


# IMAGE GUIDANCE SYSTEM AND FUTURE...



**SINUS**  
CENTRO

João Flávio Nogueira, MD  
Sinus Centro  
Fortaleza, Brazil

# DISCLOSURE

# NONE



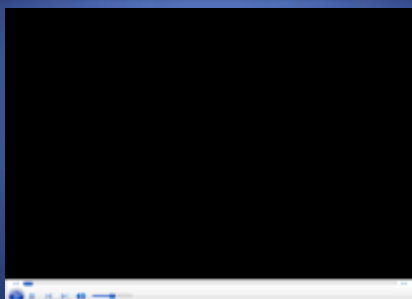
[www.sinuscentro.com.br](http://www.sinuscentro.com.br)  
[joaoflavioce@hotmail.com](mailto:joaoflavioce@hotmail.com)

# WHERE I AM FROM



Fortaleza, 3 million

# HISTORY



Harvey Cushing – Surgery 1912

## IMAGING



Free X-Ray Examination to Patients



Nature, 20 August 1896

## IMAGING



Sir Godfrey N. Hounsfield  
CT – 1967  
Nobel Prize 1979



British Museum, 2008

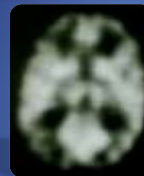
## IMAGING



Sir Godfrey N. Hounsfield  
CT – 1967  
Nobel Prize 1979

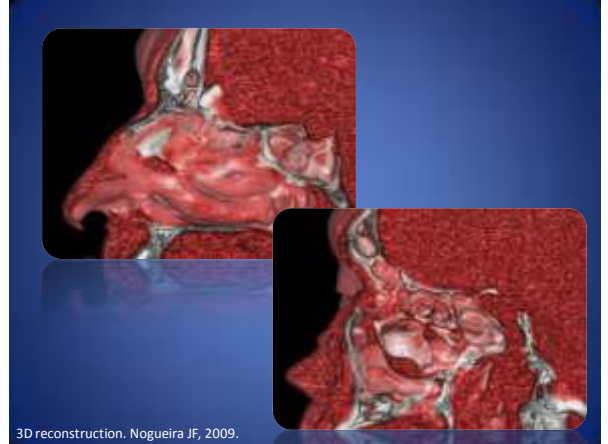
British Museum, 2008

## IMAGING

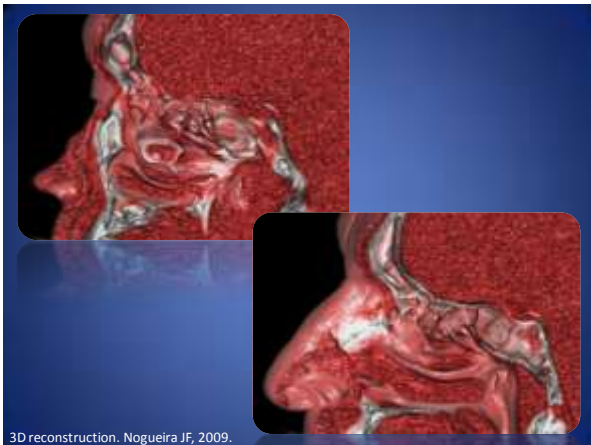


Brain study using CT. A tumor is clearly observable in the lower transverse slice. Images were presented by David Chesler at the Meeting on Tomographic Imaging in Nuclear Medicine, September 15-16, 1972.

