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Automated Histological Image Processing tool for Identifying and Quantifying Tissue Calcification

Tech ID: 32142 / UC Case 2019-375-0

BRIEF DESCRIPTION

Researchers at UCI have developed a method of identifying, quantifying, and visualizing tissue with calcification. The image processing tool can automatically characterize calcium deposits in CT images histological tissue, especially when it has accumulated in unusual places in the body.

SUGGESTED USES

- Automated image processing for identification of calcification
- Aid in diagnosis of calcification-related disorders or diseases

FEATURES/BENEFITS

- Automated image processing tool
- Provides quantification and post-processing visualization capabilities
- User-friendly
- Has potential to be easily integrated into other image processing platforms

TECHNOLOGY DESCRIPTION

Currently, medical imaging modalities such as computerized tomography (CT) can be used by radiologists to initially identify calcium deposits in tissue of patients. These deposits of calcium can lead to tissue calcification in areas such as heart valves, arteries, and soft tissue leading to potentially dangerous effects if not identified. Doctors and scientists can also preserve tissue extracted from the body (in vitro) through histological techniques for further analysis to identify cell type, biomarkers, and even mineral accumulation, such as, calcium. More specifically, tissue can be stained for calcium deposits (e.g. Von Kossa, Alizarin red staining etc), imaged under the microscope and then assessed by pathologists or by scientists for research purposes. However, many of the steps in this process require manual assessment, customization, and limited quantification capabilities.

Researchers at UCI have developed a method capable of streamlining the process of analyzing histological or CT images for tissue calcification. While the upstream preparations remain the same, the downstream image processing becomes automated. Using an open source image stitching software such as Fiji software, panoramic images of the tissue cross sections can be created. The images can be characterized and processed in another computer software program, such as Matlab. Here the innovative program can record characteristics of every panoramic image such as the Red, Green, and Blue (RGB) value of every pixel and its location. Based on these parameters, the program can determine the distinguishing pixel factors between calcified and uncalcified areas and calculate a calcification ratio based on the respective pixel number. A dual color image can also be created to highlight the calcified and uncalcified tissue and visualize the regions of interest. This automated technology is a valuable tool for scientists and doctors, and provides a more quantitative assessment of calcification in cardiac tissue, in and around native and artificial heart valves

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OTHER INFORMATION

CATEGORIZED AS

- » **Imaging**
- » Medical
- » Software
- » **Medical**
- » Imaging
- » Screening
- » Software

RELATED CASES

2019-375-0

over time, and before and after medical procedures (some of which are intended to reduce calcification).

STATE OF DEVELOPMENT

Working prototype has been used to process stained pericardial tissue

RELATED MATERIALS

» [METHOD FOR IDENTIFICATION AND QUANTIFICATION OF TISSUE CALCIFICATION - 07/23/2020](#)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,328,416	05/10/2022	2019-375

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Percutaneous Heart Valve Delivery System Enabling Implanted Prosthetic Valve Fracture
- ▶ A distensible wire mesh for a cardiac sleeve
- ▶ Method to Improve the Accuracy of an Independently Acquired Flow Velocity Field Within a Chamber, Such as a Heart Chamber
- ▶ Percutaneous Heart Valve Delivery System
- ▶ Growth-Accommodating Transcatheter Pulmonary Valve System
- ▶ System for Transcatheter Grabbing and Securing the Native Mitral Valve's Leaflet to a Prosthesis
- ▶ Real-time 3D Image Processing Platform for Visualizing Blood Flow Dynamics
- ▶ Method for Synchronizing a Pulsatile Cardiac Assist Device with the Heart
- ▶ Fully Automated Multi-Organ Segmentation From Medical Imaging
- ▶ Simple, User-friendly Irrigator Device for Cleaning the Upper Aerodigestive Tract and Neighboring Areas
- ▶ Automated 3D Reconstruction of the Cardiac Chambers From MRI or Ultrasound
- ▶ Minimally Invasive Percutaneous Delivery System for a Whole-Heart Assist Device

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