

Polarimetric Accessory for Colposcope

Summary

The National Institute of Child Health and Human Development (NICHD) seeks licensing and/or co-development of a colposcope attachment that resolves tissue borne specular flare.

NIH Reference Number

E-084-2012

Product Type

- Devices

Keywords

- Colposcopy, Tissue borne specular flare, Gandjbakhche

Collaboration Opportunity

This invention is available for licensing and co-development.

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Description of Technology

In medical diagnostic procedures for examining the cervix and the tissues of the vagina and vulva, long working-distance (-30 cm) lighted binocular microscopes (colposcope) that provide up to 25x optical magnification are used to create an illuminated magnified view. Speculum dilations can give rise to specular reflections from the tissue surface, causing physicians to overlook possible abnormalities – thus decreasing the quality of a colposcopy.

Researchers at the National Institute of Child Health and Human Development (NICHD) developed a polarimetric accessory that overcomes this limitation and enhances the visibility of subsurface structures of the scattering object. Linearly polarized light is used for cervical illumination and imaging performed through an additional polarizer that separates the specularly reflected light from the diffusely backscattered light originating in deeper tissue layers. This technology provides enhanced imaging of the hidden subsurface tissue structure (texture). The region of interest is illuminated by linearly polarized light, and backscattered light passes through the polarization filter that is detected by a digital camera. A custom optical design preserves the polarization state of

the backscattered light in the microscope, without interfering with the standard optical path and operation of the microscope – including its binocular system. Special algorithms to visualize regions of statistical similarity in the image were developed.

Though the diffusely backscattered light presents only a small fraction of the detected light, its analysis – using the customized design and image processing procedures – provides useful information about internal structures of biological tissues. The polarimetric accessory includes a linear polarizer for the illuminating beam, two beam splitters for preserving polarization state, lens system for imaging, polarization analyzer, band-pass optical filter, digital camera, and electronic triggering system.

Potential Commercial Applications

- Cancer diagnosis and detection via examination of the cervix, vagina, and vulva
- Attachment for colposcopes to resolve tissue-borne specular flare

Competitive Advantages

- Improves colposcope image quality
- Improves resolution of tissue structures at close microscope distances
- Ability to penetrate a growing market limited to date by technical inadequacies
- Ability to penetrate a large patient pool with increasing activities of healthcare organizations

Inventor(s)

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Development Stage

- Clinical

Publications

Jacques SL, et al. Imaging superficial tissues with polarized light. [[PMID 10685085](#)]

Jacques SL, et al. Imaging skin pathology with polarized light. [[PMID 12175282](#)]

Ramella-Roman JC, et al. Design, testing, and clinical studies of a handheld polarized light camera. [[PMID 15568952](#)]

Sviridov AP, et al. Analysis of Biological Tissue Textures Using Measurements of Backscattered Polarized Light. [[PMID 17212522](#)]

Patent Status

- **U.S. Provisional:** U.S. Provisional Patent Application Number 61/620,295 , Filed 04 Apr 2012
- **U.S. Patent Filed:** U.S. Patent Application Number PCT/US2013/035223 , Filed 04 Apr 2013
- **Foreign Filed:** European - Patent Application 2833777, Filed 04 Apr 2013

- **U.S. Patent Filed:** U.S. Patent Application Number 9,801,536 , Filed 02 Oct 2014
- **Foreign Filed:** German - Patent Application 13772208.8 , Filed 04 Apr 2013
- **Foreign Filed:** French - Patent Application 13772208.8 , Filed 04 Apr 2013
- **Foreign Filed:** Great Britain - Patent Application 13772208.8 , Filed 04 Apr 2013

Therapeutic Area

- Cancer/Neoplasm

Updated

Wednesday, January 25, 2023

Source URL:<https://techtransfer.cancer.gov/availabletechnologies/e-084-2012>