British Museum, 2008



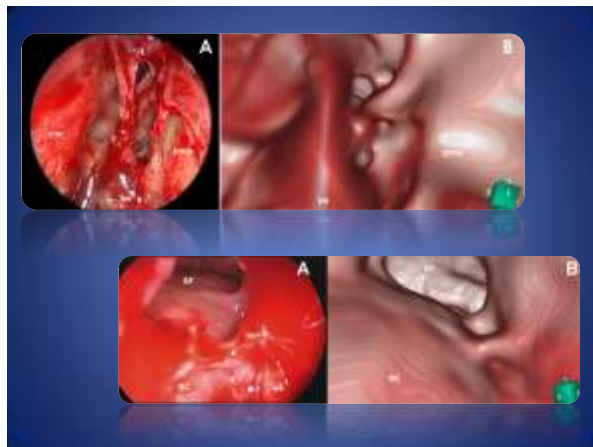
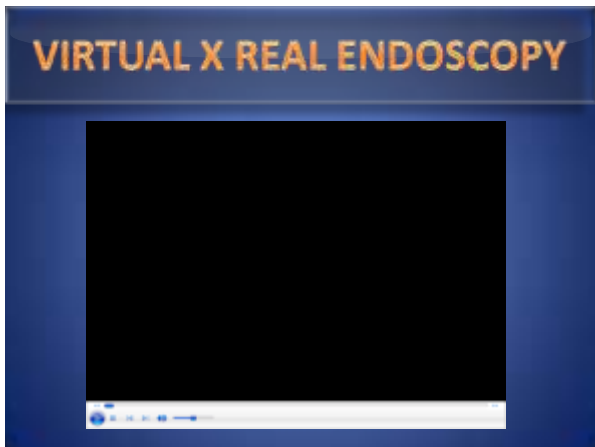
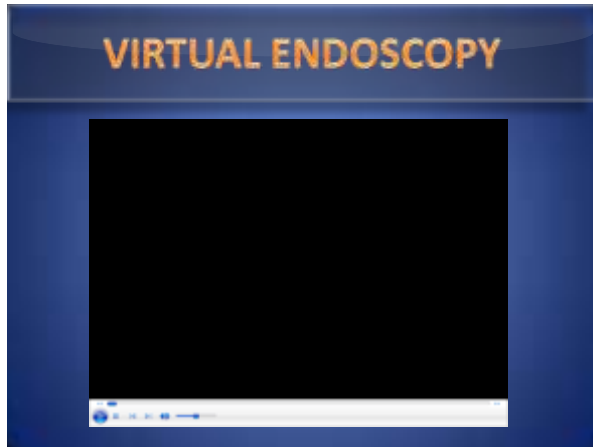
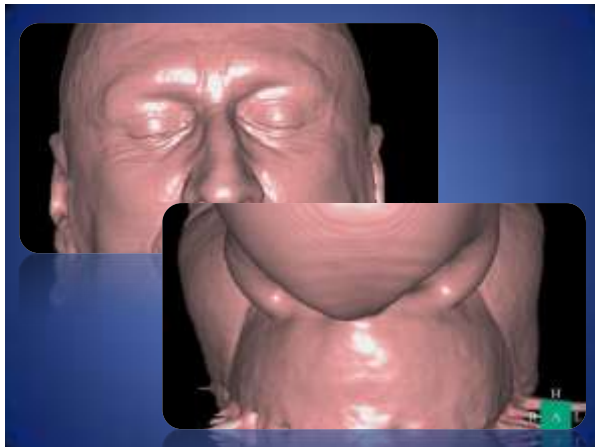
3D reconstruction. Nogueira JF, 2009.



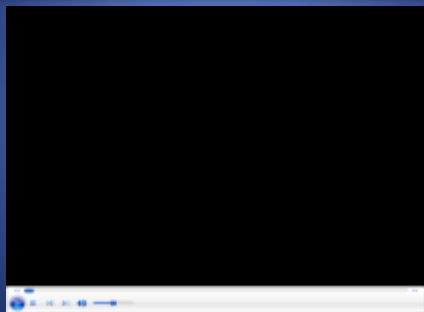
3D reconstruction. Nogueira JF, 2009.



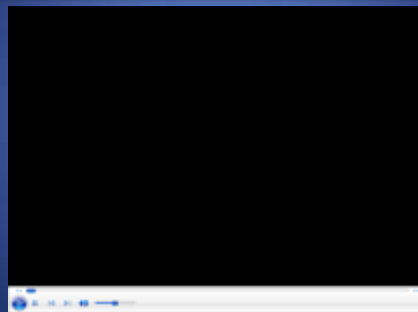
3D reconstruction. Nogueira JF, 2009.



