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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

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Michelle K. Lee

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(12) **United States Patent**
Madsen

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(54) **SYSTEM AND METHOD FOR VOLUMETRIC ANALYSIS OF MEDICAL IMAGES**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,009,212 A 12/1999 Miller et al.
6,317,617 B1 * 11/2001 Gilhuijs et al. 600/408

(Continued)

FOREIGN PATENT DOCUMENTS

WO WO 99/84983 12/1999
WO WO 02/39895 5/2002

(Continued)

OTHER PUBLICATIONS

Fox et al ("Brain Atrophy Progression Measured from Registered Serial MRI: Validation and Application to Alzheimer's Disease", the Dementia Research Group, National Hospital for NeuroloB and Neurosurgely, 8-1 1 Queen Square, London WCIN 3BG, United KIngdom. Heceived Nov. 27, 1996).*

(Continued)

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(57) **ABSTRACT**

The invention relates to a system and a method for analysis and evaluation of at least one anatomical structure in a medical image, said medical image representing at least a part of a patient or person, said system comprising image analyzing means for calculating the volume and/or providing the shape of the at least one anatomical structure, and statistical analyzing means for providing a confidence interval of the volume and/or the shape of the analyzed anatomical structure(s) based on individual data of the patient or person, thereby quantifying the normality of said anatomical structure(s). By the present system and method a detailed and trustworthy confidence interval can be provided in connection with analysis and evaluation of a medical image of a patient, thereby illustrating the expected normality of the patient. The invention can be applied to images acquired from magnetic resonance imaging (MRI). One example of use is for diagnosing diseases and/or initial stages of diseases.

10 Claims, 4 Drawing Sheets