

Orthopedic implants

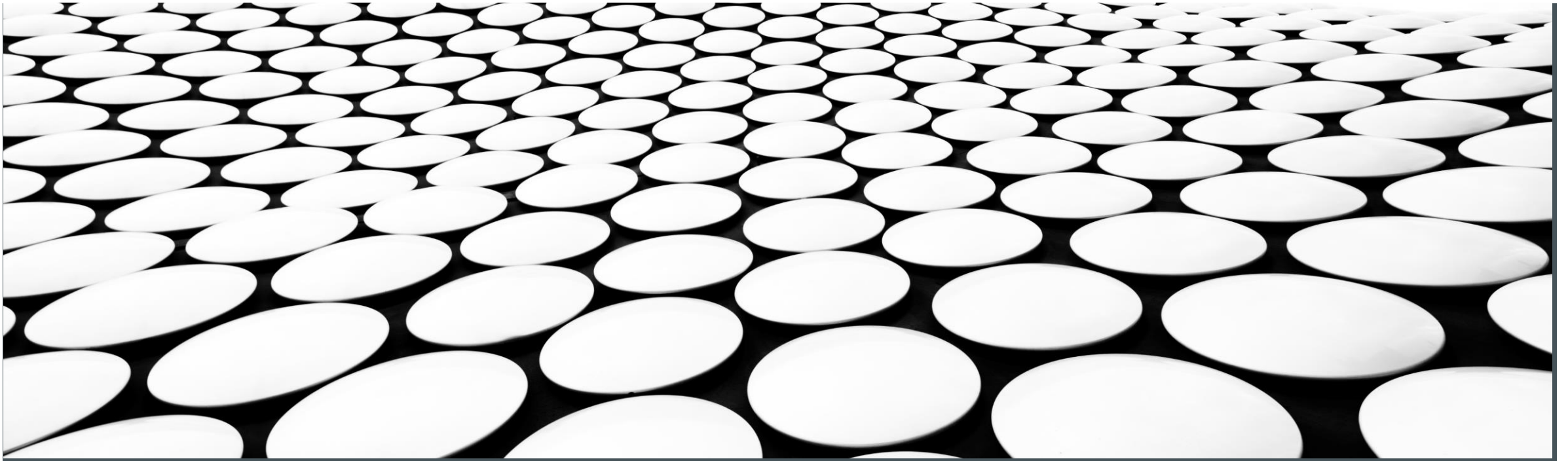
Hamidreza Salehi ,Morteza Khodaei & Amirmahdi Azizi

