



US005394199A

# United States Patent [19]

[11] **Patent Number:** 5,394,199

Flower

[45] **Date of Patent:** Feb. 28, 1995

- [54] **METHODS AND APPARATUS FOR IMPROVED VISUALIZATION OF CHOROIDAL BLOOD FLOW AND ABERRANT VASCULAR STRUCTURES IN THE EYE USING FLUORESCENT DYE ANGIOGRAPHY**
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- [73] Assignee: **The Johns Hopkins University**, Baltimore, Md.
- [21] Appl. No.: **63,343**
- [22] Filed: **May 17, 1993**
- [51] Int. Cl.<sup>6</sup> ..... **A61B 3/12**; A61B 3/14; A61B 5/02
- [52] U.S. Cl. .... **351/206**; 351/205; 351/215; 351/221; 128/633; 128/666; 128/691; 128/745
- [58] **Field of Search** ..... 351/200, 205, 211, 216, 351/221, 245, 206, 215; 128/664, 665, 666, 691, 745, 633; 606/4

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### [57] ABSTRACT

A method for visualizing the choriocapillaris of the eye in a sequence of ICG angiographic images comprising subtracting each image in the angiographic sequence from a succeeding image. In practice, a modified fundus camera is used to provide digitized images which are subtracted pixel by pixel. To better visualize aberrant vascular structures such as choroidal neovascularization (CNV), a fundus camera is modified with a polarizing filter in front of the light source and an analyzing polarizer in front of the video camera. This results in the suppression of unwanted scattered fluorescence to the extent that the CNV can be better visualized. To assist the surgeon in treating aberrant vascular structures with laser photocoagulation therapy, a fundus camera is provided with two light sources and two barrier filters operating synchronously to produce and pass two different fluorescences thereby generating precisely superimposable angiographs to aid in aiming the laser.

30 Claims, 7 Drawing Sheets

- [56] **References Cited**
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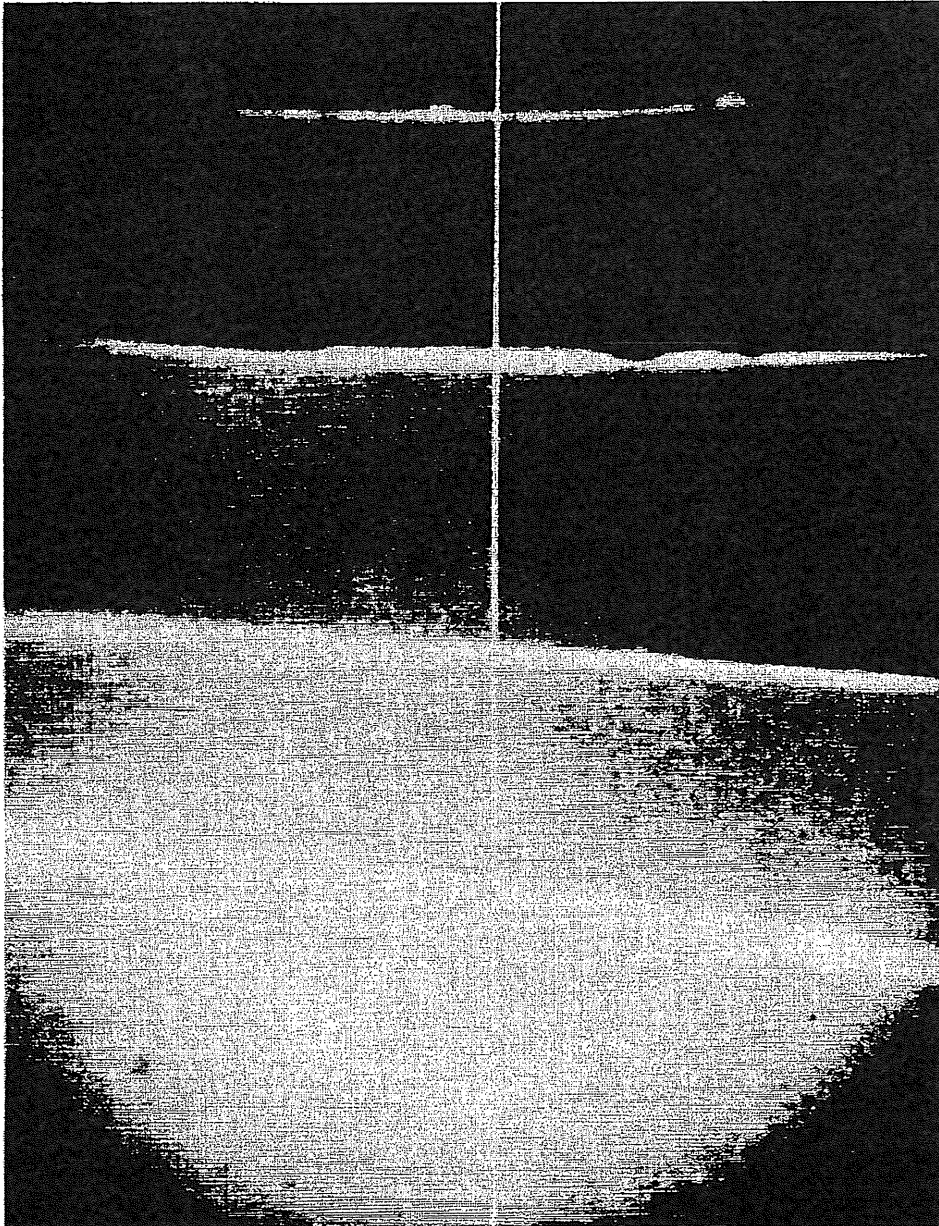


