# Quantifying Cell Number in MRI

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## Technology description

Introduction

Cell therapy is a rapidly growing medical technology that involves transplanting cellular material into an individual to treat diseases such as rheumatoid arthritis, Parkinson’ s disease, and multiple sclerosis. Magnetic Resonance Imaging (MRI), a standard medical imaging instrument, can be used to track transplanted cell material. The transplanted cells are labeled with a magnetic nanoparticle which causes the cells to be detectable on the MRI. No technology for accurately quantifying the number of transplanted cells in vivo currently exists. Manual counting of MRI images is possible, but it is a tedious and time-inefficient process.

Description of Technology

This technology is an automated cell number quantification method utilizing an advanced image analysis to quantify the number of transplanted cells using MRI. Machine Learning (ML), a category of artificial intelligence that enables a computing machine to learn concepts from given data, are employed to expedite the analysis. A large set of data has been acquired by imaging cells labeled with the ferromagnetic nanoparticles. This data set has been meticulously analyzed by manually counting the labeled cells using trained observers. In the learning phase the image analysis program processes this large training set to teach the machine how to accurately identify labeled cells. When transplanted cells are then injected into the target host, MRI imaging allows the in vivo detection of the labeled cells. The analysis tool then accurately quantifies the number of labeled cells without manual assistance.

## Application area

Cell gene therapy: tracking and quantifying transplanted cellular material

## Advantages

Automatically counts transplanted cells in vivo: Eliminates tedious manual counting
High accuracy: ~95% accurate compared to manual counting
Requires only one training period

## Institution

Michigan State University

## Inventors

Arun Ross
Professor
CSE
Erik Shapiro
Research Director and Associate Professor
Radiology
Muhammad Jamal Afridi
Doctoral Student
Radiology
Xiaoming Liu
Associate Professor
Computer Science & Engineering

邮 箱：yeyingsheng@zf-ym.com