

Hospital Gov. Celso Ramos – Florianópolis/SC

Residência Médica em Ortopedia e Traumatologia



SERVIÇO DE ORTOPEDIA E TRAUMATOLOGIA GRUPO DE CIRURGIA DO QUADRIL



Superfícies de Atrito

Richard Canella
Florianópolis

Segundo Encontro Regional Sul - SBQ
Congresso Gaúcho de Ortopedia e Traumatologia
17 a 19 de Junho de 2010, Hotel Serrano, Gramado - RS

Tribologia

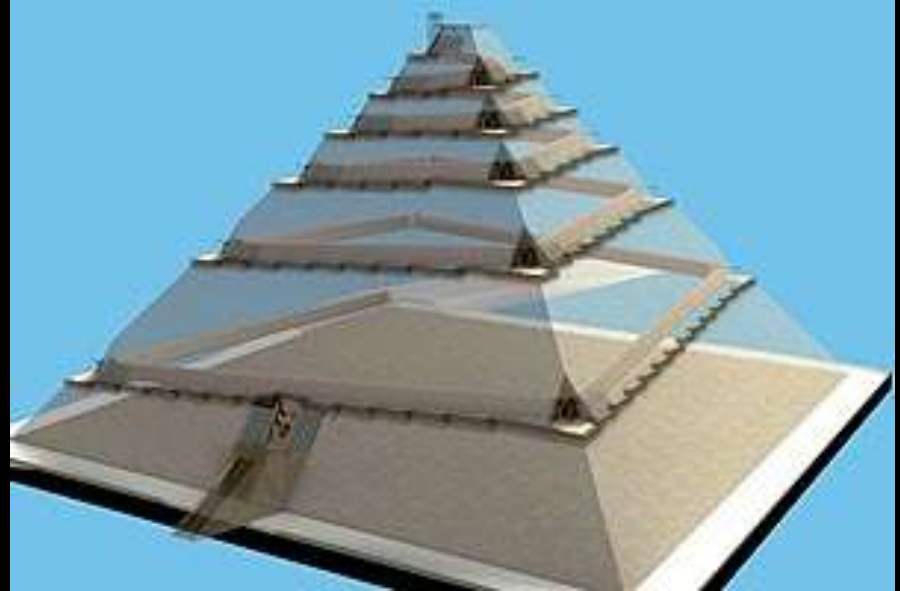
(tribo: atritar, friccionar / logos: estudo)

“É a ciência e tecnologia da interação de superfícies em movimento relativo, sendo que esta incorpora o estudo da fricção, lubrificação e desgaste.”



