# Endovascular Revascularization Devices

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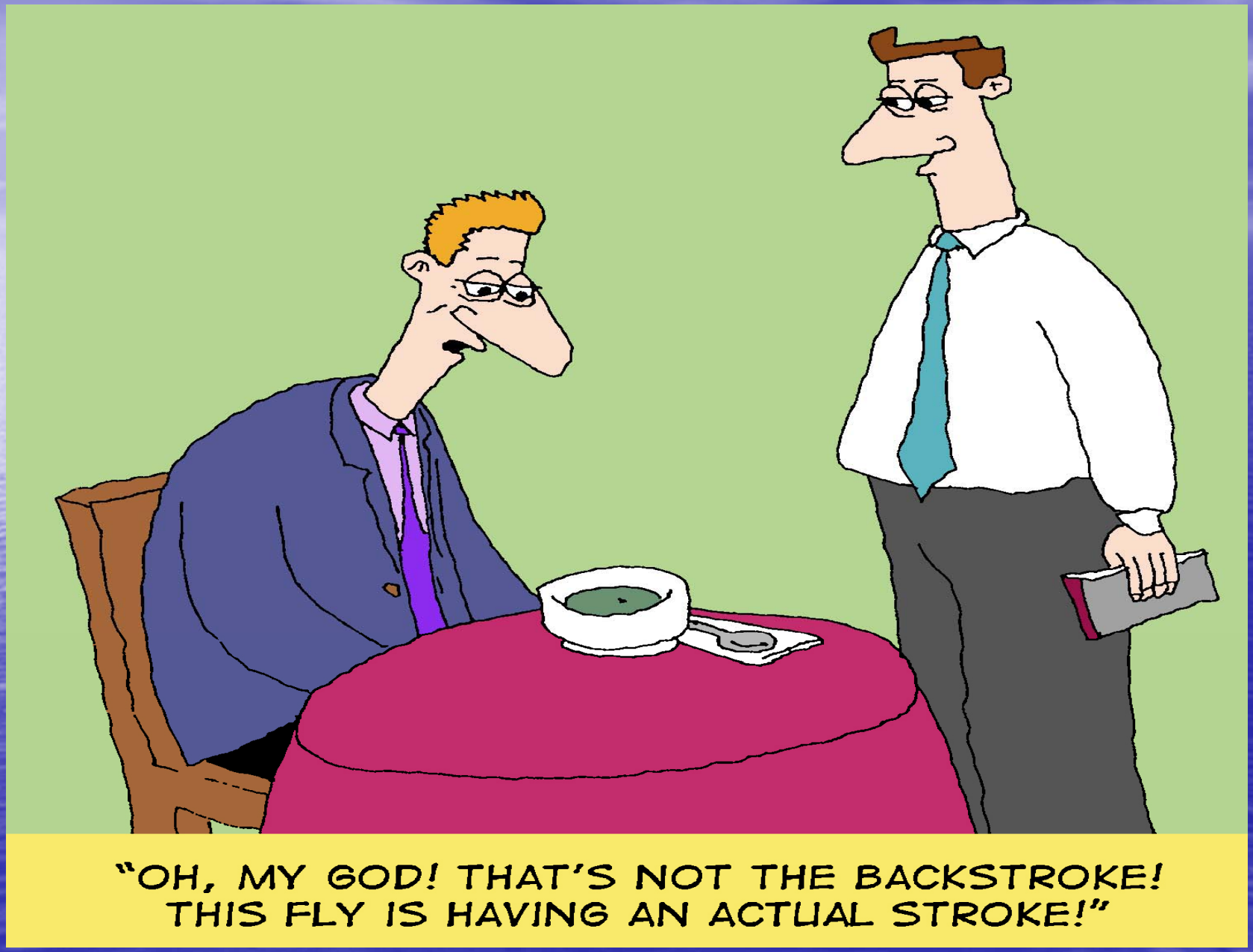
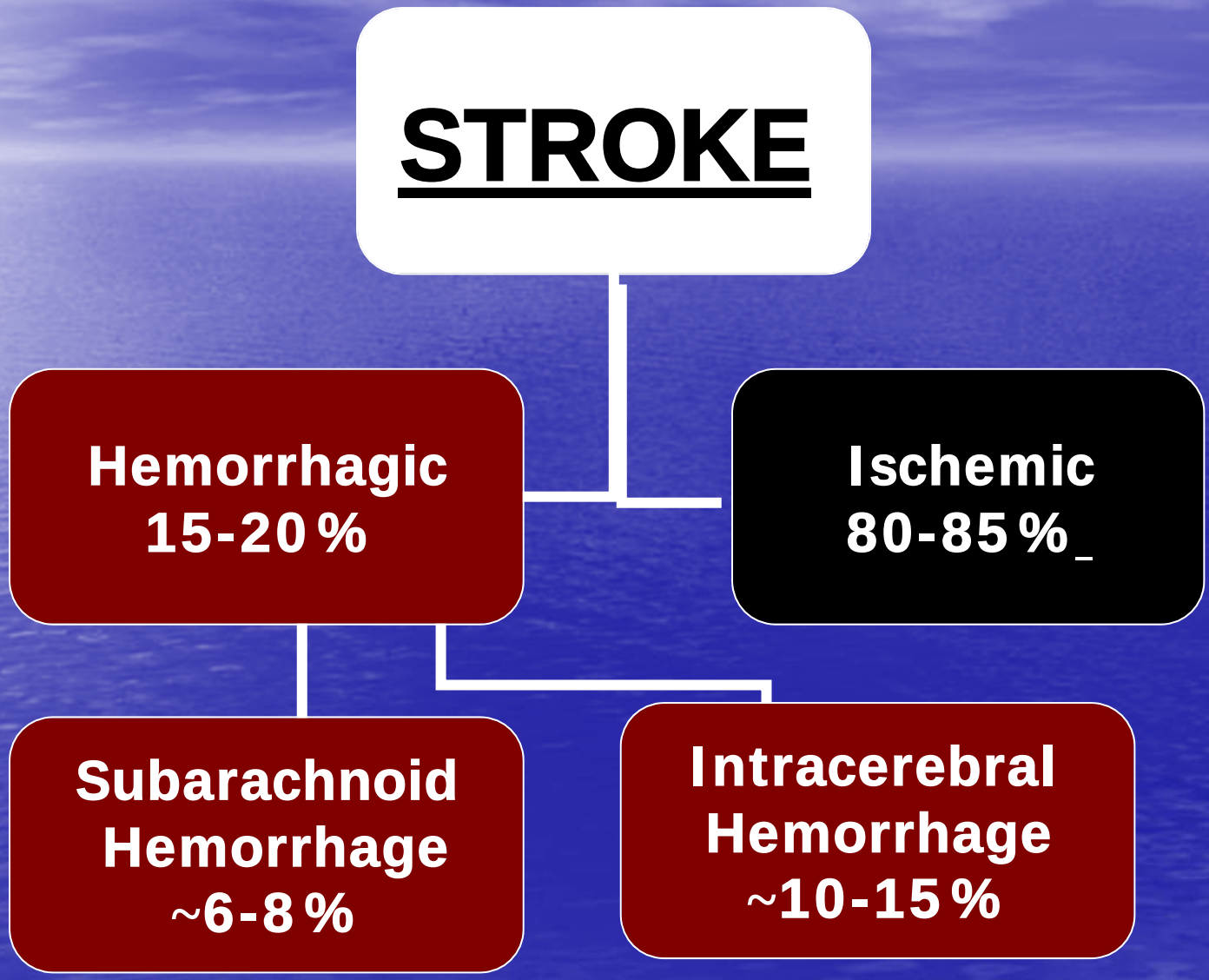
# Objectives