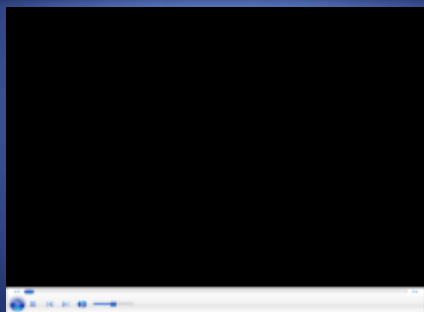
## CASE



## VIRTUAL OTOSCOPY



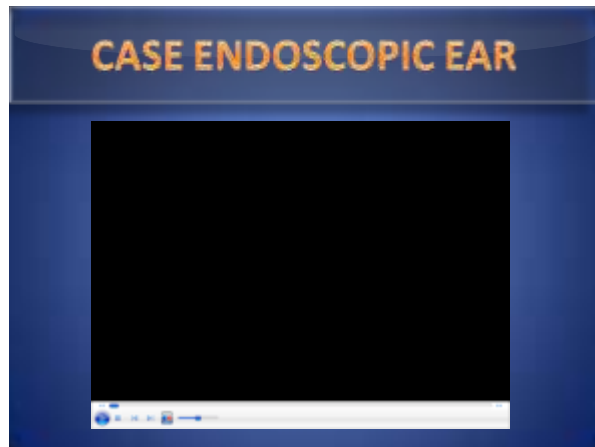
## IMPLANTABLE DEVICE



## MEASUREMENT



Distance: 4,45 mm



## IGS

- Medicine
  - Neurosurgery
  - ENT
  - Orthopedics
  - Cranio-facial



## IGS

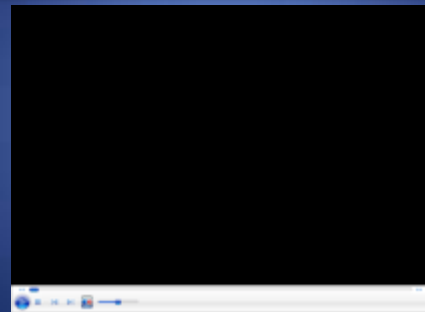
- Active
  - Electromagnetic
    - Metal tables
- Passive
  - Optics
    - Obstacles



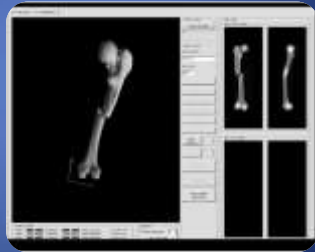
## CRANIO-FACIAL SURGERY



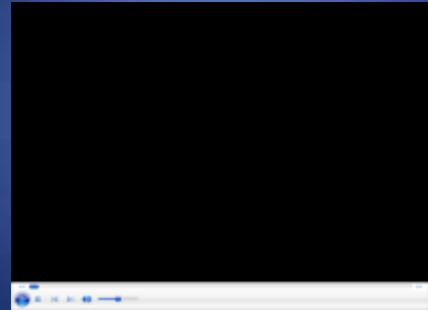
## CRANIO-FACIAL SURGERY



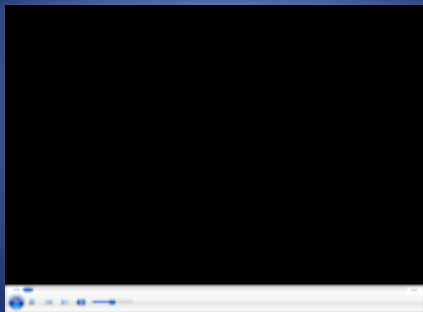
## ORTHOPEDICS



## ORTHOPEDICS



## ENT AND SKULL BASE SURGERY



- Anatomy knowledge
- IGS dependent ?
- Legal issues
- Improve security ?
- Advantages ?

Neurosurg Focus, 2011; 101:320-6  
**Improving accuracy and reducing radiation exposure in minimally invasive lumbar interbody fusion.**  
 Ward M, Stambice P.  
 Department of Neurosurgery, The Princess Alexandra Hospital, Brisbane, Australia. mward@pau.hosp.au

Int J Endocrinol Invest. 2013; 14(1):17-21  
**Level of complete detection of the ethmoid sinuses with a computerized tomographic image guidance system.**  
 Frazzetta BA, Haas JR.  
 Department of Otolaryngology-Head and Neck Surgery, Saint Louis University School of Medicine, St. Louis, MO, USA.

