An important issue in treatment planning is whether TCP rankings are robust with respect to underlying model parameters and whether other proposed quantitative surrogates for ranking tumor dose distributions correlate well with TCP calculations. Computational tests were made of the stability of tumor dose distribution rankings using different ranking criteria. Pseudo tumor differential DVHs of varying shapes and widths were generated using random number techniques. DVHs were ranked according to different criteria, including: TCP models which incorporate inter-patient heterogeneity; TCP models which do not include heterogeneity; Niemierko's formula for an equivalent uniform dose (EUD) [*Med Phys*, **24** (1997) 103-110]; the minimum dose, and the mean dose. The conclusions (assuming a TCP model with inter-patient radiosensitivity heterogeneity as the reference standard) are: a) Dose distribution ranking based on TCP models with inter-patient heterogeneity are *very* insensitive to uncertainty in the choice of parameters, even over very broad variations. The chance of an incorrect precedence (ranking) between two plans, drawn from our pseudo-DVH sets, is typically on the order of 1/1000 using TCP models which include inter-patient heterogeneity; b) Biologically-based models which neglect inter-patient heterogeneity all do much worse in terms of ranking stability compared to TCP models which include patient heterogeneity. c) EUD is clearly superior, however, to the TCP models which neglect patient heterogeneity. And d) The minimum and the mean dose do have some validity as plan ranking criteria, but still perform much worse than inter-patient heterogeneity TCP models and the EUD model.