H. Peter Josh, Londres, 1966









Escolha do Material

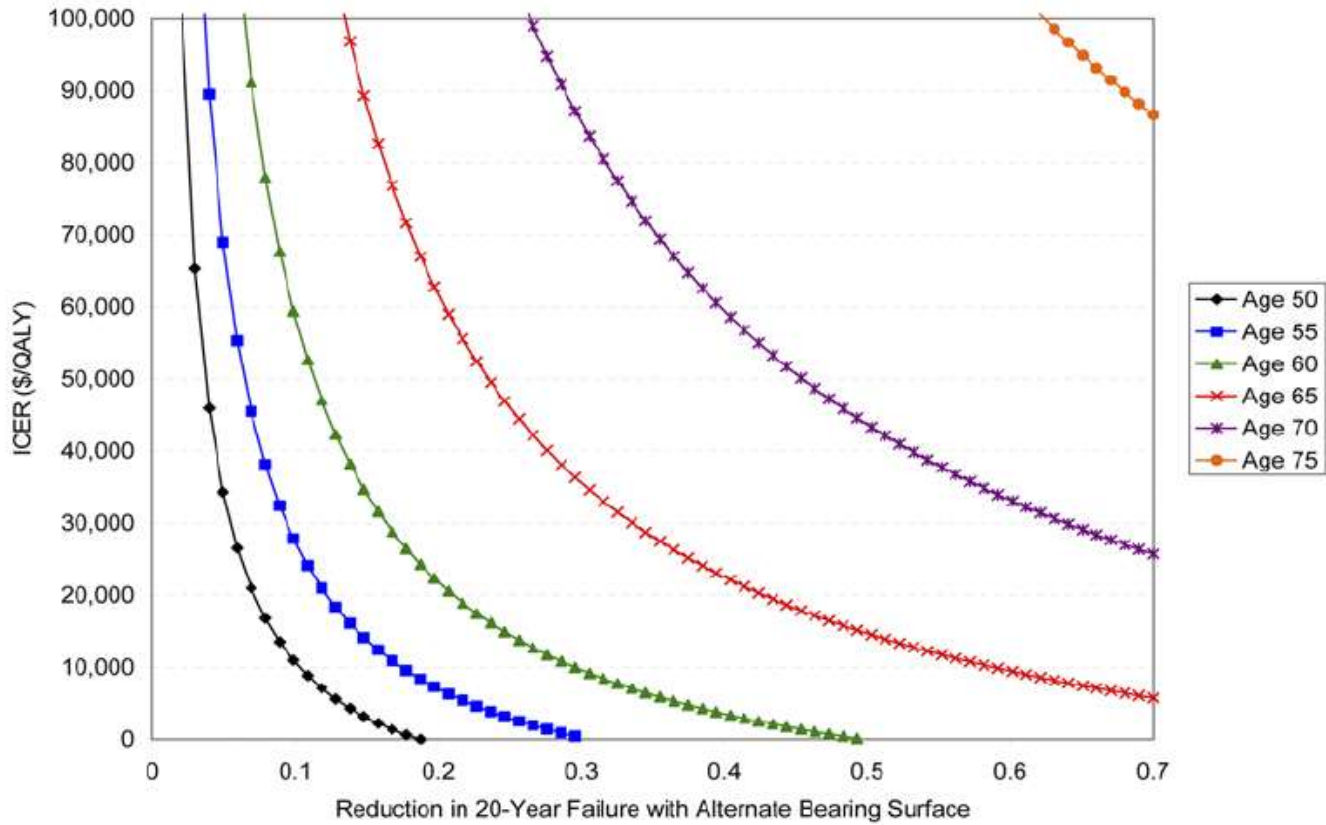
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USE OF COST-EFFECTIVENESS ANALYSIS TO EVALUATE NEW TECHNOLOGIES IN ORTHOPAEDICS

THE CASE OF ALTERNATIVE BEARING SURFACES IN TOTAL HIP ARTHROPLASTY

BY KEVIN J. BOZIC, MD, MBA, SAAM MORSHED, MD, MARC D. SILVERSTEIN, MD,
HARRY E. RUBASH, MD, AND JAMES G. KAHN, MD, MPH

*Investigation performed at Department of Orthopaedic Surgery and Institute for Health Policy Studies,
University of California, San Francisco, San Francisco, California*



Thresholds

Age	Cost-Saving	ICER = \$50,000
50	0.187	0.0375
55	0.306	0.0646
60	0.497	0.1133
65	---	0.2353
70	---	0.4546
75	---	---

--- indicates no threshold in the range of 0 to 0.70 reduction in 20 year failure rate

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Controversies Regarding Bearing Surfaces in Total Hip Replacement

By James A. D'Antonio, MD (moderator), Mark W. Pagnano, MD, Marybeth Naughton, BS, Adolph V. Lombardi Jr., MD, Keith R. Berend, MD, Michael D. Skeels, DO, Orlando J. Franchi, MD, and David Backstein, MD

Cerâmica X Cerâmica

□ Vantagens:

- Extrema rigidez
- Resistência arranhões
- Hidrofílica
- Ausência de íons metálicos
- Redução volumétrica do Debris



Cerâmica X Cerâmica

□ Desvantagens:

- Custo elevado:
 - 2x MOP
- Técnica
- Fratura
- Squeaking



Cerâmica X Cerâmica

□ Desvantagens:

