

## Evaluation of Non-iterative Shimming Using 2-D Field Map Compared with Simplex Shimming

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**목적 :** The most common instrumental approach to automatic shimming has been based on iterative optimization routine(e.g., simplex) to adjust shim settings to maximize the envelope of the FID. Disadvantage of iterative method, however, is very long to compute shim values. This paper supposes a non-iterative method that uses 2-D field map to adjust shim settings rapidly.

**대상 및 방법 :** We adopt a gradient-recalled echo sequence to acquire 2-D field map rapidly, by which the spectral information is obtained in just two acquisitions per phase encoding. This is possible for proton imaging since there are only two components of the spectrum to be aliased. The acquisitions are gathered as gradient-recalled echoes with small flip angles that the TR can be minimized. The phase difference image formed after reconstruction is the field map. We can compute shim settings from this field map through simple low-order polynomial least-squares fit. The assumed form of the field inhomogeneity is a function of the form

$$B_0(x,y) = a_2(x-x_0)^2 + a_1(x-x_0) + b_2(y-y_0)^2 + b_1(y-y_0) + c$$

All experiments were performed on a MAGNUM 3.0T(MEDINUS) using both uniform phantom and volunteer.

**결과 :** Non-iterative method computes shim values and adjusts current settings within 30 seconds of current implementation. However, typical shimming time of iterative method is about minutes. Additionally, non-iterative method gets more small field deviation than iterative method locating magnetic field on the center of object automatically.

**결론 :** A rapid and completely automated low-order shim program which can substitute for iterative method was illustrated. We present the availability of that method through experiments. While the present implementation only adjusts linear shim components, the method could be readily extended to any order desired.