Advance Materials

1401-1402

Dr.maddah

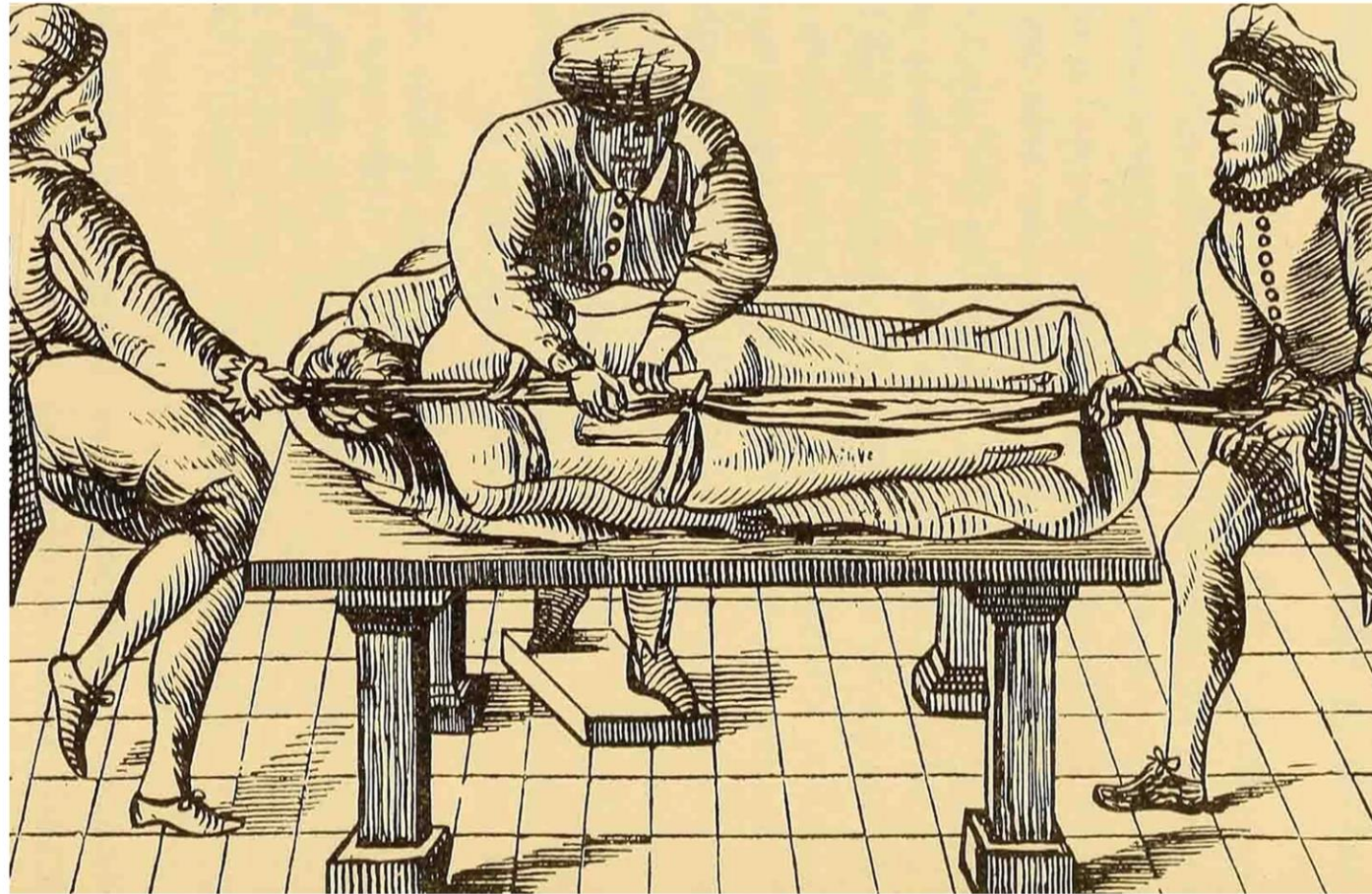
Ms.zandi



TITLE TIME LINE FOR Orthopedic implant



Past Orthopedic implant



Egypt Orthopedic implant

Orthopedic implants have a long and fascinating history dating back to the ancient Egyptians. The first known orthopedic implant was discovered in the mummy of an Egyptian woman who lived around 300 BCE. The woman had a wooden toe implant that was designed to help her walk after the amputation of her big toe.



Ancient rome Orthopedic implant

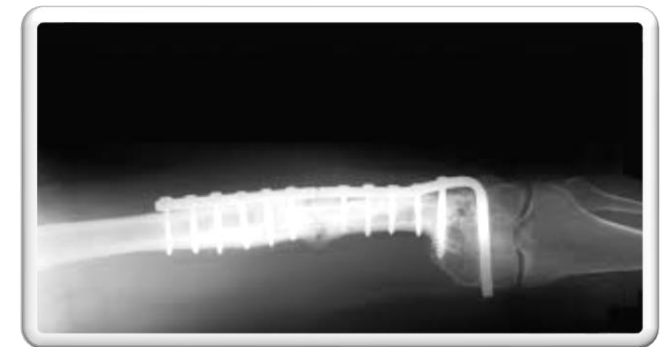
In ancient Rome, surgeons treated fractures using bronze screws and plates to hold broken bones in place. However, these early implants often led to complications such as infection and rejection by the body.