- Identify the different causes of ischemic strokes
- Know what is Interventional Neuroradiology
- Be familiar with the latest advancements in endovascular devices for the treatment of ischemic stroke
- Understand that there are possible device associated complications


"OH, MY GOD! THAT'S NOT THE BACKSTROKE!
THIS FLY IS HAVING AN ACTUAL STROKE!"

# Types of Strokes



# Ischemic stroke: Classification
## (Based on the Trial of Org 10172 in Acute Stroke Treatment (TOAST criteria))

- **Large artery atherosclerosis**– infarction in the perfution territory of an extracranial or intracranial artery within >50% stenosis, and no other likely cause of stroke
- **Cardioembolism** – infarction in the presence of at least 1 cardiac condition strongly associated with stroke, such as atrial fibrillation
- **Stroke of other determined etiology**– cerebral infarction caused by vasculitis, arterial dissection, and hypercoagulable states
- **Stroke of undetermined etiology** – infarction in the setting of 2 or more different potential etiologies, no potential etiology despite complete diagnostic evaluation, or an incomplete evaluation

# Neurological Interventional Radiology (NIR or Neuro IR or INR)

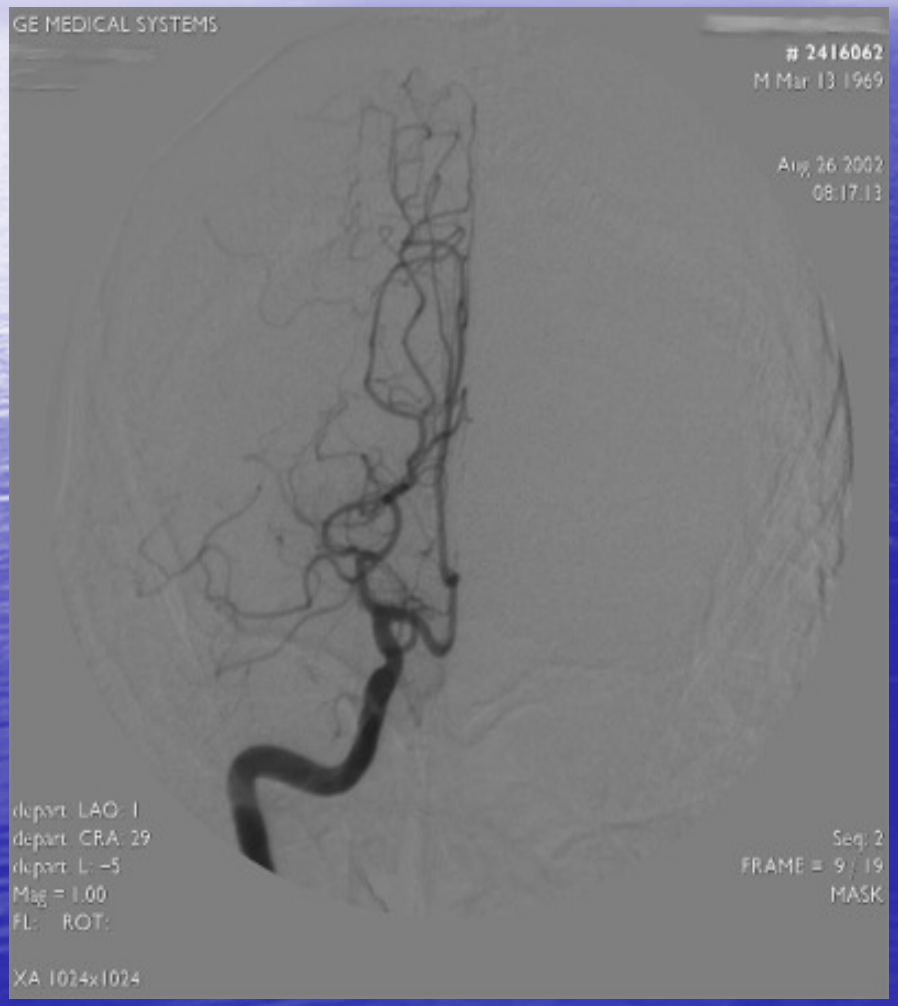
- Endovascular treatment is a medical imaging technique used to visualize the inside of blood vessels of the body. This is done by injecting a radio-opaque contrast agent into the blood vessel and imaging using X-ray based techniques such as fluoroscopy.