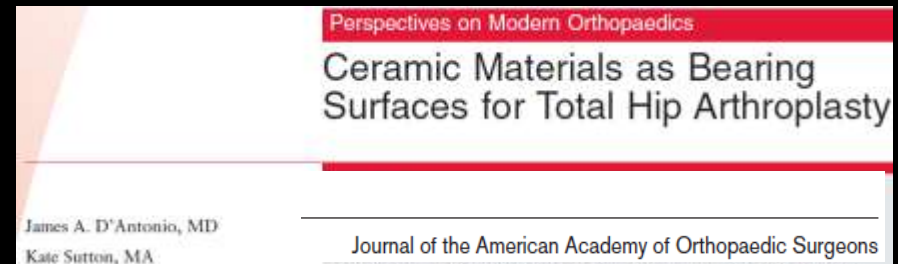
- Custo elevado
- Técnica:
 - Impacto
 - $<55^\circ$ de inclinação
- Fratura
- Squeaking



Cerâmica X Cerâmica

Desvantagens:

- Custo elevado
- Técnica
- Fratura:
 - Cabeça: 1-3000
 - Acetábulo: 1-8000
 - Maior com 28mm
 - Menor com tamanho “zero”
- Squeaking



Cerâmica X Cerâmica

□ Desvantagens:

- Custo elevado
- Técnica
- Fratura
- Squeaking:
 - 0,3 – 25%



Cerâmica X Cerâmica

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The Effect of Stem Design on the Prevalence of Squeaking Following Ceramic-on-Ceramic Bearing Total Hip Arthroplasty

By Camilo Restrepo, MD, Zachary D. Post, MD, Brandon Kai, BS, and William J. Hozack, MD

Investigation performed at the Thomas Jefferson University Hospital, Rothman Institute, Philadelphia, Pennsylvania





squeaking hip





Metal X Metal

□ Vantagens:

- Cabeças femorais de maior diâmetro



Metal X Metal

- Desvantagens:
 - Custo elevado
 - Técnica
 - Pseudotumor
 - Squeaking
 - Íons metálicos
 - Contra-indicado nas mulheres em idade fértil
 - Contra-indicado nos pacientes com IRC
 - Carcinogênese (?)



Tribology and Wear of Metal-on-Metal Hip
Prostheses: Influence of Cup Angle and Head Position

By Sophie Williams, BEng, PhD, Ian Leslie, MEng, PhD, Graham Isaac, BSc, MSc, PhD, Zhongmin Jin, BEng, PhD, CEng, MIMechE,
Eileen Ingham, BSc, PhD, and John Fisher, BSc, PhD, DEng, CEng, FIMechE, FIPEM

Metal X Metal

- Desvantagens:
 - Custo elevado
 - Técnica
 - **Pseudotumor**
 - Squeaking
 - Íons metálicos
 - Contra-indicado nas mulheres em idade fértil
 - Contra-indicado nos pacientes com IRC
 - Carcinogênese (?)

Inflammatory Pseudotumor Associated with Femoral Nerve Palsy Following Metal-on-Metal Resurfacing of the Hip

A Case Report

By Robert A.E. Clayton, BSc(Hons), MB ChB(Hons), MRCS(Ed), Ian Beggs, MB ChB, FRCR, Donald M. Salter, MD, FRCPath, FRCPE, M. Helen Grant, PhD, James T. Patton, MB ChB, FRCS(Tr&Orth), and Daniel E. Porter, MD, FRCS(Tr&Orth)

Investigation performed at the Department of Orthopaedic Surgery, Royal Infirmary of Edinburgh, Edinburgh, and the Biomechanics Unit, Wolfson Centre, University of Strathclyde, Glasgow, United Kingdom

Perspectives on Modern Orthopaedics

Metal-on-metal Bearing Surfaces

Joshua J. Jacobs, MD
Robert M. Urban
Nadim J. Hallab, PhD
Anastasia K. Skipor, MS
Alfons Fischer, PhD
Markus A. Wimmer, PhD

Journal of the American Academy of Orthopaedic Surgeons

Metal X Metal

- Desvantagens:
 - Custo elevado
 - Técnica
 - Pseudotumor
 - **Squeaking**
 - 3-10%
 - Presença de íons metálicos
 - Contra-indicado nas mulheres em idade fértil
 - Contra-indicado nos pacientes com IRC
 - Carcinogênese (?)



