Poster 16 The patient-derived cancer spheroid model predicts response to chemotherapy in curatively resected patients with high-risk stage II and stage III colon cancer

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Background

The prospective SpheroPCT cohort study was conducted to evaluate the chemopredictivity of the patient-derived cancer spheroid model (PDCS) in locally advanced CRC.

Methods

Tumor spheroids were prepared from 48 colorectal cancer patients (R0M0) with UICC-II high-risk and UICC-III tumors for 48 h and treated with guideline-recommended chemotherapy for 72 h. Treatment efficacy was measured by ATP luminescence assay and multivariately correlated with 5-year disease-free survival (DFS).

Results

CRC patients treated according to the most effective test results did not experience tumor recurrence within the 5-year follow-up (32 of 36 patients, 88.9%). In contrast, tumor recurrence occurred in patients who did not receive the best therapy suggested by the PDCS model (7 of 12 patients, 58.3%, $p<0.001$). Drug testing in the PDCS model proved to be an independent predictor of drug response (HR 0.191, 95% CI 0.045-0.801, $p=0.024$). Test specificity was calculated to be 86.5% and test sensitivity was calculated to be 74.6%. Consistent with guideline recommendations, drug testing in the PDCS model showed no improvement in treatment efficacy with the addition of irinotecan to 5-FU or cetuximab to 5-FU in combination with oxaliplatin (FO). In six of the 11 relapsed patients (54.5%), the test detected a more effective treatment option than the given one. Two CRC patients were classified as chemoresistant. For nine of 13 patients (69.2%) who required reduction of standard chemotherapy with FO due to severe side effects, the PDCS model identified an equivalent or more effective treatment option.

Discussion

The data suggest that preclinical drug testing in the predictive PDCS model should be translated to clinical practice. This strategy could provide more effective and less toxic therapeutic options for individual cancer patients, resulting in prolonged survival and improved quality of life.

Conclusion

The patient-derived cancer spheroid model supports decision making in personalized cancer therapy.