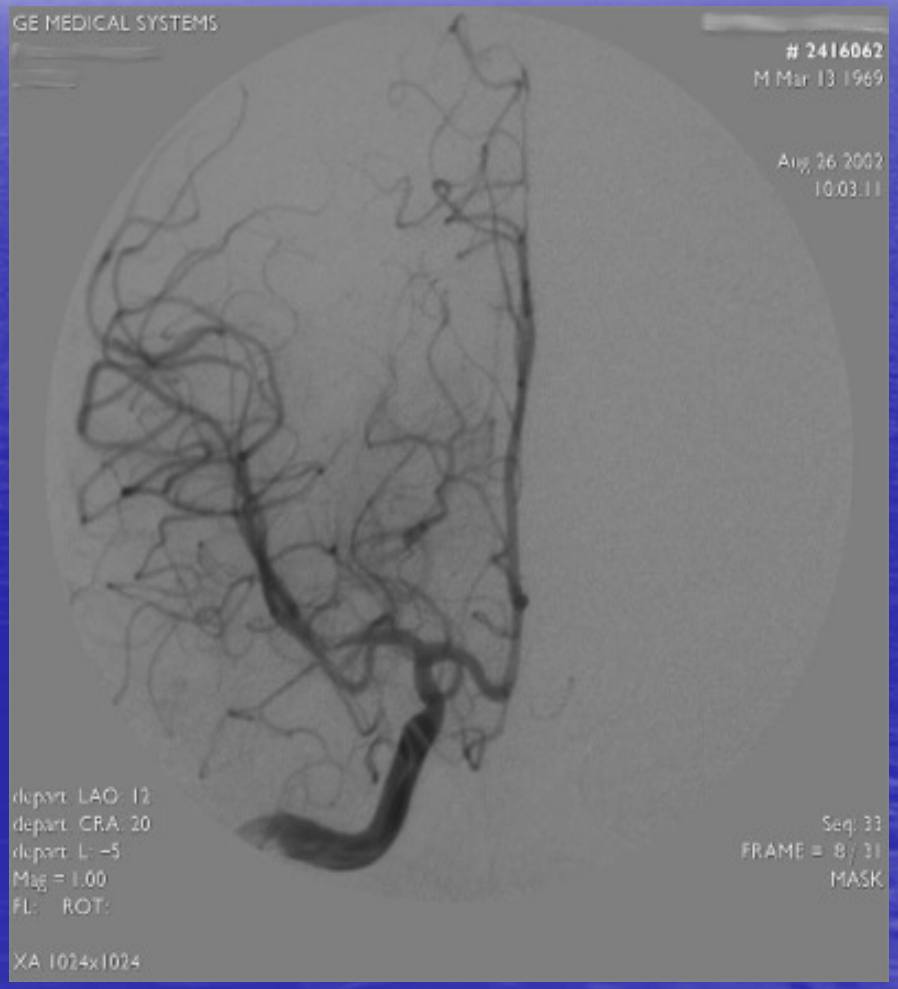
# Intra-Arterial tissue Plasminogen Activator (tPA)

- Available in neurointerventional radiology and pharmacy
- Reconstituted by radiology RN
- Administered by Neurointerventional Radiologist
- tPA used intra-arterially can be more effective than IV tPA in its ability to recanalize major intracranial arterial occlusions
- Intra-arterial tPA can be administered up to 6 - 12 hours as per the operating physician
- Complications with IA tPA?

**RWC Kaiser Policies and Procedures - INR-Medication Preparation-Intra Arterial (IA) Tissue Plasminogen Activator (tPA) Management for Acute Ischemic Stroke INS.09.06**