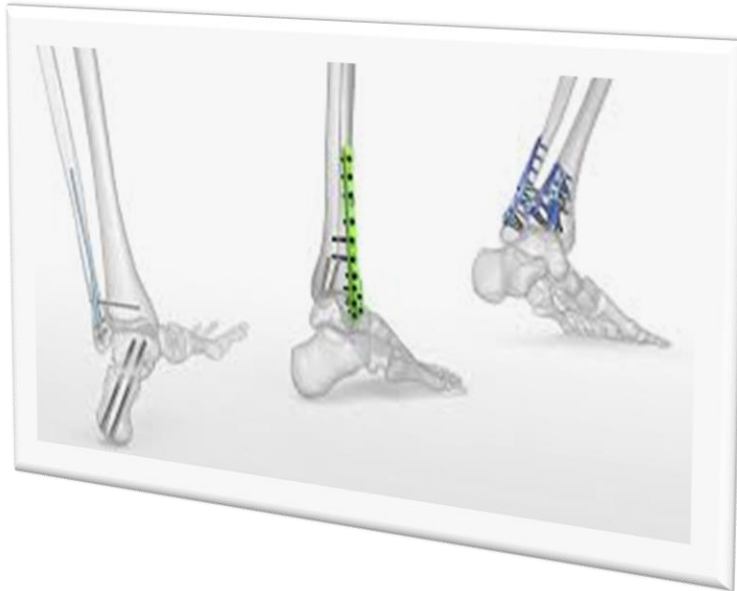
19th&20th Orthopedic implant

The development of modern orthopedic implants began in the late 19th and early 20th centuries, with the introduction of metal screws, nails, and plates made from materials like stainless steel and titanium. These materials were found to be biocompatible, meaning they didn't cause harm to living tissue, and could remain in the body without causing rejection or infection.

Early orthopedic implants were simple in design, but advances in technology have allowed for the development of more complex devices. For example, hip replacement surgery was first performed in the 1960s using a basic ball-and-socket design, but today's artificial hips are much more advanced with features like modular components that allow for greater customization and improved mobility.



Current situation for Orthopedic implant



How?

Orthopedic implants have come a long way in recent years, thanks to advances in technology and materials science. Modern implants are designed to be more durable, less invasive, and more biocompatible than their predecessors. However, like any medical procedure, there are risks associated with orthopedic implants. Patients should discuss these risks with their doctor before deciding to undergo surgery.



Which part of body is most commonly used?

The most commonly used orthopedic implant in the world is probably the hip replacement. Hip replacements are typically made of metal, ceramic, or plastic and are used to replace a damaged or worn out hip joint. In fact, hip replacements are one of the most successful medical devices ever invented, with more than 300,000 procedures performed each year in the United States alone.



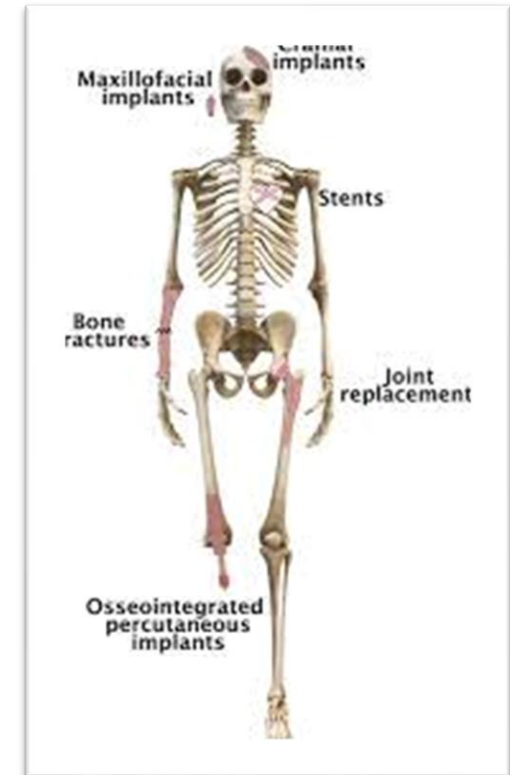
Some common types of orthopedic implants include:

Joint replacements: These are used to replace damaged or worn out joints such as hips, knees, shoulders, and elbows. They are typically made of **metal**, **ceramic**, or **plastic**.

