History of biomaterials

History

Earlier surgical procedures, whether they Involved bimetallism or not, were generally unsuccessful as a result of infection Bimetallism, Joyce Y Wong and Joseph D Brannon (Deeds), CRY press, Boca Orator, FL, 2007 3 asses: Bone plates were Introduced to lad In the fixation of long-bone fractures. Many of these early plates broke as a result of unsophisticated mechanical design; they were too thin and hadstress-concentrating corners.

Also, materials such as indium steel, which was chosen for its good mechanical properties corroded rapidly in the body and caused adverse effects on the healing processes asses: Stainless steels and cobalt chromium alloys were introduced and great success was achieved In fracture fixation, and soon Joint replacement surgeries were Bimetallism, Joyce Y Wong and Joseph D Bronzing (Deeds), CRY Press, Boca Orator, FL, 4 MAMA asses: During the World War II, it was found that pilots injured by fragments of plastic MAMA (polymath matriculate) aircraft canopy did not suffer adverse chronic reactions from the presence of the fragments in the body.

MAMA became ideal used after that time for corneal replacement and for replacements of sections of damaged skull bones 1950-asses: Following further advances in materials and in surgical technique, blood vessel replacements were tried in asses and heart valve replacements and cemented Joint replacements in asses 5 Year Investigators Late 18-19th century Development Metal devices to fix bone fractures; wires and century pins from Fee, Au, Gag, and Opt 1860-1870 J. Leister Aseptic surgical techniques 1886 H.

Huntsman 1893-1912 W. A. Lane Steel screws and plates (Lane fracture plate) 1912 W. D. Sherman Vanadium steel plates, first developed or medical use; lesser stress concentration and corrosion (Sherman 1924 A. A. Zeroed Introduced(Corm alloy) 1926 M. Z. Lange Introduced 18-cosmos stainless steel, better than 18-8 stainless steel 6 Used carpenter's screw for femoral neck fracture 1931 M. N. Smithereens First femoral neck fracture fixation device made of stainless steel 1936 C.

S. Venerable, W. G. Stuck Introduced(19-9 stainless steel), later changed the material to Coir alloys 1938 P. Wiles First total hip replacement prosthesis 1939 J. C. Burch Introduced tantalum (Ta) ASSES M. J. Doreen, A. Franchisee First used replacement 1946 J. And R. Jude First phonemically designed femoral head replacement prosthesis. First plastics (MAMA) used acrylics (MAMA) corneal 7 1947 J. Cotton Introduced It and its alloys 1952 A.

A leaflet in heart valve must flex 60 timer per minutes without tearing for the life time of a patient (10 years or more) 0 Bulk physical properties: The dialysis membrane has a specified permeability, the reticular cup of the hip Joint has a lubricity, and the intraocular lens has clarity and refraction requirements 13 Absorbability 0 Absorbability is the ability of a material to perform with an appropriate host response in a specific application (Williams, 1987) 0 Thus, absorbability is the acceptance of a material by the surrounding tissues ND by the body as a whole. A objectionable material should not do exhibit following characteristics: (1) irritate the surrounding structures (2) provoke an abnormal inflammatory response (3) incite allergic or immunologic reactions (4) cause cancer 14 15 Performance of bimetallism

the material properties, design, and absorbability of the material used, as well as other factors not under the control of the engineer, including the technique used by the surgeon, thehealthand condition of the patient, and the activities of the patient.

If we can assign a numerical value f to the probability of allure of an implant, then the reliability can be expressed as r= l -f If, as is usually the case, there are multiple modes offailure, the total reliability art is given by the product of the individual reliabilities RL =(1 -FL), etc. Art= RL re 16 Inert and evocative bimetallism 0 Initially (asses-asses) the bimetallic designed were inert (not reactive with the body) to decrease the potential for negative immune response to the implant 0 Later (asses), the concept of inert bimetallic was replaced with that of evocative bimetallism. The evocative material interact with the body in a positive manner to remote localized healing Bimetallism - The Intersection of Biology and MaterialsScience, AS Tenement and GAG Mikes, Prentice Hall, 2009 17 Hard and Soft tissue replacement bimetallism 0 Bimetallism scientists must have an appreciation of material science.

A wide range of materials are routinely used and no researcher will be comfortable in synthesizing and designing with all these materials and therefore specialization is the rule 0 There is tendency to group bimetallism into hard tissue replacement bimetallism (metals, ceramics for use in orthopedic and dental materials) and soft tissue placement bimetallism (polymers) for cardiovascular and general plastic surgery 0 Division is arbitrary though 18 Market perspectives (2008) 0 Mostly used devices are replacement heart valves, synthetic vascular grafts, hip and knee replacement, heart lung machine, renal dialysis equipment, and bone and

dental implants 0 About 100, 000 replacement heart valves; 300, 000 vascular grafts; and 500, 000 artificial Joint replacements are carried out in the United States every year 19 Do it yourself? 0 Assume that a bone implant (bone plate) leads to calcification. Will you consider it an appropriate or inappropriate host response? 20