Metal X Metal

□ Desvantagens:

- Custo elevado
- Técnica
- Pseudotumor
- Squeaking
- Presença de íons metálicos
- Contra-indicado nas mulheres em idade fértil
- Contra-indicado nos pacientes com IRC
- Carcinogênese (?)

Chromosomal Aberrations in the Peripheral Blood of Patients with Metal-on-Metal Hip Bearings

By E. Dunstan, FRCS(Orth), D. Ladon, PhD, P. Whittingham-Jones, MRCS, R. Carrington, FRCS(Orth), and T.W.R. Briggs, FRCS

Investigation performed at the Bristol Implants Research Center, Bristol, England

THE RISK OF CANCER FOLLOWING TOTAL HIP OR KNEE ARTHROPLASTY

By Ravi Tharani, BS, Frederick J. Dorey, PhD, and Thomas P. Schmalzried, MD

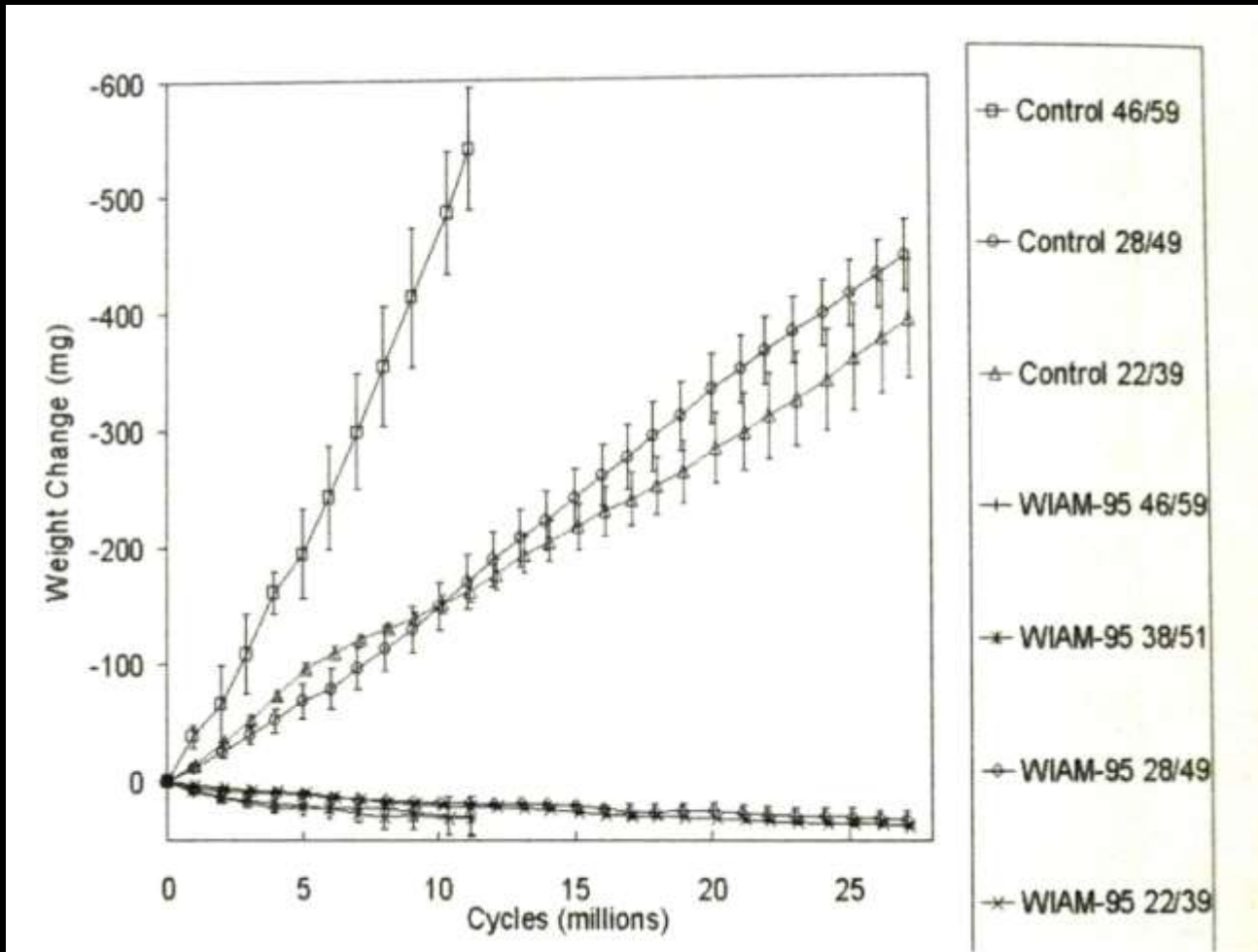
Metal X Polietileno *Highly Cross-linked*

