


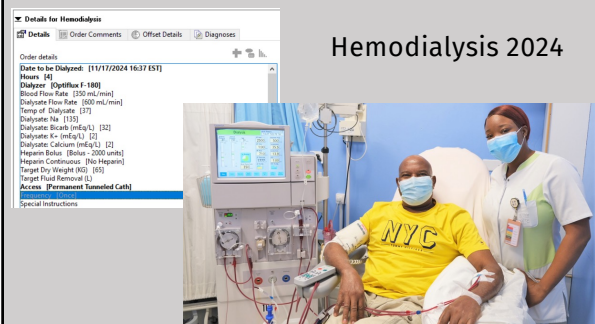
**Willem J. "Pim" Kolff**  
 February 14, 1911 – February 11, 2009



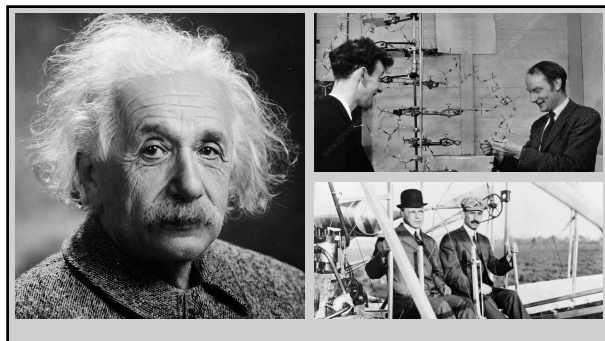
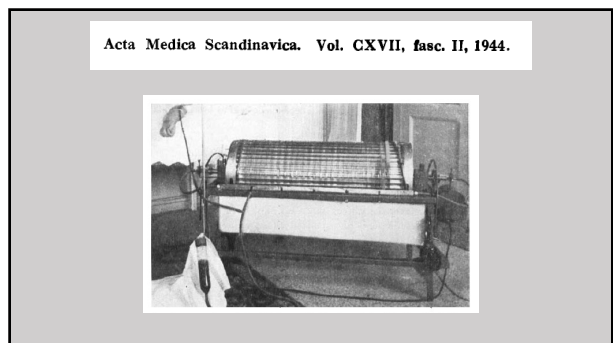
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NO DISCLOSURES

**Hemodialysis 2024**



The image shows a screenshot of a medical order form for hemodialysis on the left and a photograph of a patient on a dialysis machine on the right. The patient is wearing a yellow shirt with 'NYC' on it and is being attended to by a nurse. The order form includes details such as 'Date to be Dialyzed: 11/17/2024 16:37 (EST)', 'Dialyzer: Optiflux F-180', and 'Access: Permanent Tunneled Cath'.

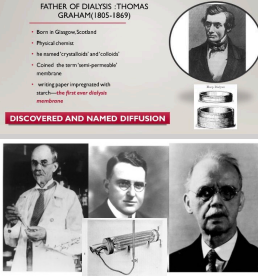


**Dialysis: Laying the Groundwork**

**FATHER OF DIALYSIS THOMAS GRAHAM (1805-1869)**

- Born in Glasgow, Scotland
- Physical chemist
- Isolated crystalline and colloidal solutions
- Coined the term 'semipermeable membrane'
- Writing paper impregnated with starch—the first ever dialysis membrane!

**DISCOVERED AND NAMED DIFFUSION**

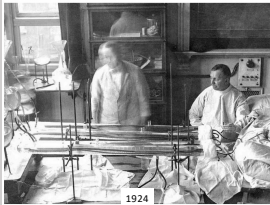


Below the text are several portraits of scientists, including Thomas Graham and others involved in the early development of dialysis.

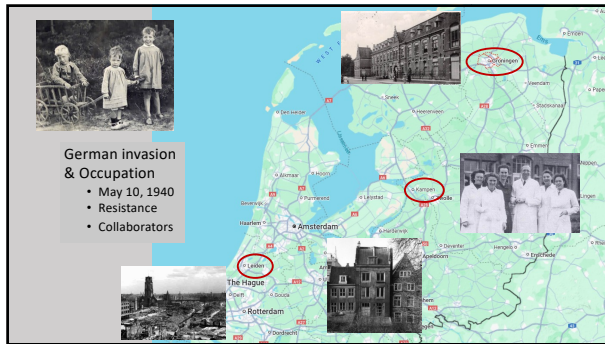
**1924**

John Jacob Abel, Leonard Rowntree and Bergrin (B) Turner, the team who constructed the first apparatus to perform ex vivo haemodialysis in dogs in 1913

Dr. Georg Haas performing dialysis on a patient at the University of Giessen



A photograph showing Dr. Georg Haas performing dialysis on a patient in a clinical setting. The patient is lying on a table, and the dialysis apparatus is visible.



