

Purpose: To evaluate the ability of FLT PET imaging to measure bone marrow recovery from chemoradiation therapy in cervical cancer patients.

Methods: Two cervical cancer patients were enrolled in an IRB approved protocol to obtain FLT PET images at simulation, during chemoradiation, and ~30 days post chemoradiation therapy. WBC counts and bone marrow FLT uptake change inside and outside the radiation therapy (RT) field were measured to correlate with recovery measured with FLT uptake 30 days post-therapy. Bone marrow response and recovery was measured within the RT field in 1 Gy/week dose volumes and outside the field within the lumbar vertebral bodies.

Results: Each subject was unique in her bone marrow recovery due to chemoradiation therapy when compared to pre-therapy values. Inside the RT field, subject 1 bone marrow that received < 3 Gy/week recovered ~85% while bone marrow that received > 6 Gy/week recovered at least 50% of pre-therapy FLT uptake 30 days post-therapy. However, subject 2 bone marrow that received < 3 Gy/week recovered ~45% and bone marrow that received > 6 Gy/week recovered ~35% of pre-therapy FLT uptake. Outside the RT field, subject 1 L1 FLT mean SUV increased over initial values 60.6% after 3 weeks of RT and 59.1% 30 days post-therapy. Subject 2 L1 FLT mean SUV increased over initial values only 18.5% after 3 weeks of RT and 10.6% 30 days post-therapy. Pre-therapy bone marrow activity may also influence bone marrow recovery. Subject 1 had lower initial WBCs and FLT uptake than subject 2 (5.3 vs. 12.2 K/mm³ and 10.4 vs. 13.6 max SUV).

Conclusion: This preliminary data shows that bone marrow recovery, pre-therapy FLT uptake, and compensatory response can be quantified with FLT PET. These metrics may be valuable in correlating pre-, during, and post-therapy response to radiation dose and long-term systemic toxicity.