□ Vantagens:

- Baixo custo
- Baixo risco de fratura da cabeça femoral
- Diminuição íons metálicos
- Maior opção intra-op:
 - Cabeça: 22, 28, 32, 36, 40
 - Elevação: 0, 10, 20°
 - Offset: standart ou lateral.



Metal X Polietileno *Highly Cross-linked*



Metal X Polietileno *Highly Cross-linked*

□ Desvantagens:

- Maior risco de fratura do polietileno
- Partículas menores e mais reativas

WEAR AND SURFACE CRACKING IN EARLY RETRIEVED HIGHLY CROSS-LINKED POLYETHYLENE ACETABULAR LINERS

BY LETITIA BRADFORD, MD, DAVID A. BAKER, PhD, JOVE GRAHAM, PhD,
ARUN CHAWAN, MS, MICHAEL D. RIES, MD, AND LISA A. PRUITT, PhD

Investigation performed at the Department of Mechanical Engineering-Bioengineering, University of California, Berkeley, Berkeley, California



BEARING SURFACE OPTIONS FOR TOTAL HIP REPLACEMENT IN YOUNG PATIENTS

BY CHRISTIAN HEISEL, MD, MAURICIO SILVA, MD, AND THOMAS P. SCHMALZRIED, MD

An Instructional Course Lecture, American Academy of Orthopaedic Surgeons

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WEAR PARTICLES

BY JOSHUA I. JACOBS, MD, NADIM J. HALLAB, PhD, ROBERT M. URBAN, AND MARKUS A. WIMMER, PhD

Cerâmica X Polietileno *Highly Cross-linked*

- Vantagens:
 - Menor custo em relação COC e MOM
 - Menor desgaste em relação MOP
 - Preservar opções intra-op do polietileno
 - Sem íons metálicos
 - Sem pseudotumor
 - Sem squeaking
 - Sem carcinogênese



