

**Charles A Mistretta PhD**

**Digital Subtraction Angiography**

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State of the Art Neuro-angiography Suite 1972



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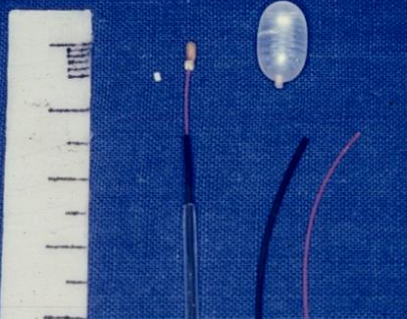
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In 1980 only device capable of accessing the intracranial arteries



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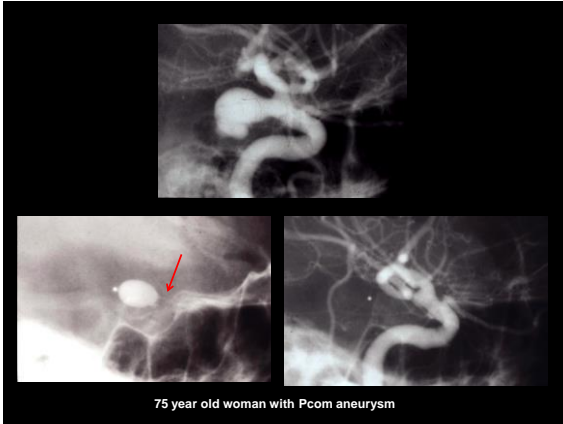
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**NOTES**

The Silicon Storage Tube:  
A New Method of Image Storage  
in Fluoroscopy

CHARLES A. MISTRETTA, PhD  
MICHAEL G. ORT, MS  
JOHN R. CAMERON, PhD  
PAUL R. MORAN, PhD

Investigative Radiology May-June 1972

The simplest mode of operation uses only the conventional footswitch. Pressing this switch turns on the x-rays for fluoroscopy in the usual manner and initiates an erase cycle on the storage tube. When the footswitch is released, a write cycle is initiated while the x-rays are held on for just long enough (about 10 milliseconds) to write one TV frame on the storage tube. This image is then continuously displayed while the x-rays are off.

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Why this was important

It allowed the user to examine details of a region of interest without continued x-ray exposure. Analogous today to the application called "last image hold".

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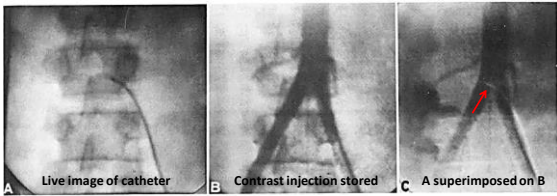
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### An Inexpensive Storage System for Selective Catheterization Procedures<sup>1</sup>

Andrew B. Crummy, M.D., Charles A. Mistretta, Ph.D.,<sup>2</sup>  
Ross Cline, M.D., Ward Terry, M.D., Michael G. Ort, M.S.,  
Fred Kelcz, M.S., and John R. Cameron, Ph.D.

It takes less exposure time to store an image which can then be studied without fluoroscopic exposure than it does to

Radiology 1974;110:369-372



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Why this was important

Added a dynamic component to the storage tube capability. Further reduced the radiation exposure required by simplifying the location and catheterization of arteries.

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START OF A NEW ERA !

# INVENTION OF DSA

Kruger RA, Mistretta CA, Lancaster J. et al: A digital video image processor for real time X-ray subtraction imaging Optic Eng 17: 652-657:1978

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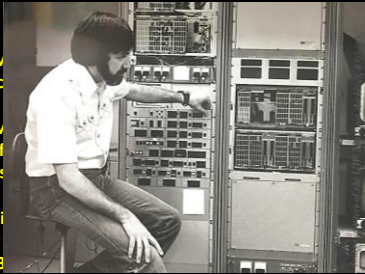
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# INVENTION OF DSA

Kruger RA, Mistretta CA, Lancaster J. et al: A digital video image processor for real time X-ray subtraction imaging Optic Eng 17: 652-657:1978



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Chuck with the DVIP UW 1980

Kruger RA, Mistretta CA, Lancaster J. et al: A digital video image processor for real time X-ray subtraction imaging Optic Eng 17: 652-657:1978

Ergun DL, Mistretta CA, Lancaster J. et al: A digital video image processor for real time X-ray subtraction imaging Radiology 136: 103-107:1978

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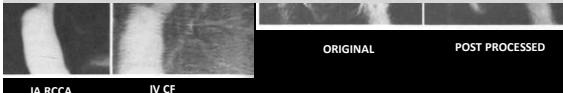
## Clinical Applications of Computerized Fluoroscopy

The Extracranial Carotid Arteries<sup>1</sup>

Charles M. Strother, M.D., Joseph F. Sackett, M.D., Andrew B. Crummy, M.D., Finn G. Lilleas, M.D., William J. Zwiebel, M.D., William D. Turnipseed, M.D., Manucher Javid, M.D., Charles A. Mistretta, Ph.D., Robert A. Kruger, Ph.D., David L. Ergun, M.S., and Chong G. Shaw, M.S.

