





### **High Resolution CT**

- Sectioned cadaver head
- Dissected out temporal
- bone: Normal case
- Laser drilled lesions
- Floating mass transducer
- Cochlear implant













## Cochlear Implant Imaging



## **Temporal Bone: Stapes Prosthesis**



### **Ossicular Chain**



# <image>









### **Pros and Cons of VCT**

- + –
   High spatial Lower contrast resolution resolution
- Volume coverage Slow scintillator
- "Omni-scanner"

### Small Animal Imaging: Thumb Tissue Engineering



### **Implantation into SCID Mice**



### High-resolution Tissue Engineering





Conventional Testing: Bone Morphogenic Proteins										
	Collagen DO	Collagen ROB	Alginate DO	Fibrin DO	Fibrin ROB	Bone				
ALP		-	-	-		-				
BMP-2						-				
ON	-	-			-	-				
OPN		-	-	-	-	100000				
GADPH	1	-	-	-	-	-				

### Histology: DO – Collagen (after 6 wks 40x and 200x)

















### **Djehutynakht Head**

- 1917 Harvard University and MFA joint expedition
- Bersha tomb [10A] of the monarch Djehutynakht.
- Middle Kingdom (4000 years old)
  Indeterminate sex
- Museum of Fine Arts Boston (15-5-279, MFA 21.11767)





### Ex-cerebration: Cribriform Defect



Internal view

### **Strouhal Occipital Defect**

Middle Kingdom female skull from the Dashur pyramid of Amenemhet III

Strouhal, E.: Embalming excerebration in the Middle Kingdom. In: David, R.A., (ed.): Science in Egyptology. 1986



### Facial Skeleton Mutilations

- Systematic
- Sharp edges
- Bones removed
- Grossly symmetric



# **Coronoid Process of Mandible**



### **Oral View of Resected Bones**









### Assessment of Knee Prostheses

Why?

- Siemens fpVCT: 150x150x150 µm voxel size
- Assessment of TKA unworn in phantom
- Assessment with distraction reduction of metal artifacts



# Dynamic 4D CT Continuous rotation and projection acquisition for a selected time. Never misses the bolus!

# A 16 phase dynamic study

Frames from Dynamic CT Angiogram







# Post-op Aneurysm Imaging





### **Neuro Vascular Assessment**



### 3D Brain Perfusion



### **3D Liver Perfusion**



# Bone Architecture in AN













### Wound Debridement and Exposure













### 4-D Angiography using Compressed Sensing

European Radiology © European Society of Radiology 2013 10.1007/s00330-012-2761-2

Interventional

Real-time X-ray-based 4D image guidance of minimally invasive interventions

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### 4D CATH for Dynamic Scenes Compressed sensing Conventional tomographic data A2 в A1 Tomographic reconstruction for 4D intervention

C2 Low dose temporal updates

C3

quidance

C1

Full dose prior

An Example



### 4-D CATH



### **FpVCT: Year 5**

- Great for high-resolution applications
- Excellent for volumetric coverage
- Can to time-resolved 4D imaging (dynamic full-field angiography)
- Low-frame rate and after-lag issues are here to stay
- Contrast resolution sucks
- Steady State:
   Can help patients in specific applications
  - Has some niche clinical areas of excellence
  - Small market, if any

### Reassessment: What's the next generation

- Detector experimentation: integration with fiber-optic face plates
- 4-D CATH (Catheter Advancement via Tomographic Help)

Thank you!