Introduction
Prostate carcinoma is the most common cancer type in men above 50 years of age. Mostly, the cancer grows very slowly but often metastasizes via the lymphatic system. Essential for the metastatic process are adhesion molecules. CEACAM1, a member of the carcinoembryonic antigen (CEA) family, is a homophilic/heterophilic cell adhesion molecule with angiogenic and lymphangiogenic properties. It exists in short and long isoforms (CEACAM1-S and -L) and is expressed on most epithelial cells, angiogenically activated endothelial cells and leukocytes. CEACAM1, but no other CEACAMs are expressed in normal prostate tissue, and is down-regulated in prostate carcinoma (PIN, Gleason grade 4, 5). Interestingly, CEACAM1 is absent in quiescent endothelial cells, but appears in tumor-associated blood and lymphoendothelial cells. Our previous results (Immunohistochemistry) showed an expression of CEACAM1 in sinusoidal endothelial cells of lymph nodes in patients with prostate carcinoma as well as in tumor cell clusters found within lymphatic vessels. Based on these findings we hypothesized an important role of CEACAM1 in lymphangiogenesis and lymphatic metastasis of prostate cancer. To test this, we established a mouse and human in vitro model. For the mouse system, we used different prostate cancer cell lines (AD-Ca) and the endothelial cell line bEnd.3. For the human model, we analyzed the prostate cancer cell line PC-3 and the lymphoendothelial cell line AS-M.5.

Objectives
- Characterization of the CEACAM expression pattern in lymphoendothelial and prostate carcinoma cell lines
- Analyses of homophilic/heterophilic CEACAM interaction between tumor and lymphoendothelial cells in murine and human in vitro model

Results murine model

![Figure 1: Confluent endothelial cells bEnd.3 express more CEACAM1 than proliferating cells. The murine prostate carcinoma cell lines (AD-Ca E2E4, AD-Ca e1E2E2) express barely CEACAM1. Flow cytometry and Western Blot of confluent and proliferating cells was performed utilizing mAb anti-mCC1.](image)

Results human model

![Figure 3: Confluent endothelial cells AS-M.5 express more CEACAM1 than proliferating cells. Confluent prostate carcinoma PC-3 cells express no CEACAM1, barely CEACAM6 and a significant amount of CEACAM5. Flow cytometry and Western Blot analysis of confluent and proliferating cells was performed utilizing mAb B3-17 (anti-hCC1), mAb 5C8C4 (anti-hCC5) and mAb 1H7-48 (anti-hCC6), respectively.](image)

Conclusion
Confluent CEACAM1-positive prostate carcinoma cell lines express more CEACAM1 than proliferating cells. Murine prostate carcinoma cell lines express very low level of CEACAM1, whereas the human prostate carcinoma cell line PC3 does express no CEACAM1, barely CEACAM6, but a significant amount of CEACAM5. Other human prostate cancer cell lines analyzed do not express any CEACAMs (e.g. DU-145, LNCaP).

In murine, prostate carcinoma cells over-expressing CEACAM1-S, but not CEACAM1-L show an increased adhesion to confluent lymphoendothelial cells.

In human, PC-3 cells expressing CEACAM5 show a decreased adherence to confluent lymphoendothelial cells compared to CEACAM5 negative counterparts. Hence, the CEACAM1-CEACAM1 interaction supports, while the CEACAM1-CEACAM5 interaction inhibits lymphogenic metastasis of prostate carcinoma.

**Functional role of CEACAM1 in the lymphogenic metastasis of the prostate carcinoma**

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