

AbstractID: 6515 Title: The effect of weekend-off and day of treatment initiation on tumor control probabilities

Purpose: Recently developed tumor control probability (TCP) models can incorporate temporal variations in the delivery of treatment fractions. This study investigated the effect on TCP of weekend treatment breaks and of the treatment initiation week day.

Methods and Materials: Treatment plans were selected for three patient with tumors of different cell doubling times - squamous cell carcinoma of the head and neck (short doubling time), breast cancer (intermediate doubling time), and prostate adenocarcinoma (long doubling time). TCPs were calculated and compared for each treatment plan using fractionation schedules that included or omitted weekend breaks. We also computed TCPs for fractionation schedules that included weekend breaks but started on different week days - Monday, Wednesday, or Friday. We assumed the same numbers of fractions and total doses for all fractionation schedules.

Results: For the primary PTV of the head and neck tumor, the TCP increased by 3.1% when weekend breaks were not given. For the breast cancer, the TCP was independent of weekend break. For the prostate tumor, the TCP increased by 1.4% when weekend breaks were omitted. When comparing different start days for treatment, TCPs were higher for Monday starts than for the other days for all cases.

Conclusions: The calculations suggest that TCPs can be increased for the same total dose if treatment is delivered without weekend breaks. In addition, the overall treatment time is reduced, which is known to be an important factor in head and neck treatments. The comparison of TCPs calculated for different treatment start days suggests that Monday is the best day for treatment initiation. This is consistent with current clinical practice. However, we did not examine the effect on normal tissues of fractionation without weekend breaks.

Supported in part by a research agreement with TomoTherapy, Inc.