Purpose:
Although the measurement of magnetic field homogeneity is a key task for physicists, the methods, including those suggested by ACR guideline that are based on the spectral analysis and gradient echo phase images, are sometimes not available, or often require a specially designed phantom. Here, a new method of measuring field homogeneity is introduced as simpler yet generally applicable to any phantom scans.

Methods:
A general purpose phantom composed of commonly available materials (grapes and fish oil capsules fixed in agaros solution) and a fiducial frame (used for GammKnife treatment and readily available around us) were scanned using a series of conventional spin echo sequence at Philips 1.5 T Intera system (TR=500 ms, TE=20 ms, Nex=1, FOV =250 cm, matrix 256 x 256, thickness=3 mm). The phantom was scanned 6 times while changing the pixel bandwidth gradually in the range between 81.4 and 415.6 Hz, which respectively corresponds to the fat chemical shift (3.4 ppm) of 2.670 to 0.523 pixels. The field inhomogeneity between two spatially distant points (12 cm apart) referenced by the fiducial frames (Fig. 1) was estimated by the linear fitting of the equations (see supporting material).

Results:
The frequency offset value at a point can be attributed to both spatially dependent and spatially independent offsets (e.g. chemical shift of the material). However, the subtraction of two offset values, obtained from the same material but at different locations, would cancel the spatially independent offsets. Therefore, when the offset values for points 1 and 2 (2.5054 vs. 2.0503 ppm, Fig. 2) are subtracted, the difference (0.46 ppm) would be the spatial magnetic field inhomogeneity over the two 12 cm apart points.

Conclusions:
The introduced method could be a useful alternative way of measuring magnetic field homogeneity and can be incorporated into any phantom setting.