INTRODUCTION
Prostate cancer is the most prominent oncologic disease in men in the western world. Most prostate cancers show androgen dependency at their beginning, that’s why androgen ablation therapy is the most common therapy. A big range of biomarkers is available for primary cancer diagnostic as well as therapy monitoring. But in prostate cancer the tracer of choice is still missing. The aim of this study was to validate [11C]Choline, [18F]FEC and [11C]Choline, [18F]FEC, three PET tracers, specifically designed for prostate cancer imaging, and to compare them with [18F]FDG and [18F]FET pre and post surgical in the PAC120 human hormone-dependent prostate cancer subcutaneously xenografted in the Nude rats.

RESULTS
The PET baseline image analysis of the PAC120 tumors showed excellent [11C]Choline uptake with a T/M of 2.19±0.32 and very good uptake with the derivatives ([18F]FEC/T/M: 1.54±0.29, [18F]Ch/T/M: 1.79±0.38). A great delineation of the tumors was observed with [18F]FDG (T/M: 4.9±0.84). For [18F]FLT a very low baseline with a T/M of 1.14±0.16 was found. Effective androgen-ablation therapy through surgical castration is greatly pictured in the first line through [11C]Choline and its derivatives as well as the oncologic “Gold-Standard” tracer [18F]FDG. Thus, we found a significant decrease of the T/M ratio (T/M: 3.16±0.23, p<0.01) three weeks post castration (p.c.) using choline PET imaging. [18F]FEC and [18F]Ch show a highly significant decline of the tracer tumor uptake 3 weeks (p<0.007) and 7 weeks (p<0.0006) p.c. compared to baseline measurements as well as with the [11C]Choline (p<0.017). [18F]FDG imaging show highly significant decrease (p<0.0001) of the tracer uptake 3 weeks p.c. (T/M: 2.96±0.54) compared to the baseline scans. Analysis of the ADC maps revealed a clear increase of the ADC values post castration due to a change in the tumor microenvironment. This effect is characterized by the loss of cellular density because of treatment-induced cell death. Additionally a shift in the CSI data from choline and lactate could be shown.

CONCLUSION
These data show for the first time a significant response to androgen ablation therapy using PET imaging with [11C]Choline and its derivates in an in vivo model of human hormone-dependent prostate cancer xenografted in Nude rats. Additionally, we have shown an excellent data correlation with ADC and CSI parameters as well as immunohistochemistry. Conclusively the PAC120 tumor-bearing Nude rat is a useful in vivo model to study new PET tracers for human hormone-dependent prostate cancer diagnostic and therapy efficacy monitoring.