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## *Abstract*

[Back to Hit List](#)

**Grant Number:** 1Z01CL000075-03

**PI Name:** SUMMERS, RONALD M.

**PI Email:**

**PI Title:** STAFF RADIOLOGIST

**Project Title:** MORPHOLOGIC CHARACTERIZATION OF CAROTID ARTERY PLAQUE USING VIRTUAL ANGIOSCOPY

**Abstract:** This project is an exploratory study of the efficacy of a new diagnostic method for evaluating the vasculature known as virtual angiography (VA). VA is performed by acquiring high-resolution images of the blood vessels of interest, using either computed tomography (CT) or magnetic resonance (MR) images. These images are used to generate a three-dimensional (3D) model of the blood vessel wall on a graphics workstation. The model can be manipulated to allow the viewer to fly through the blood vessel, providing views similar to those obtained during angiography. The technique produces a display of human arterial and venous anatomy in a readily understood format. Moreover, it may allow investigation of vascular stenosis and atherosclerotic plaques. Research in the literature suggests that plaque morphology may be an important determinant of the incidence of stroke and transient ischemic attack. Patients studied in this protocol will have known atherosclerotic plaque in the region of the carotid bulb and will have been referred for carotid endarterectomy. The surgery will be done at Georgetown University Hospital or the National Naval Medical Center, and the imaging will be done in the NIH Clinical Center Department of Radiology. The study design consists of high resolution MR scanning of the neck followed by 3D surface rendering of the carotid arteries. Plaque morphology will be compared to pathologic analysis. We anticipate that VA will yield new insights into plaque morphology. Despite collaborations with NINDS (Dr. T.J. DeGraba) to ensure increased patient accrual in the coming months, we have had difficulty recruiting patients due to the need for the patients to have MRI scans just before major surgery at another hospital. We plan to continue this study.

**Thesaurus Terms:**

angiography, atherosclerotic plaque, carotid artery, cerebrovascular disorder diagnosis, cerebrovascular visualization, computer assisted diagnosis, computer simulation, diagnosis quality /standard, disease model, dog, endotoxin, model design /development, noninvasive diagnosis, oxygen consumption, respiratory therapy, septicemia anatomy, anesthesia, blood vessel, computed axial tomography, computer processing of clinical data, image processing, magnetic resonance imaging, ultrasound scanning

catheterization, clinical research, human subject, interview, tracheotomy

**Institution:**

**Fiscal Year:** 1999

**Department:**

**Project Start:**

**Project End:**

**ICD:** CLINICAL CENTER

**IRG:** DRD

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Version 2.0



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## *Abstract*

[Back to Hit List](#)

**Grant Number:** 1Z01CL000084-01  
**PI Name:** SUMMERS, RONALD M.  
**PI Email:**  
**PI Title:** STAFF RADIOLOGIST  
**Project Title:** Diagnostic Efficacy of Virtual Bronchoscopy

**Abstract:** This project is a test of the efficacy of a new diagnostic method for imaging the airways known as virtual bronchoscopy. Virtual bronchoscopy is performed by acquiring thin-section computed tomography (CT) images of the chest. These images are used to generate a three-dimensional model of the tracheal and bronchial walls on a graphics workstation. The model can be manipulated to allow the viewer to fly-through the tracheobronchial tree providing views similar to those obtained using bronchoscopy. The technique produces a display of the human bronchial system in a readily understood format. Moreover, it allows investigation of post-stenotic portions of the bronchial tree that are beyond the reach of fiberoptic bronchoscopy. Further, virtual bronchoscopy may be used to guide interventional procedures. The patients who will be studied in this proto-col will be those having inflammatory, infectious, or neoplastic pulmonary processes who would have had chest CT for clinical reasons. These patients will be recruited from current NIH protocols. The study design consists of scanning of the thorax using thin-section heli-cal CT, followed by three-dimensional surface rendering of the airways and transfer of the digital data to videotape. In one of four parts of the protocol, the virtual bronchoscopy will be compared with results from fiberoptic bronchoscopy in a blinded study. In a second part of the protocol, the virtual bronchoscopy will be used to perform a descriptive analysis of cavity lung lesions. In the third part, the utility of virtual bronchoscopy in diagnosis of neo-plastic lesions of the chest will be studied. In the fourth part, certain technical problems in the virtual bronchoscopy procedure will be investigated. The patients will only have fiber-optic bronchoscopy for clinically indicated purposes. We anticipate that virtual bronchoscopy will be diagnostically efficacious for disorders that produce a morphologic alteration in bronchial anatomy. There have been no complications. Virtual bronchoscopy has been shown to be useful for detecting stenoses. We now have access to a CT scanner with higher Z-axis resolution and are investigating its efficacy for virtual bronchoscopy.

**Thesaurus Terms:**

bronchoscopy, computed axial tomography, computer assisted diagnosis, computer simulation, diagnosis design /evaluation, lung neoplasm, neoplasm /cancer diagnosis diagnosis quality /standard, infection, inflammation

bioimaging /biomedical imaging, clinical research, computer graphics /printing, fiber optics,  
human subject

**Institution:**

**Fiscal Year:** 1999

**Department:**

**Project Start:**

**Project End:**

**ICD:** CLINICAL CENTER

**IRG:** DRD

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