### Kolff Dialysis Machine 1943-1945 Kampen Hospital

- **Frame:** Downed German bomber
- **Tank:** Repurposed bathtub
- **Drum:** Wooden bed slats
- **Coupling:** Ford water pump
- **Dialysis membrane:** Cellophane sausage casing
- **Dialysate:** Isotonic NaCl + glucose
- **Anticoagulation:** Heparin\*
- **Power:** Sewing machine motor
- **Access:** Metal needles or glass tubes in artery and/or vein

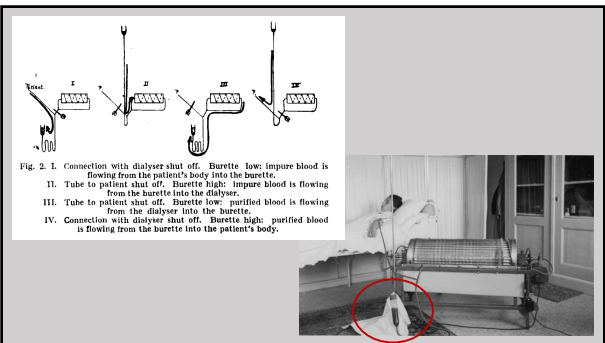
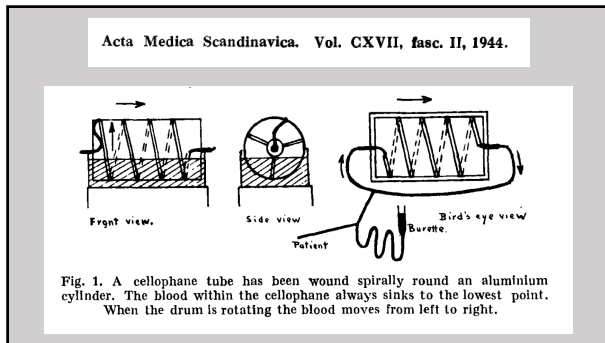
\* Newly available since 1930's; hirudin from leeches proved to be too toxic/difficult

*"Whenever I see a problem," Willem Kolff once said, "I try to reduce it to simple terms. If the problem is very complicated, I look at whether or not there is a simple component to it. And if the simple component is an important part, I take that first."*

**Acta Medica Scandinavica. Vol. CXVII, fasc. II, 1944.**

**The Artificial Kidney: a dialyser with a great area.**

By  
**W. J. KOLFF**, Specialist for internal diseases at the Municipal Hospital of Kampen (The Netherlands);  
**H. TH. J. BERK**, Managing Director of the Kampen Enamel Works, with the collaboration of  
**NURSE M. ter WELLE**; Miss **A. J. W. van der LEY**;  
 Messrs. **E. C. van DIJK** and **J. van NOORDWIJK**.  
 (Submitted for publication October 6, 1943).



• Urea 704 mg/dL  
 • “BUN” 335 mg/dL  
 • 263 gm removed in one session  
[Dr. Willem Kolff Urea](#)

Photo with patient signed consent for educational presentation

**Fig. 5 - Two hundred and sixty three grams of urea could be removed in one single dialysis in a very large man, who was patient 13. He was nearly comatose when we started, but the first day after dialysis, he was reading a newspaper.**

### Sophia Maria Schafstad

#### First successful life-saving human dialysis

- 16 consecutive patients did not survive
  - Most succumbed to underlying illness
- 17<sup>th</sup> attempted hemodialysis
  - September 1945
  - Acute renal failure associated with reversible hepatorenal syndrome
  - Recovered
  - Lived another 7 years

[Dr. Willem Kolff Sophia Schafstad](#)

After WW2 Machines GIVEN to:

- Hammersmith Hospital, London
- Royal Victoria Hospital, Montreal
- Mt. Sinai Hospital, New York City

### First Dialysis in USA: January 1948

#### Mount Sinai's Role in Hemodialysis: From the First Treatment in the United States to Continuing Innovations

Updated on Sep 14, 2023 | Featured, Research

It has been more than 75 years since Mount Sinai conducted the first hemodialysis treatment in the United States in 1948, a monumental accomplishment, and Mount Sinai continues to play a leading role in research to help patients in need of this lifesaving treatment.

The first type of dialyzer, called the artificial kidney, was built in 1943 by Dutch physician, Willem Kolff, MD, PhD, working in the Netherlands during World War II. He attempted to treat more than a dozen patients with acute kidney failure over the next two years and continuously improved his machine design.

In 1947, Dr. Kolff came to the United States to demonstrate his model artificial kidney at the Mount Sinai Hospital. On January 1948, **Alfred Fishman MD** and Irving Koop, MD, who had been trained by Dr. Kolff, used his machine for the first time to treat a patient with acute renal failure who eventually recovered completely. That first dialysis took place at 11 am on January 26, 1948, is listed for six hours, and it represents the first clinical use of the artificial kidney in the United States.

### Willem Kolff: Later Achievements

#### Cleveland Clinic & University of Utah

- The artificial heart: Jarvik-7
- Cardiopulmonary bypass: “Stopped heart surgery”
- Intra-aortic balloon pump
- First wearable artificial kidney
- Nobel Prize nomination 2003

FIGURE 1. Dr. Willem A. Kolff demonstrating the wearable artificial kidney (WAK) to a patient (1976).



*"If you can give someone a happy life you should do it. If it cannot be a happy life you should not"*

Willem "Pim" Kolff