Radiology 1980;136:781-783

A 1/15th-second mask was obtained 4–5 seconds after the start of the injection; then, as the carotid arteries began to opacify, a series of 1/15-second exposures was used to provide 10-bit subtraction images at a rate of one every 1.5 seconds, which in our experience is near the minimum needed to ensure imaging of the carotid artery at near-maximal opacification during passage of the contrast bolus. Using this technique, it is possible to obtain 3 or 4 separate projections during an examination.



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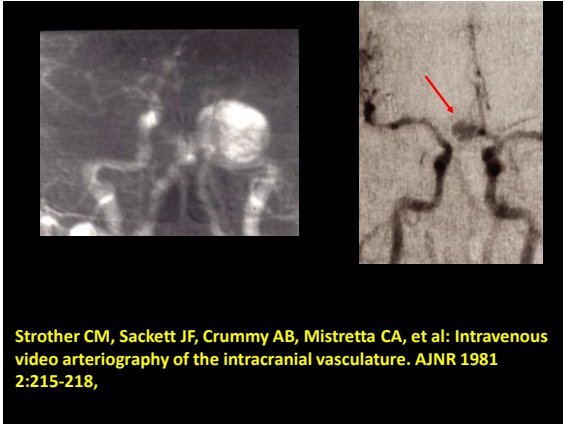
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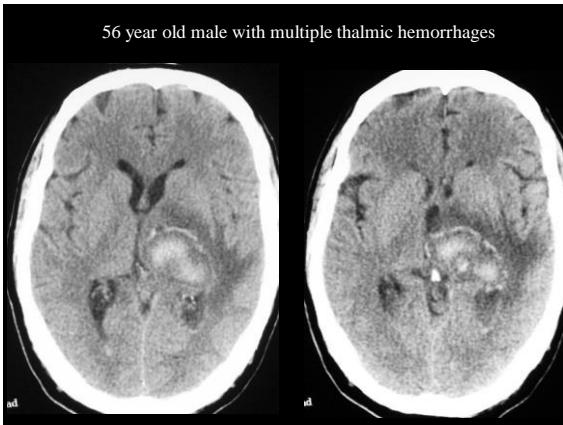
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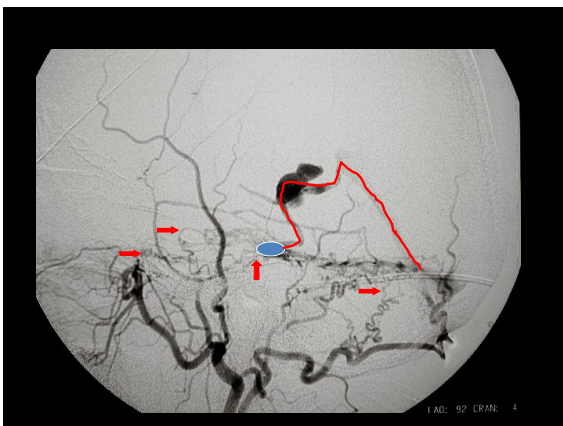
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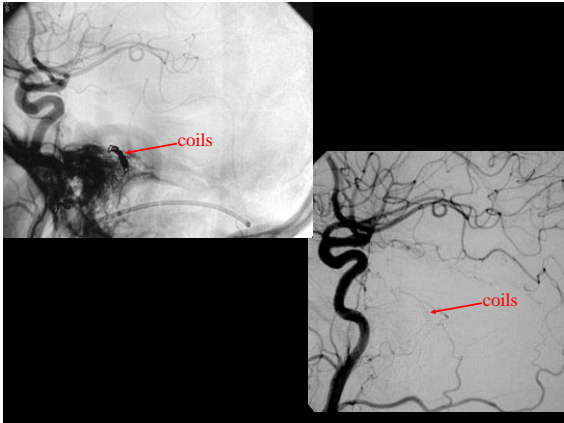
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### Why this was a quantum advance

- It allowed visualization of vasculature in real time without it being obscured by bone. The capability for a user to “see”, was the advance that enabled the development of endovascular therapies.
- The platform and concepts of DVIP 1 were used by Chuck and his team, along with other researchers worldwide, to produced derivatives and improvements that are the basis of angiography systems today.

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After commercialization of DSA at the 1980 RSNA Chuck and his team continued to make fundamental contributions to the further development of the technique. As MRI became available he became enamored with the unexplored possibilities of using this new modality for diagnostic studies. He began early research in MR publishing his first paper in 1992. Dr. Grist will give the details of his many contributions to MR imaging.