Plates and screws: These are used to hold bones together while they heal after a fracture. The plates and screws can be made of metal or bioresorbable materials that dissolve over time.

Intramedullary nails: These are used to stabilize fractures of long bones such as the femur or tibia. They are inserted into the bone marrow canal and held in place with screws.

External fixation devices: These are used to stabilize fractures by applying an external frame that holds the broken bones in place. The frame is attached to the bone using pins or wires.



Dental implant based on Ti

Dental implants are titanium posts that are surgically positioned into the jawbone beneath your gums. Once in place, they allow your dentist to mount replacement teeth onto them. The process involves multiple steps and can take several months to complete.

your dentist will assess your oral health and determine if dental implants are a good option for you. If so, they will create a treatment plan that addresses your specific needs.

Dental implants offer many benefits over other tooth replacement options, including improved appearance, increased comfort, better speech, and enhanced chewing ability. They are also more durable than other options, such as bridges or dentures. However, dental implants require a significant investment of time and money, and not everyone is a good candidate for them.





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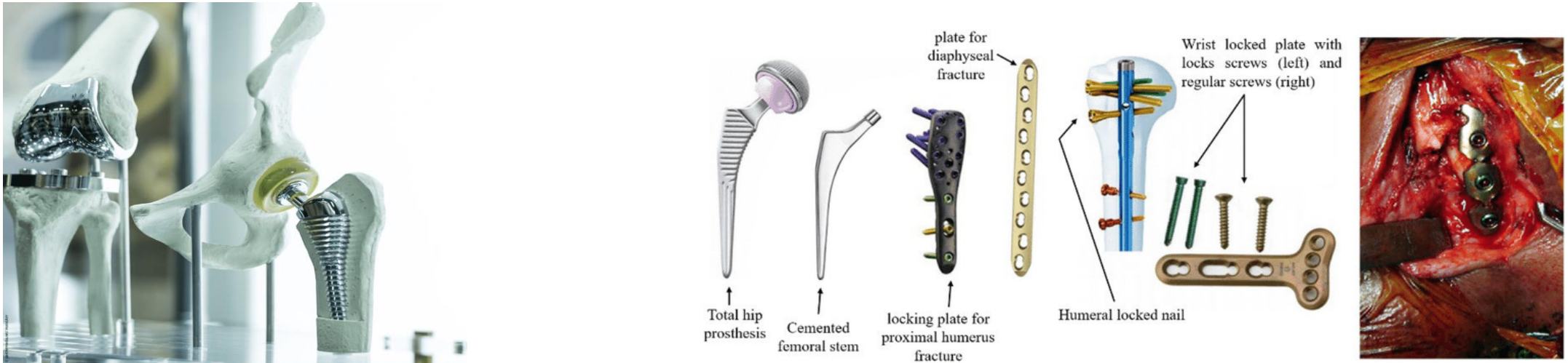
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1-ADVANCE MATERIAL