# The right middle cerebral artery before and after IA tPA

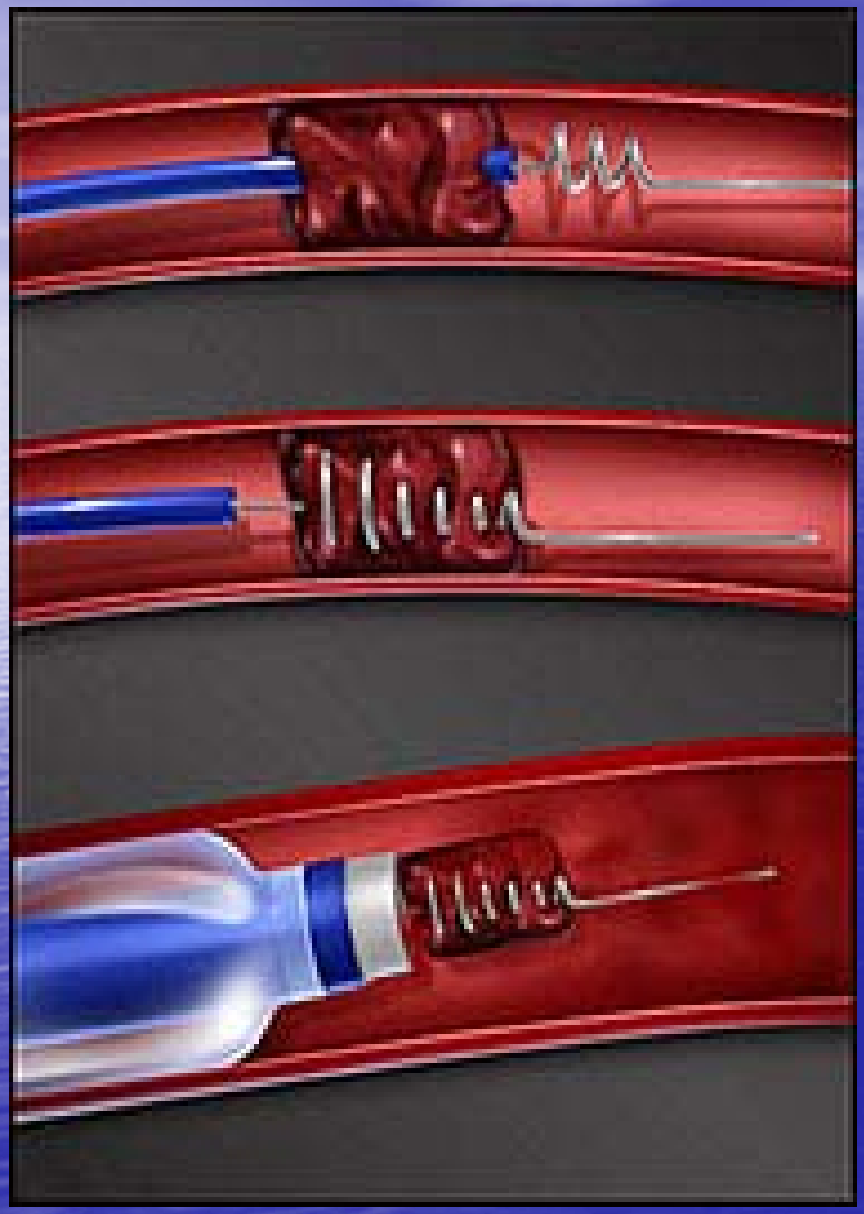


# Merci Retriever System

- Corkscrew-shaped products designed to remove blood clots from large vessels within the neurovasculature
- Use for patients presenting within 8 hours of stroke symptom onset
- There are currently ten Merci Retrievers available to match vessel size
- The Merci Retriever was first cleared for human use in 2004 by the FDA
- Since 2004, the Merci Retriever has been used in more than 14,000+ patients throughout the world including the United States, Europe, Australia, Singapore and Canada.
- Complications with the Merci Retriever System?

