The aim of this study was to determine whether [11C]choline can be used for docetaxel therapy response assessment in a LNCaP-prostate cancer xenograft mouse model using [11C]choline small-animal PET/CT. Animals, methods: The androgen-dependent human prostate cancer cell line LNCaP was implanted subcutaneously into the left flanks of 17 SCID-mice, 12.5 mg testosterone platelets were implanted in the neck wrinkle. All mice were injected 4-6 weeks after xenograft implantation with 37 MBq [11C]choline via the tail vein. Dynamic imaging was performed for 60 minutes with a small-animal PET/CT scanner. After the first [11C]choline PET/CT imaging 8 mice were subsequently injected intravenously with docetaxel twice (days 1 and 5) at a dose of 3 mg/kg body weight. 8 mice were treated with PBS as a control. [11C]choline PET/CT imaging was performed on day 7, 14 and 21 after treatment. Image analysis was performed using tumor/muscle (T/M) ratios (ROIT/ROIM = T/M ratio). Results: All LNCaP tumours could be visualized by [11C]choline PET/CT. Before treatment the mean T/M ratio was 2.0 ± 0.2 in the docetaxel-treated group and 1.9 ± 0.2 in the control group (p = 0.837). There was a reduction in the
mean [11C]choline uptake after docetaxel treatment of the tumours of the LNCaP cell line as early as 1 week after initiation of therapy (T/Mmean ratio 1.5 ± 0.2 after one week, 1.3 ± 0.2 after 2 weeks and 1.4 ± 0.2 after 3 weeks). There was no decrease in [11C]choline uptake in the control group.

Conclusion: Our results show that [11C]choline has the potential for use in the early monitoring of the therapeutic effect of docetaxel in a LNCaP prostate cancer xenograft animal model.