was tested, namely Support Vector Machines (SVM), K-Nearest Neighbor (KNN), Ensemble classifiers and Neural Networks. The hyper-parameters of the ML models were tuned using (10X-) 5-fold cross-validation on training sets (99 samples) and the optimized models were tested in test sets (10 samples).
Results: For all ML models and for the training (validation) sets, the mean accuracy was found to be 95.30 ± 1.61, the mean sensitivity (True Positive Rate - TPR) was found to be 94.10 ± 1.51, while the mean specificity (True Negative Rate - TNR) equal to 96.35 ± 1.72. For the test sets, the mean accuracy was found to be 97.00 ± 2.45, the mean sensitivity (TPR) was found to be 96.50 ± 3.00, while the mean specificity (TNR) equal to 97.50 ± 3.00.
Conclusions: The present study reports preliminary results concerning the utilization of PBMCs gene expression profiles in distinguishing stage I breast cancer samples from healthy ones. These findings indicate that ML models developed based on PBMCs gene expression patterns could be a valuable tool for early breast cancer detection in clinical practice. Although additional experiments are necessary for method validation and extension based on larger datasets and using different types of cancer, the preliminary results show great promise in early cancer detection.

V108

Adherence to Tumor Board Recommendations at the Breast Cancer Center of the Krukenberg Cancer Center Halle (KKH), University Medicine Halle (UMH)

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Introduction: Strict adherence to tumor board (TB) recommendations is a key component of quality assurance in oncology with a positive effect on survival [Kandemir, E.A., et al. Clinical Breast Cancer, 2025]. The goal of the present study is a structural and content analysis of the TB adherence at Krukenberg Cancer Center Halle (KKH).
Methods: This retrospective analysis includes TBs from the German Cancer Society (DKG) certified breast cancer center at KKH between November 1st 2022 and February 28th 2023 with follow-up until March 1st 2025. The collected data includes the number of TBs, recommendations, implementation rate and reasons for non-adherence. Ethical approval was granted by the local ethics committee.
Results: A total of 557 TBs for 276 patients (female n=271, 98%) were included. In 83% (n=463/557) of TBs, all required interdisciplinary specialists in gynecology, oncology, radiology, and pathology were present. In total, 1199 recommendations were given. The implementation rate was 86% (n=1028/1199). As depicted in figure 1, implementation rates were 86% (n= 544/633) for diagnostic and 86% (n=484/566) for therapeutic recommendations. In 59% (n=106/181) of not implemented recommendations, a reason for not following the TB's suggestions was documented, with medical reasons (n=36/106) being the most common, followed by patient preference (n=32/106) (Figure 2).
Conclusions: The discipline of specialists to attend TBs improved further to 98% in 2025. The high implementation rate of recommendations indicates efficient multidisciplinary decision-making and quality-assured care. Improved structured documentation of non-implementation reasons could further improve traceability of disease courses. The impact of TB adherence on outcome is being analysed at present.

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