FIG. 1A

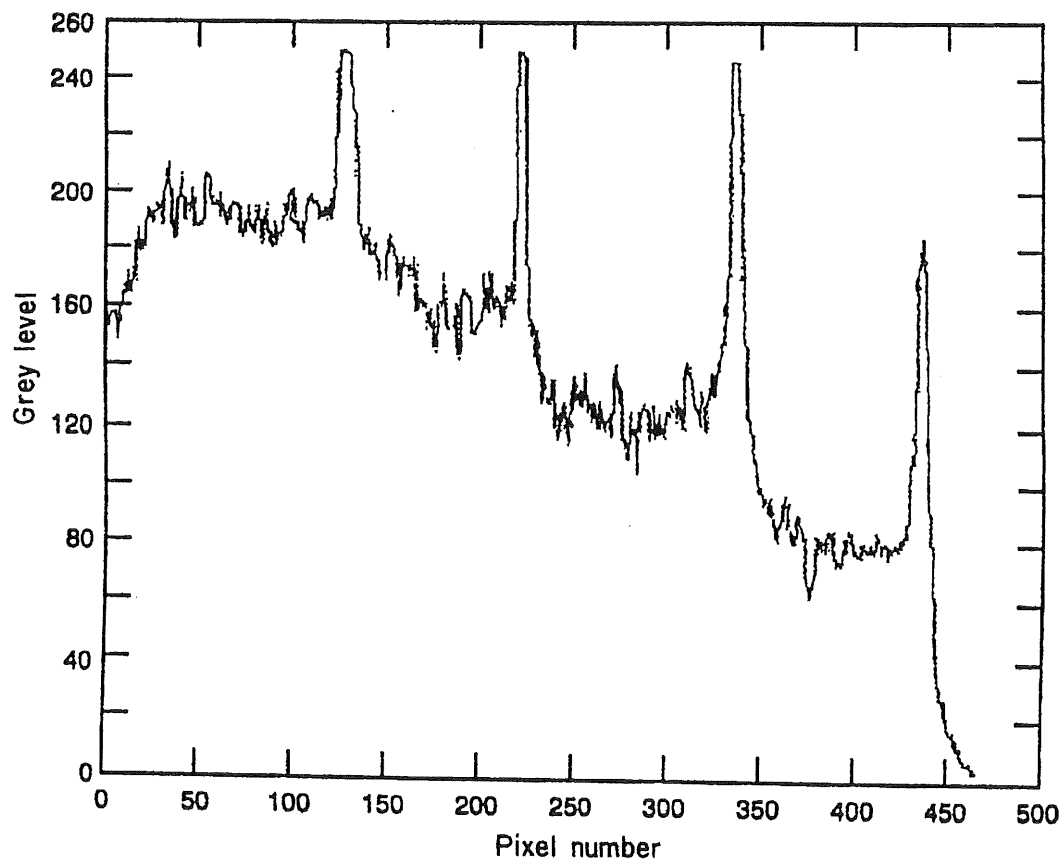


Fig. 1B

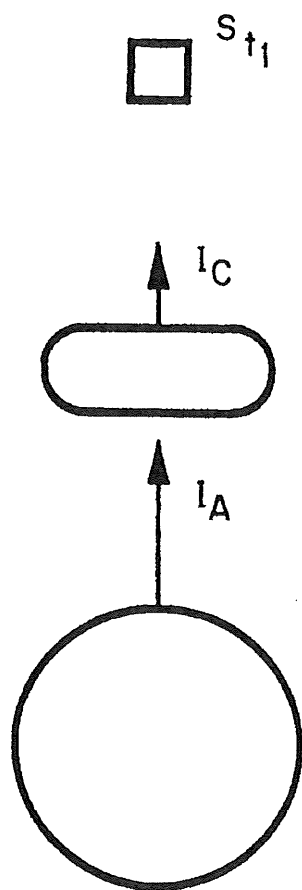


Fig. 2A

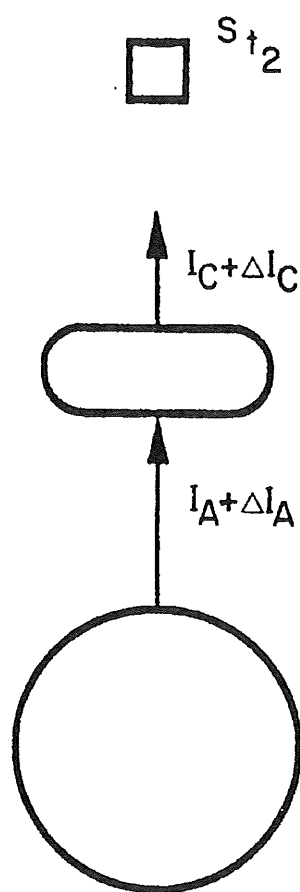


Fig. 2B

FIG. 3B

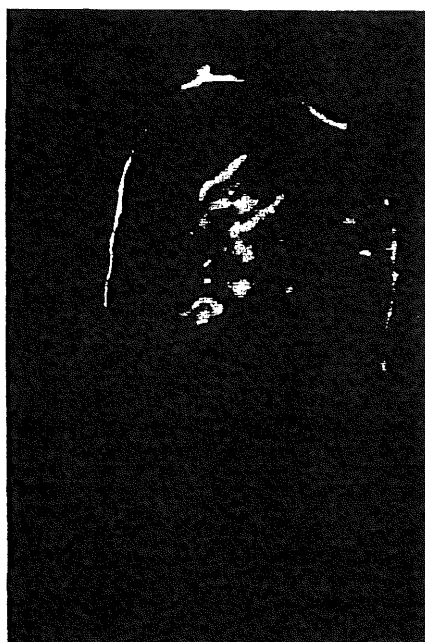