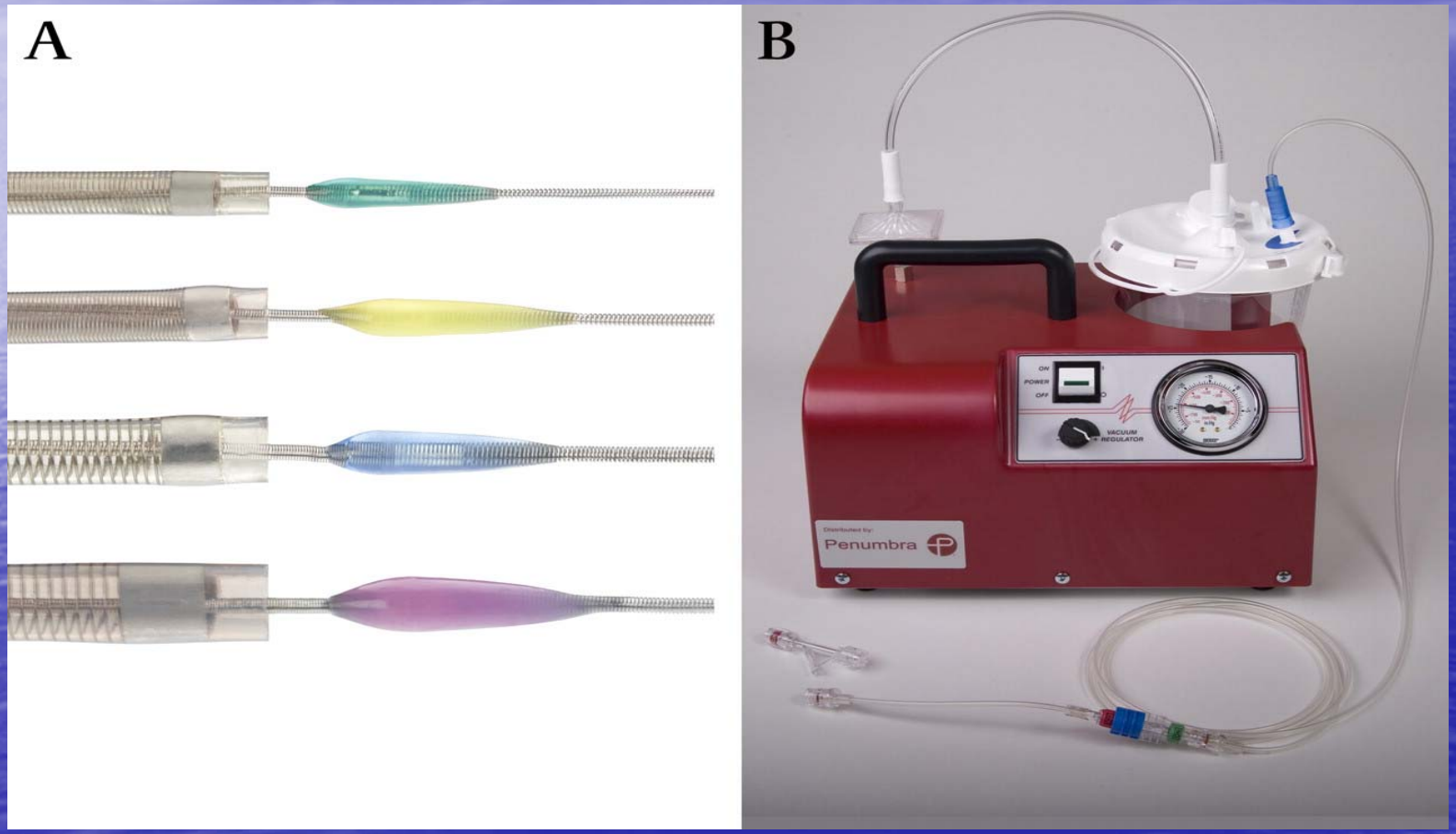
http://www.concentric-medical.com/merci-retriever



# Penumbra System

- Indicated for use within 8 hours of stroke symptom onset
- FDA approved in 1/2008
- Uses a reperfusion catheter in parallel with a separator component and an aspiration source to achieve separation of the thrombus and subsequent aspiration of the occlusion from the vessel
- Complications with the Penumbra System

# Penumbra System



# Solitaire Flow Restoration Device

- Approved by the FDA in March 2012
- Made by Covidien
- A self-expanding, stent-like design, and once inserted into a blocked artery using a thin catheter tube, it compresses and traps the clot. The clot is then removed by withdrawing the device, reopening the blocked blood vessel.
- Complications with the Solitaire?

# SWIFT (SOLITAIRE™ FR. With the Intention for Thrombectomy) Trial

- Covidien sponsored the SWIFT trial comparing the Solitaire vs. Merci Retriever
- The trial enrolled 113 stroke patients at 18 hospitals in the United States between February 2010 and February 2011.
- The patients were randomly assigned to undergo clot removal with either the Solitaire Flow Restoration device or the Merci Retriever within 8 hours of stroke onset.

| Outcomes | Solitaire (n=58) | Merci (n=53) | *P* value |
|---|---|---|---|
| Recanalization with no symptomatic ICH | 68.5% | 24.1% | <0.0001 |
| Good neurological outcome at 90 days | 58.2% | 33.3% | 0.0001 |
| Use of rescue therapy | 20.7% | 43.6% | <0.0001 |
| Mortality at 90 days | 1.7% | 38.2% | 0.0001 |
| Symptomatic ICH | 1.7% | 10.9% | <.0001 |
| Any ICH | 17.2% | 38.2% | 0.0001 |
| Device-related serious adverse events | 8.6% | 16.4% | 0.26 |
| Procedure-related serious adverse events | 13.8% | 16.4% | 0.80 |
| Device fracture | 3.4% | 0 | 0.50 |

