The Thirty-Minute Fluorescein Angiogram

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The need for rapid results of fluorescein angiograms prompted us to set up our own darkroom. Previous experimentation with other processing methods used for other photographic purposes inspired me to utilize some little known but commercially available chemicals to process the angiograms more rapidly. If you do not already have a darkroom, the investment is less than a thousand dollars for equipment including shelving and tables.

There are a number of advantages to having your own darkroom. Foremost, of course, is fast results for diagnosis and treatment. The quality of negatives, contact prints, and enlargements can better be judged and processed by someone working closely with the doctor, something a commercial photo lab can not do. Enlargements can be made in a minute. Even though our small town, rural area, private practice averages only twenty angiograms a month, it took little time for the investment to be amortized and recovered. Commercial photo labs' special handling charges are skyrocketing. Last, but not least, processing is easy.

Assuming you already have a darkroom set up and are now processing angiograms, the only additional equipment necessary is a stabilization print processor (spiratone print-all) an electric film dryer, and polycontrast filters, if you don't already have them.

The expendable materials which I use that might differ from the conventional materials you use are listed in Fig. 1.

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Fig. 1:

Acufine Developer

Acufine Replenisher

Kodak Indicator Stop Bath

Kodak Rapid Fixer

Kodak Hypo Clearing Agent

Kodak Ektamatic

Kodak Ektamatic "30" Stabilizer

The Process

My choice of the chemicals and equipment was primarily to reduce time in processing and to maintain and improve image quality. The only sacrifice made by utilizing this method, is the wasted time that occurs with conventional methods.

Conventional processing of angiograms using Kodak Tri-X or Ilford HP-5 film is by push processing (extended time in the developer, or higher temperature) to increase the film sensitivity or existing image. Sacrifices are made by this method in image quality, contrast and grain structure (clumping). Time required is a minimum of eleven minutes in Kodak D-76 with continuous agitation of 68°F (20°C). The camera I use is a Kowa RC-W with a P.U. 300 F power supply. Fluorescein angiographies are done with the flash intensity set at 300 watts and diaphragm up using Kodak Tri-X film, BP-B-45 exciter filter, and W-15 barrier filter.

Acufine developer increases the ASA. rating of Tri-X and HP 5 from 400 up to 1600 depending on time and temperature while maintaining resolution, grain structure (little clumping), and contrast. Development is a minimum of 4 min at 68°F (20°C) with intermittent agitation. Contrast can be increased by slightly increasing time. My chemicals remain at 70°F so my developing time is 5 min. Figure 2 gives the time for different temperatures for 35 mm films.

I use Kodak indicator stop bath for convenience as a purplish coloration indicates exhaustion of the solution. Kodak rapid fixer requires only 2-4 min. A quick rinse in water and 2-3 min in Kodak hypo clearing agent reduces the washing time to 5 min.

I continuously dump out the water so as to eliminate more rapidly as much of the residue as possible. Increasing the temperatures of the solutions will decrease the processing time. After a complete wash, shake out the excess water and pour in Yankee instant film dryer. This, along with the electric film dryer reduces drying time to 5 min.

Contact printing on Kodak Ektamatic SC-F paper allows use of the more rapid stabilization printer instead of the time consuming tray development.

I've found that contrast, using the stabilization printer, is about one grade lower than tray development. I use a #4 polycontrast filter instead of a #3 to increase contrast. Exposure...
must be increased either in time or aperture to compensate for the greater density of the filter. I use a Besseler 23 cll enlarger to expose the contact print (15 sec at f 5.6). If more contrast is desired, the polychromat filters can be combined to get greater than #4. (# 4 + #2 = # 6) Exposure will have to be increased by one aperture per contrast guide.

The exposed print takes only 20 sec in the stabilization processor and can then be handed to the doctor while slightly damp. Follow manufacturers’ directions for using the processor. The chemicals used for stabilization are strong and I recommend placing them on a paper towel for the doctor to handle as well as yourself. Total time is less than 30 min.

**Conclusion**

As is readily apparent, rapid processing of a fluorescein angiography is within the means of large or small practices, clinics, or hospital without extraordinary equipment. Materials and equipment are inexpensive: Only a minimum of space is required for a basic darkroom. Processing is a very simple procedure.

**References**

1. Kodak Professional Black and White Films (F-5).
2. Ilford, Ins. West 70 Century Road, Paramus, NJ 07652.
3. Kodak Black and White Darkroom Dataguide (R-201).
5. Stabilization with Kodak Ektamatic Products (G25).
8. Kodak Black and White Photographing Papers (0-1).