FIG. 3D

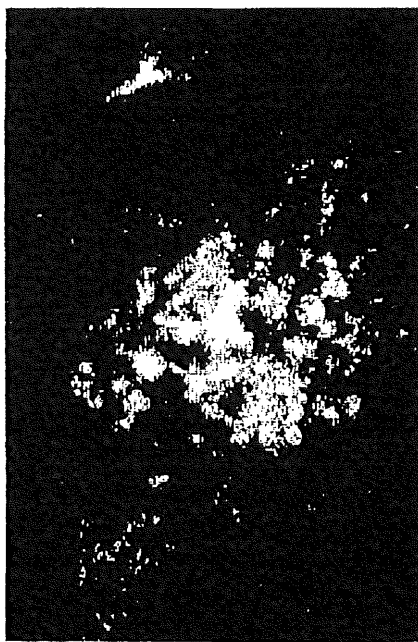


FIG. 3A

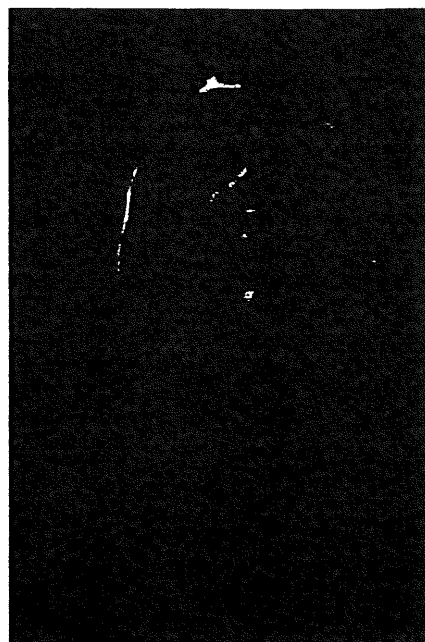
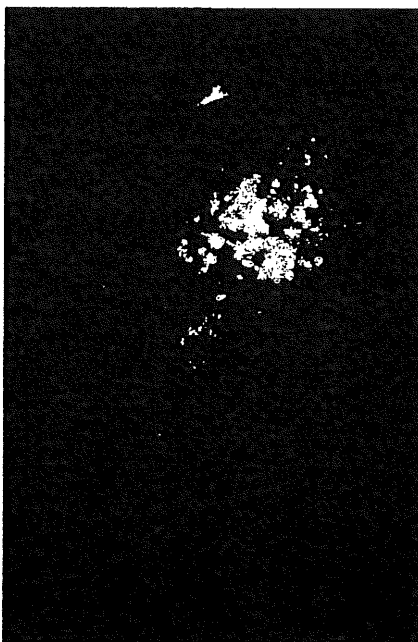


FIG. 3C





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