# Trevo Pro

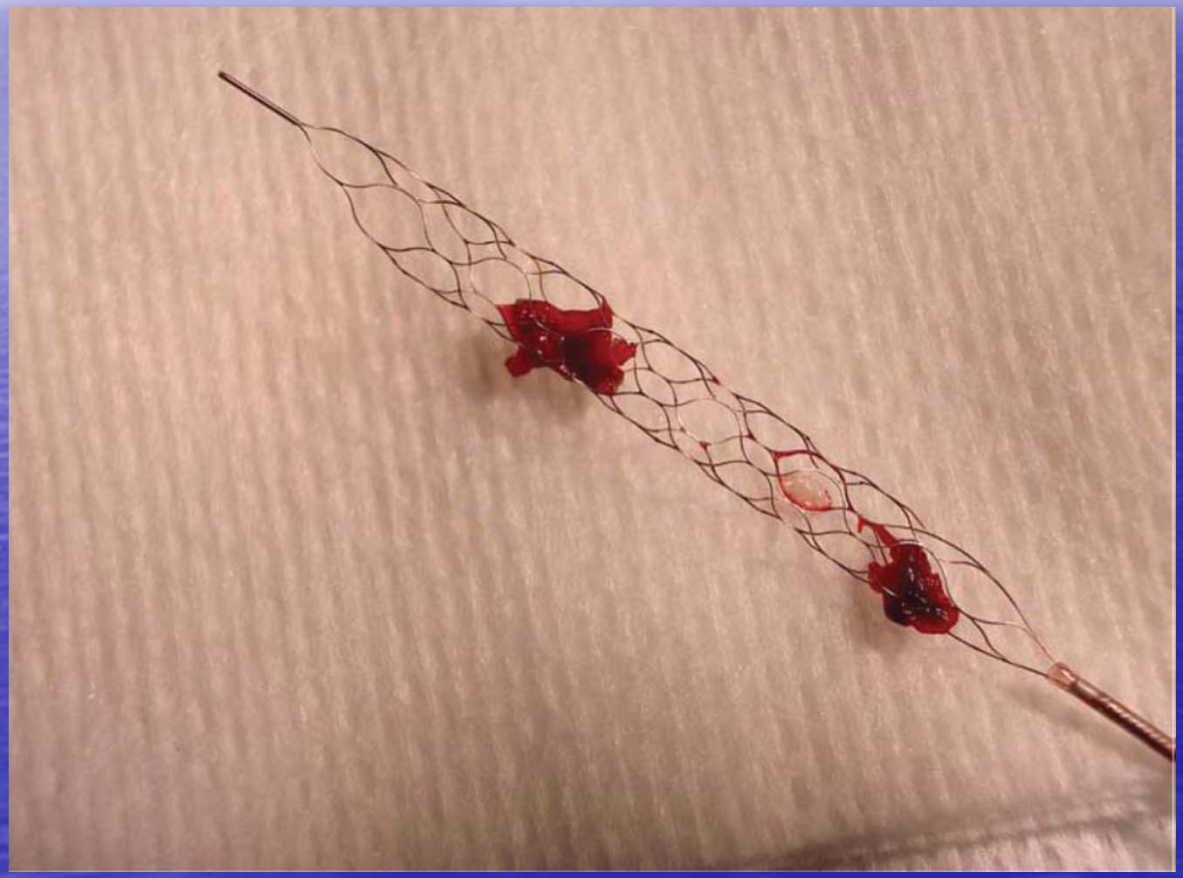
- FDA approved in early 8/2012
- Made by Concentric Medical which made the Merci Retriever. This company has now been acquired by Stryker.
- Trevo 2 trial randomized 178 individuals following an acute ischemic stroke to treatment with either the Trevo Pro or the Merci Retriever
- Complications with the Trevo Pro?