Cerâmica X Polietileno *Highly Cross-linked*

ALTERNATIVE BEARING SURFACES: THE GOOD, THE BAD, AND THE UGLY

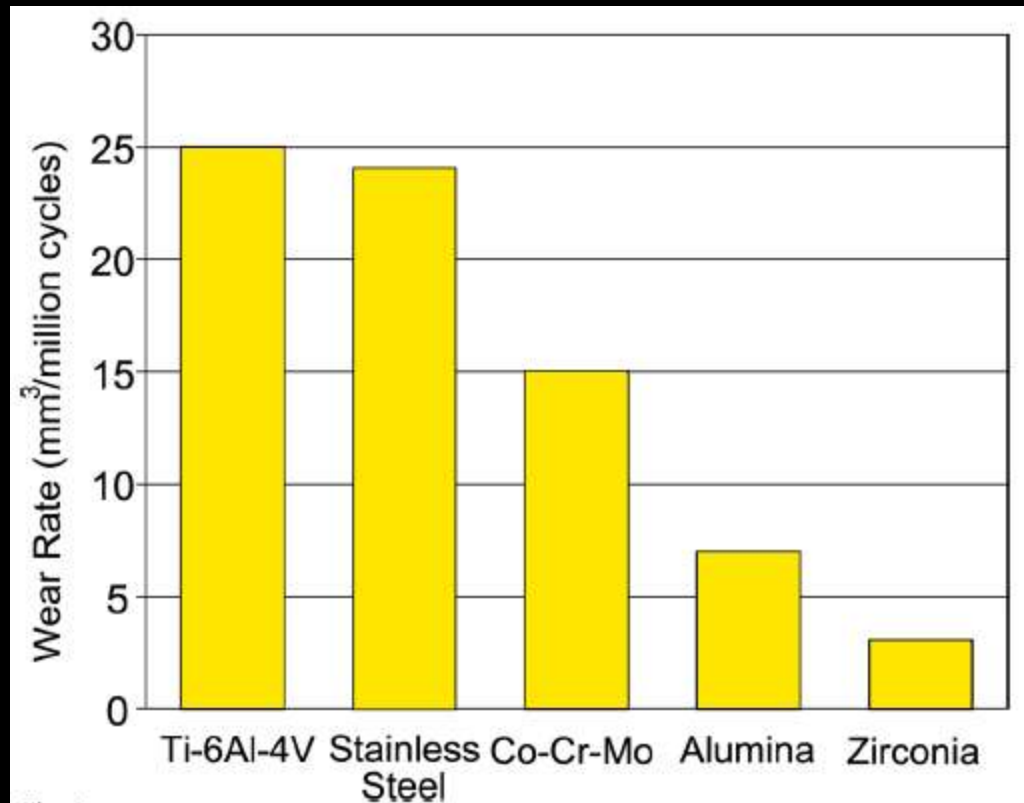
By A. SETH GREENWALD, DPHIL (OXON), AND JONATHAN P. GARINKI, MD,
FOR THE COMMITTEE ON BIOMEDICAL ENGINEERING AND THE COMMITTEE ON HIP AND KNEE ARTHRITIS

CERAMIC-ON-POLYETHYLENE BEARING SURFACES IN TOTAL HIP ARTHROPLASTY

SEVENTEEN TO TWENTY-ONE-YEAR RESULTS

By JOSHUA A. URRAN, MD, KEVIN L. GARVIN, MD, CLIFFORD K. BOESE, MD, LINDA BRYSON, RN,
DOUGLAS R. PEDERSEN, PhD, JOHN I. CALLAGHAN, MD, AND RONALD K. MILLER, MD

Investigation performed at University of Nebraska Medical Center, Omaha, Nebraska,
University of Iowa, Iowa City, Iowa, and Miller Orthopaedic Affiliates, Council Bluffs, Iowa



