Comparative analysis of circulating tumor cells in prostatic plexus and peripheral blood of patients undergoing prostatectomy

Abstract Submitter: Simon Joosse, Germany*

Co-Authors: Gresa Emurlai, Randi Pose, Nikhil Kalra, Cornelia Coith, Sandra Lenz, Pierre Tennstedt, Markus Graefen, Stefan Werner, Sabine Riethdorf, Derya Tilki, Klaus Pantel

*University Medical Center Hamburg-Eppendorf

Abstract

BACKGROUND. The potential influence of radical prostatectomy on tumor cell release into the blood circulation is an under-investigated area.

METHODS. 103 treatment-naïve patients with early-stage prostate cancer were recruited. Blood from the prostatic venous plexus was analyzed for the local release of tumor cells during radical prostatectomy. Simultaneously, systemic spread was assessed by the presence of circulating tumor cells (CTCs) in peripheral venous blood using both the EpCAM-dependent CellSearch and the size-dependent Parsortix systems in parallel. Tumor cells in the plexus blood and CTCs were detected by epithelial keratin expression and lack of CD45 leukocyte antigen. Median follow up time was 25.2 months.

RESULTS. Median counts of Keratin+/CD45- cells detected in peripheral blood with the CellSearch and Parsortix systems differed significantly ($p<0.01$) with higher sensitivity of the Parsortix system. Even if the results of both assays were combined, the median number of Keratin+/CD45- cells in the prostatic plexus blood was significantly higher than in the peripheral blood (97 vs. 2 per 7.5 ml, respectively, $p<0.0001$). Keratin+/CD45- cells could be identified in 85% of prostate cancer patients in the prostatic plexus blood and in 42% of patients in peripheral blood during surgery without any significant correlation. Keratin+/CD45- cell clusters were identified in the prostatic plexus in 51.2% of patients but neither these clusters nor single Keratin+/CD45- cells were associated with biochemical relapse during follow-up. Single-cell genome wide sequencing by NGS showed copy number alterations (CNAs) in 15 out of 26 index CTCs originating from both the prostatic plexus and peripheral blood compartments.

CONCLUSION. Combining different CTC enrichment principles increases the CTC detection rate in the peripheral blood of early-stage prostate cancer patients. Our study provides first evidence for a considerable local release of normal and malignant epithelial cells during prostatectomy, which, however, was neither associated with increased CTC detection in the peripheral blood nor with early biochemical recurrence. Longer follow up studies are required to assess whether local tumor cell spread might contribute to clinical outcome in prostate cancer.

Do you have any conflicts of interest?

No, I do not have a conflict of interest.