# Trevo 2 trial Results

| | Trevo | Merci |
|---|---|---|
| Number of patients | 76 | 54 |
| Revascularization rate | 86.4% | 60% |
| Patient with mRS of ≤ 2 | 40% | 21.8% |

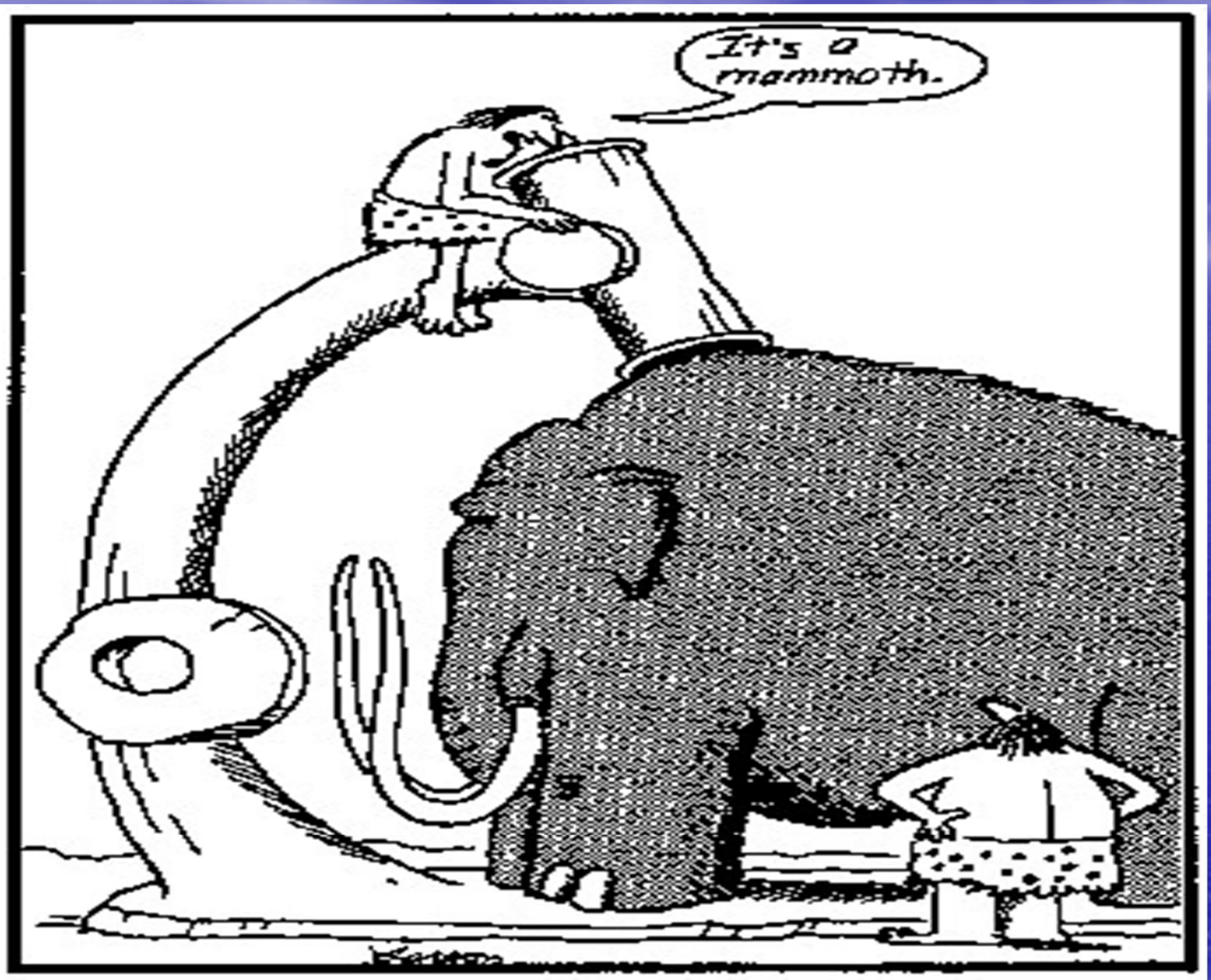
- Other measures of performance also strongly favored the Trevo Pro Retriever, including improvement in the National Institutes of Health Stroke Scale (NIHSS) and shorter hospital stays.

# End Result with Trevo Pro



# Conclusion

Previously doctors had limited treatment options with acute ischemic stroke if patients were beyond the three-hour window. Now with revolutionary advancements in technology, there are a number of endovascular devices for revascularization of occluded vessels. However, all revascularization devices are limited by the experience of the operator and the quality of the equipment used.




Early microscope

# Questions ?