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Evaluation of radiation effect, tumor differentiation, and prostate specific antigen staining in sequential prostate biopsies after external beam radiotherapy for patients with prostate carcinoma.

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Abstract

BACKGROUND: Sequential systematic biopsies after radiotherapy (RT) for prostate carcinoma were evaluated with respect to radiation effect, tumor differentiation, and prostate specific antigen (PSA) staining, and these histopathologic parameters were correlated with local outcome.

METHODS: Since 1990, transrectal ultrasound-guided biopsies have been used to follow patients with localized prostate carcinoma after radical external RT at the General Hospital division of the Ottawa Regional Cancer Centre. Eighty-nine patients with residual tumor in 1 or more biopsies at 10-78 months of follow-up were selected for review. All patients had undergone biopsy on more than one occasion. The 198 biopsies were stained for PSA, high molecular weight keratin, and proliferative cell nuclear antigen (PCNA). Therapy effect was graded by nuclear and cytoplasmic changes.

RESULTS: Of these 89 selected patients, 25 progressed to local failure (LF), 38 had delayed tumor clearance, and 26 remained biopsy positive without local or biochemical progression. In the 24- and 36-month biopsies, RT effect correlated with mean nadir serum PSA (Grade 4-6 RT effect: 0.7 ng/mL; Grade 0-3 RT effect: 1.3 ng/mL [$P = 0.01$]) and with local outcome (Grade 0-2 RT effect: 55% LF; Grade 3-4 RT effect: 30% LF; and Grade 5-6 RT effect: 0% LF [$P = 0.003$]). Of tumors with minimal RT effect, 61% were PCNA positive, compared with 34% for moderate and 17% for marked RT effect ($P < 0.001$). Adjacent areas within biopsies showed varied RT effect in 27 patients, of whom 41% had local failure, compared with 18% of patients with uniform RT effect ($P = 0.03$). Gleason score was assigned only if RT effect was minimal (36 patients/59 biopsies); 74% had the same Gleason score (+/-1) as the original, whereas 23% were 2 points lower. Only 1 biopsy lost PSA staining completely and 10% stained faintly, whereas 34% stained moderately and 55% strongly.

CONCLUSIONS: PSA staining is apparently retained in residual tumor after RT, despite obvious RT effect.

RT effect correlates with serum PSA nadir, PCNA staining, and local outcome. Varied RT effect is commonly observed in biopsies, and correlates with local failure. There is no convincing evidence for tumor dedifferentiation after RT.