Expert Rev Med Devices. 2005 Jul 2(4):395-406.  
**Computer-aided surgery of the paranasal sinuses and skull base.**  
 Wise SK, DelGaudio JM.  
 The Emory Clinic, Department of Otolaryngology-Head and Neck Surgery, Atlanta, GA 30322, USA.

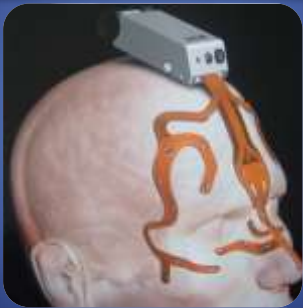
Int J Endocrinol Invest. 2013; 14(1):17-21  
**Image-guided surgery of the paranasal sinuses and skull base.**  
 Srinivasan G.  
 Department of Otolaryngology-Head & Neck Surgery, Saint Louis University School of Medicine, St. Louis, MO, USA.

## STUDIES

- Help to identify critical anatomic landmarks
- Increase sensation of security to surgeons
- Increase costs and surgical time
- **Does not** decrease complications
  - DOES NOT INCREASE SECURITY
- Accuracy is linked with calibration

Fried MP, Parikh SR, Sadoughi B. Image-guidance for endoscopic sinus surgery. Laryngoscope 2008;118:1287-92.  
 Chu ST. Endoscopic sinus surgery under navigation system—analysis report of 79 cases. J Chin Med Assoc 2006; 69:529-33.

## STUDIES



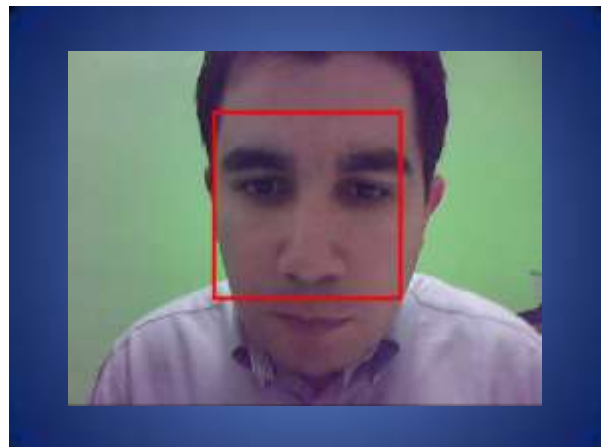
Tracker Image Guidance System, Stryker, USA, 2009.

## COSTS

- Equipment (Brazil)
  - R\$ 180.000,00 – 400.000,00
  - Institution
- Rental (Brazil)
  - R\$ 4.000,00 – R\$ 20.000,00
  - Surgery

Romcy H. CAFAZ Medical insurance, 2010

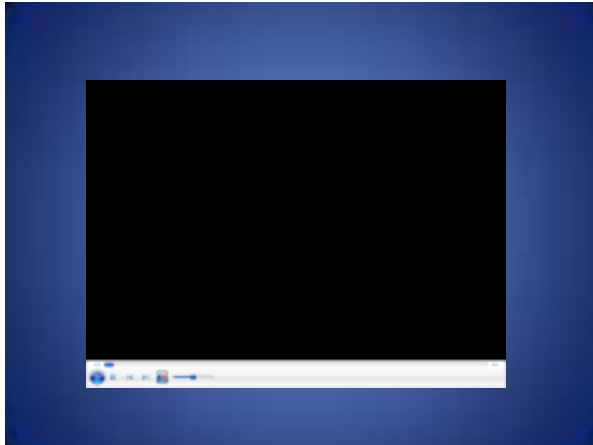
# AUGMENTED REALITY





**MEDICINE ?**  
MEDICINE ?





"640K RAM memory will be enough for anybody."  
Bill Gates, 1981

"There is no reason anyone would want a computer in their home."  
Ken Olson, 1977

"Fooling around with alternate current is just a waste of time. Nobody will use it ever."  
Thomas Edison, 1889

Top 87 Bad Predictions about the Future  
Published on 3/28/2006

[www.sinuscentro.com.br](http://www.sinuscentro.com.br)

**"The best way to predict the future is to create it"**

**Peter F. Drucker**