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### THE ANGIO SUITE TODAY



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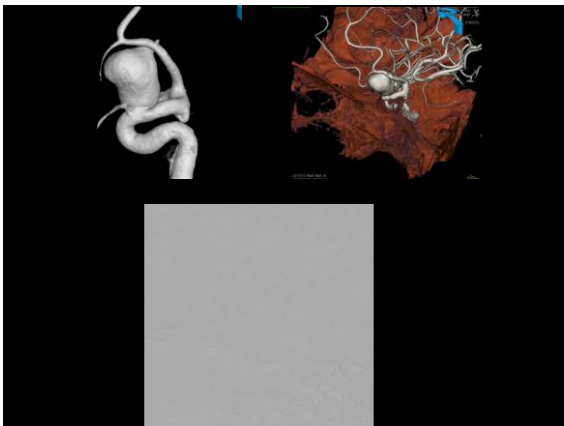
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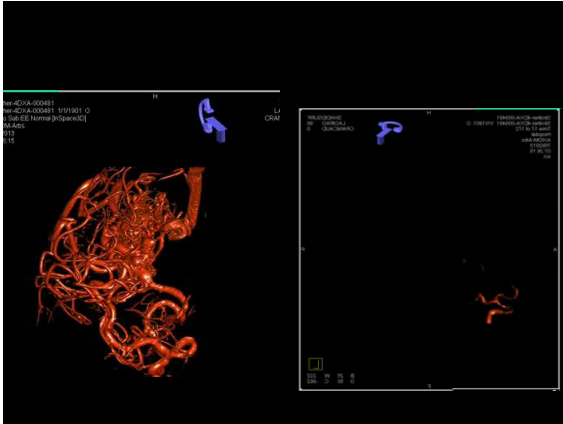
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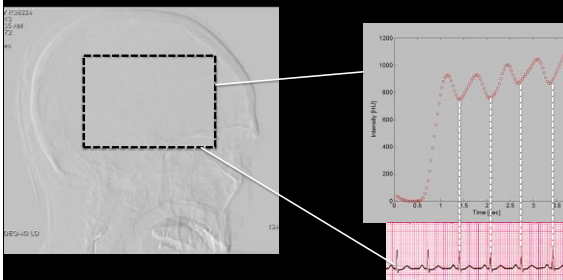
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**AS A BOLUS PASSES DOWNSTREAM THE RATIO BETWEEN THE CONTRAST BLOOD MIXTURE AND NON-OPACIFIED BLOOD OSCILLATES DURING EVERY CARDIAC CYCLE. THIS IS SEEN IN THE TCCs AS PULSATILITY WAVEFORMS**



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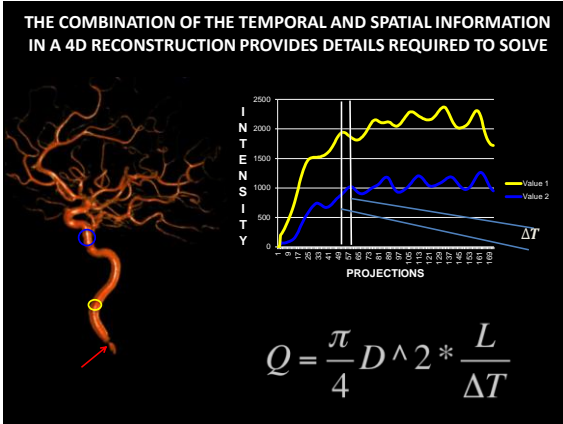
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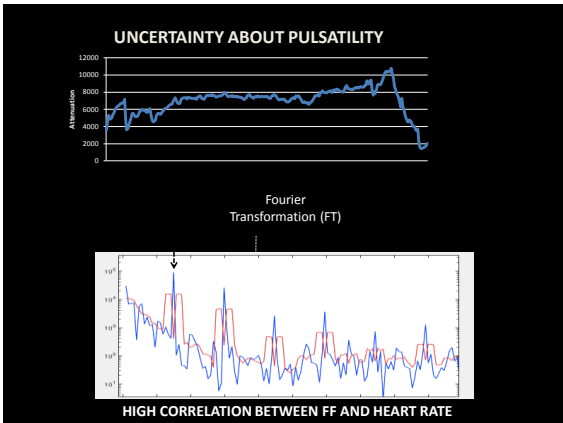
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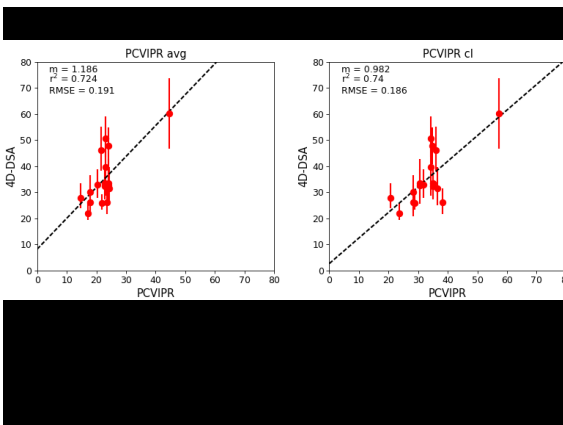
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**DSA was an invention that made it possible to  
diagnose and treat vascular diseases of  
all organs in ways that could not be  
imagined prior to its availability.**

**It stands as the gold standard against which all other  
forms of angiography are measured.**

**From me, your colleagues at UW, physicians worldwide and,  
of most importance, the countless numbers of patients who  
have benefited from DSA, THANK YOU Dr. Mistretta.**

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