

AbstractID:9162Title:Reliability of the ultrasonographic characterization of quantitative measurements of radiation-induced breast tissue toxicity

Purpose:

To evaluate the reliability of the ultrasonographic characterization (UTC) as a measure for breast-tissue radiation toxicity.

Method and Materials:

We have recently reported that UTC midband-fit could be used to assess radiation-induced tissue toxicity. The reliability of this method is presented in this report. Twenty-three breast cancer patients previously treated with radiation were recruited. Both treated and untreated breasts were scanned by an oncologist. The untreated breasts were used for reliability study, in which two ultrasound radio-frequency (RF) images were reacquired at the same position. A region-of-interest (ROI) was selected either manually by a physician or a computer program, in which a fixed ROI was used. Between-scan repeatability and the correlation between physician and computer program were assessed using intraclass correlation coefficient (ICC). To evaluate the ability of UTC to scale tissue toxicity, the patients were divided into four groups according to patient self-assessment of breast tenderness and hemoglobin level. Midband-fit differences between treated and untreated breast in each group were investigated.

Results:

The repeatability using single measurement is 0.860 and 0.804 for physician and computer program, respectively. When the average of two measurements is used, the repeatability for computer program is 0.891, which suggests computer program can contest with the physician at the expense of double measurements. The correlation between physician and computer program is very good (ICC = 0.897), which indicates a substantial agreement between the physician and the computer program. For both methods, the UTC midband-fit increases with higher tissue toxicity of the patients.

Conclusion:

Both physician and computer program can assess toxicity reliably. The physician may prefer the computer program for automatic evaluation of tissue toxicity. There is a clear concordance between the UTC evaluations and the patients' self-assessment, which proves the reliability of single UTC in quantitative measurement of radiation toxicity.