Cerâmica X Polietileno *Highly Cross-linked*

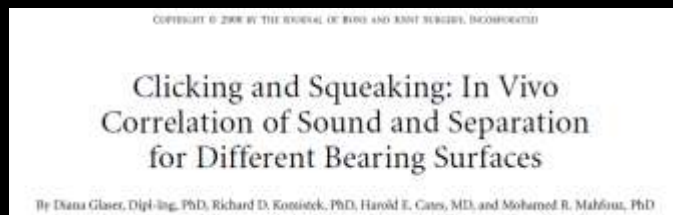
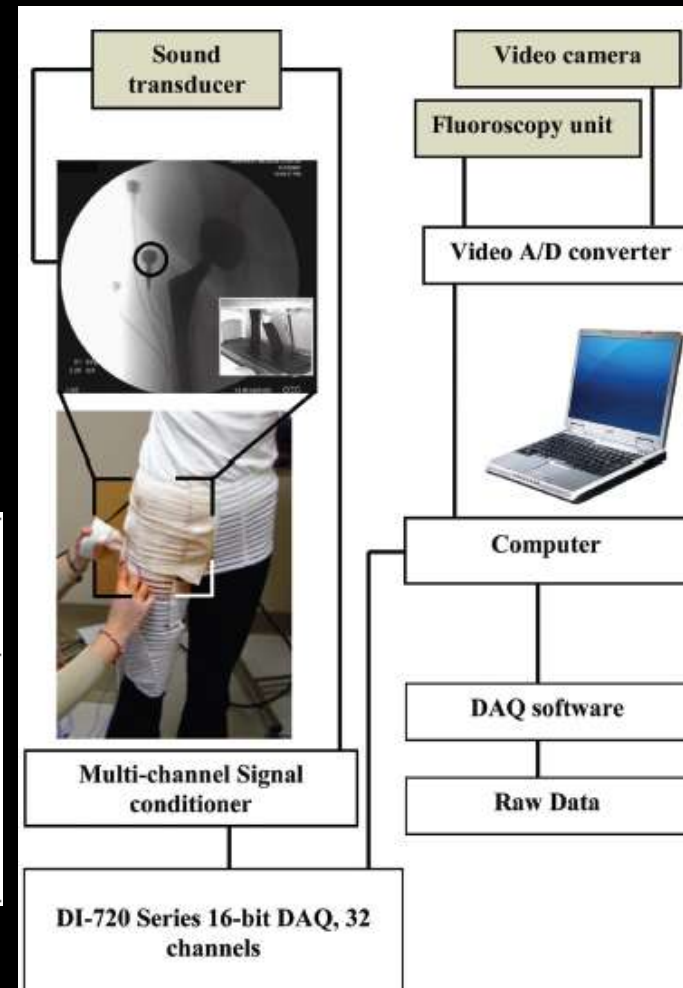


TABLE II Bearing and Sound Correlation

Sound	Bearing				
	Metal-on-Polyethylene	Ceramic-on-Polyethylene	Metal-on-Metal Polyethylene Sandwich	Metal-on-Metal	Ceramic-on-Ceramic
Pops	Yes	Yes	Yes	Yes	Yes
Snaps and/or thuds	Yes	Yes	Yes	No	No
Knocking	Yes	Yes	Yes	Yes	No
Crunching	No	Yes	Yes	Yes	No
Grating	No	Yes	Yes	Yes	Yes
Cracking	No	No	Yes	Yes	Yes
Squeaking	No	No	No	Yes	Yes
Duration of sound	Isolated	Isolated	Isolated	Sustained	Sustained



Cerâmica X Polietileno *Highly Cross-linked*

□ Desvantagens:

- Relatos de fratura da cabeça femoral

A Habermann, W Ewald, M Rauschmann, L Zichner,
and AA Kurth

**Fracture of ceramic heads in total hip
replacement.**

Arch Orthop Trauma Surg, 2006 126:
Department of Orthopaedic Surgery,
University Hospital Frankfurt/Main,
Marienburgstr.2, 60528 Frankfurt/Main,
Germany.

CASUÍSTICA

558 ARTROPLASTIAS (FEV 03 – DEZ 09)

379 ATQ PRIMÁRIAS

140 REV ATQ

39 PARCIAIS

263 POLIETILENO *LONGEVITY*®

CASUÍSTICA

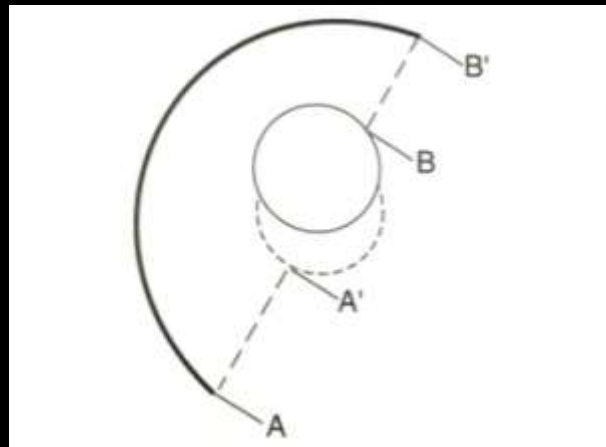
263 POLIETILENO *LONGEVITY*®



**112 CERÂMICA X POLIETILENO
LONGEVITY®**



**151 METAL X POLIETILENO
LONGEVITY®**



OBRIGADO

