Estimating Cerebral Blood flow in angiographic images from Residue Curves*

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Abstract

Objective: The purpose of this reseated is to estimate cerebral blood flow in the cerebral microvasculature beds by measuring the change of the intensity gray scale levels in dynamic angiographic images which have been acquired by Digital Subtraction Angiography (DSA).

Materials and Methods: The method which is adopted in this research is based on using two Regions Of Interest (ROIs) within MATLAB. These ROIs were placed on the frame that best depicted of a Scene file to obtain Time Density Curves. Then, image processing and signal processing principles have been applied which include an Iterative Model Based Deconvolution technique, Tracer Kinetic Theory and methods of measuring density to estimate cerebral blood flow from residue curves.

Results: The research have included thirteen patients (four female patients and nine male patients). Statistical analysis has been done using t-student distribution. Cerebral Blood Flow(CBF) For male patients was CBF = 55.6000 ± 10.5596 ml/100g/min while Cerebral Blood Flow For female patients was CBF = 82.0500 ± 19.0726 ml/100g/min.

Conclusion: We have estimated Cerebral Blood Flow for two groups of patients from residue curves by using an Iterative Model Based Deconvolution technique. Applying this technique to DSA images of thirteen patients have yielded CBF values which have been discussed later. The method has the advantage that it doesn't need any additional procedure in order to estimate CBF values other than waiting until the contrast medium disappear from cerebral veins.

Key words: Digital Subtraction Angiography, Cerebral Blood Flow, Tracer Kinetic Theory, Residue Curves.

*For the paper in Arabic see pages (261-275).

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