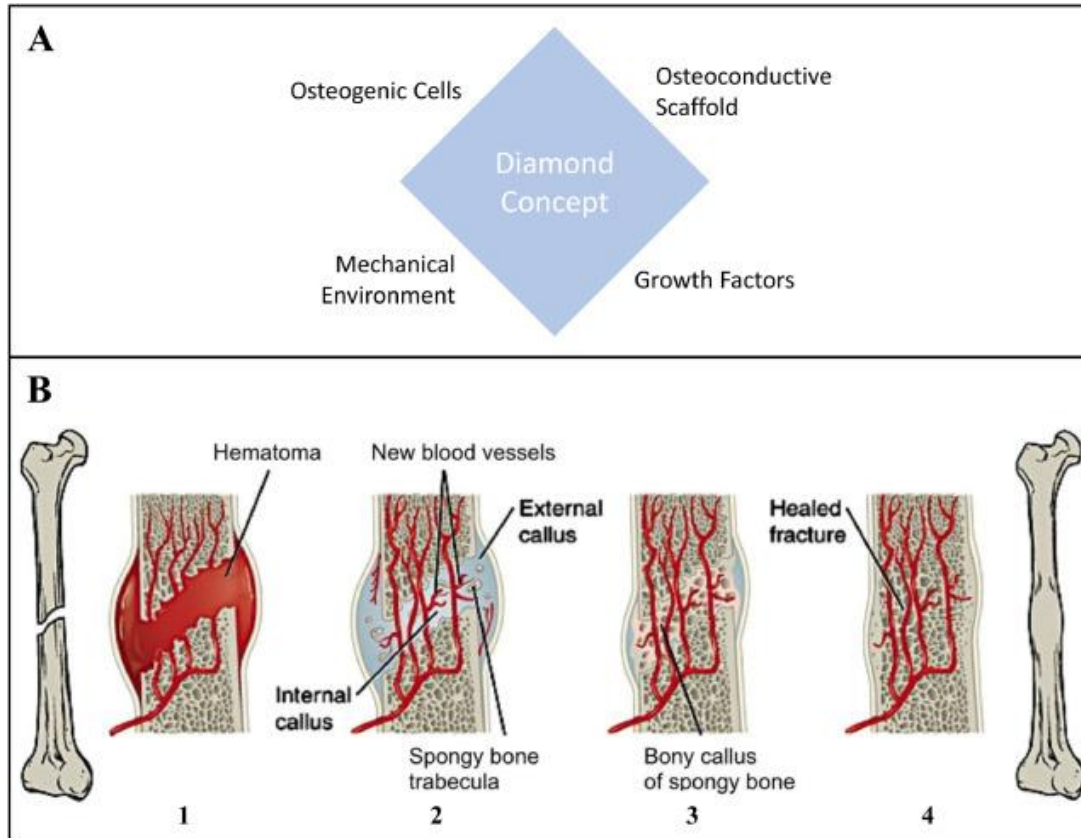
■ Sputtering of Titanium in Co-Cr-Mo Alloys for Orthopedic Implant Materials

Sputtering process of titanium was carried out to improve the hardness and wear resistance of the Co-Cr-Mo alloys used for orthopedic implant materials



2-REGENERATIVE IMPLANTS

- To conduct a thorough appraisal of recent and inventive advances in the field of bone tissue engineering using biomaterials, cell-based research, along with the incorporation of biomimetic properties using surface modification of scaffolds



Precise strategy utilized for the reconstruction, restoration, or repair of the bone-related tissues exploits cells, biomaterials, morphogenetic signals, and appropriate mechanical environment to provide the basic constituents required for creating new tissue.

