Low dose-rate treatments comprising spatially-varying rates of dose delivery require special consideration of the spatial-variation in radiobiological response. Consideration of clonogenic cell repair and proliferation requires dose-rates to be maintained above a threshold, and minimisation of wasted dose and treatment practicalities place other restrictions on initial dose-rates and isotope half-lives. The linear-quadratic model including cell proliferation and repair was used as the basis for formulating a dose-response model for tissues irradiated with non-uniform dose-rates. This model evaluates the tumour control probability (assuming purely serial tissue structure). The model parameters include radiobiological quantities (cell sensitivities, proliferation and repair constants), radionuclide half-life, and the dose-rate-volume histogram for the tissue being irradiated. TCP is evaluated for a test-tissue assuming simple variations in dose-rate distribution for varying total radionuclide activities. These results are compared with dose-rate distributions encountered clinically, with dose-rate-volume histograms calculated from estimated radionuclide distributions of beta emitters in liver. TCP results are also compared with ‘equivalent uniform dose-rates’ – the dose-rate of a uniform activity distribution which would yield the same surviving fraction of cells.