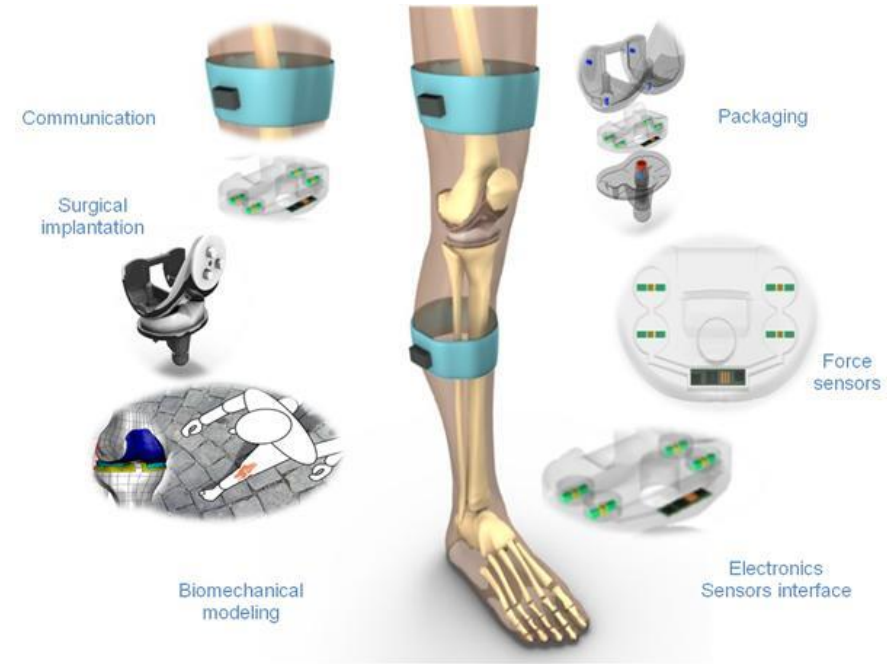
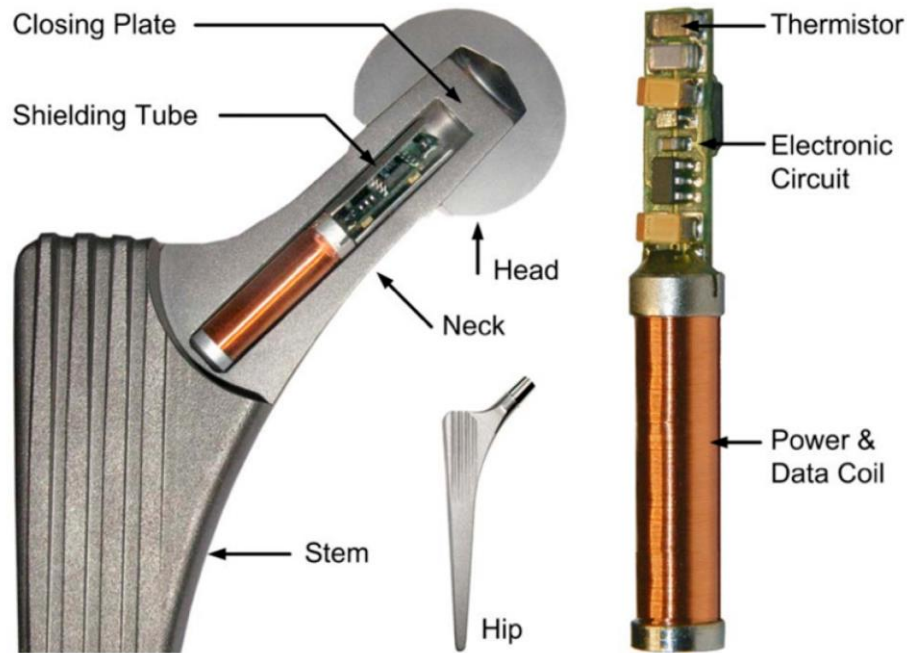
3- PERSONALIZED IMPLANTS

- Following the most recent software and 3D printing developments, the use of personalized 3D printed orthopedic implants for treatment of complicated surgical cases has gained more popularity.
- Personalized 3D printed prostheses offer an opportunity for a treatment of choice and provide good anatomical and functional results, shortened surgical time, less complications, and high satisfaction in patients with appropriate indications



4- SMART IMPLANTS AND SENSORS

- This implies miniature unobtrusive sensors that are implanted along with the orthopedic device and used to wirelessly communicate information to exterior monitoring/control equipment. This information may be related to the status of the medical device itself and/or the health status of the surrounding biological tissues





Thank you very much for your attention