

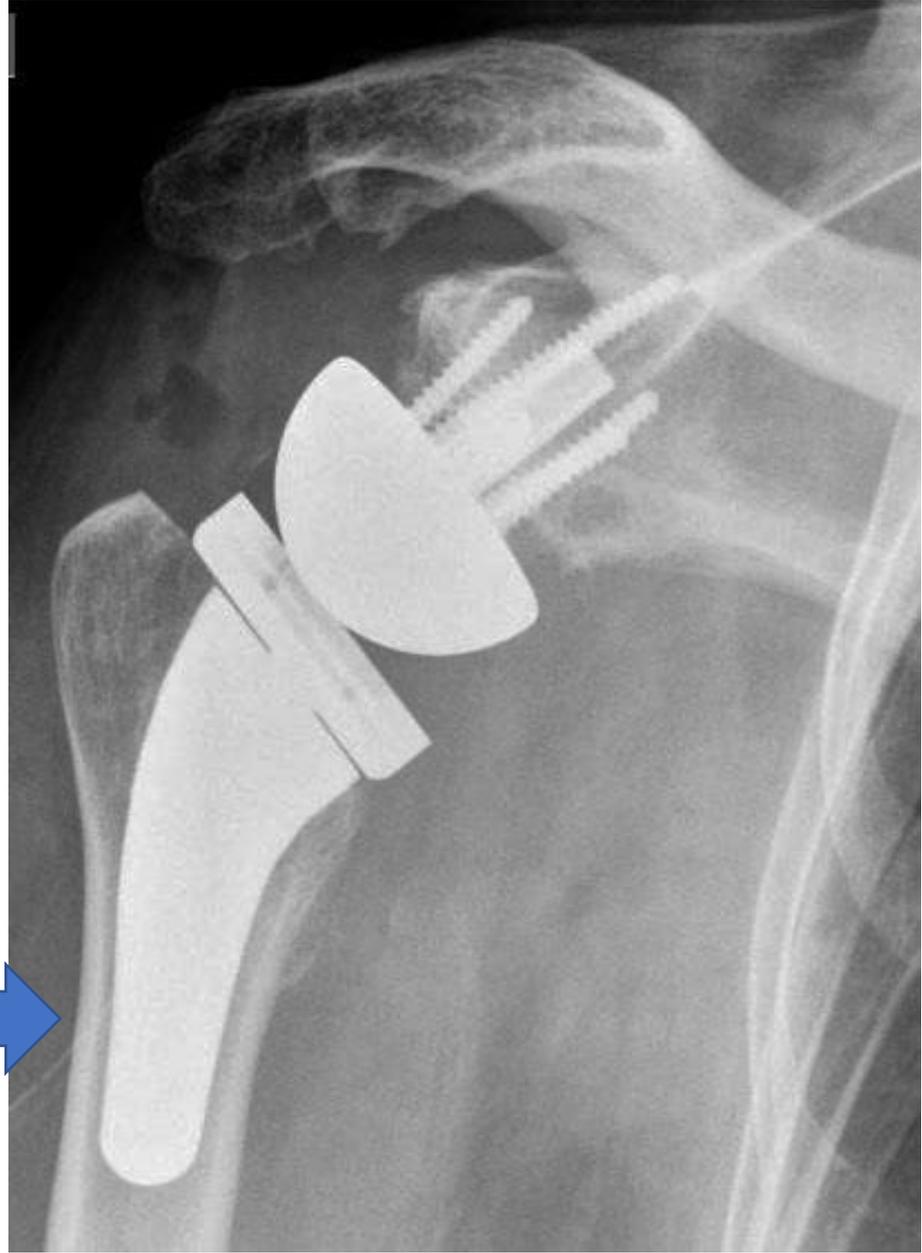
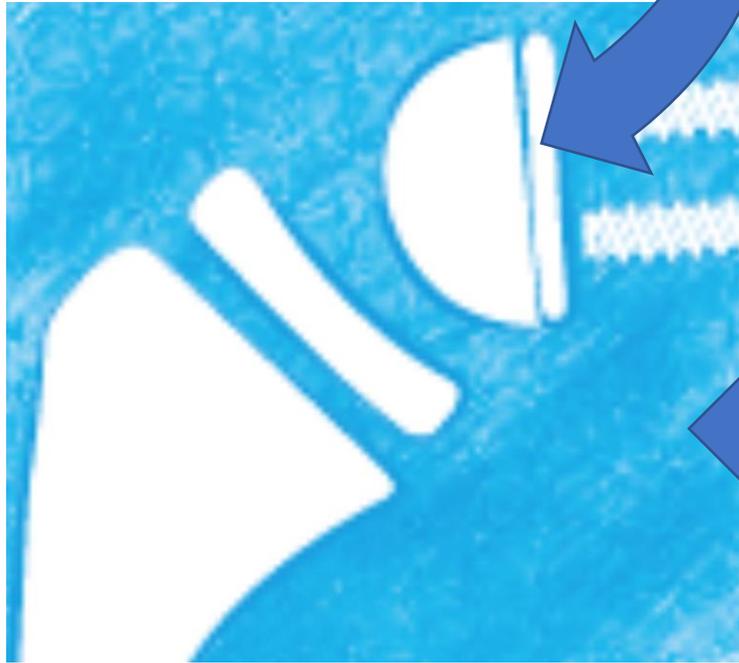
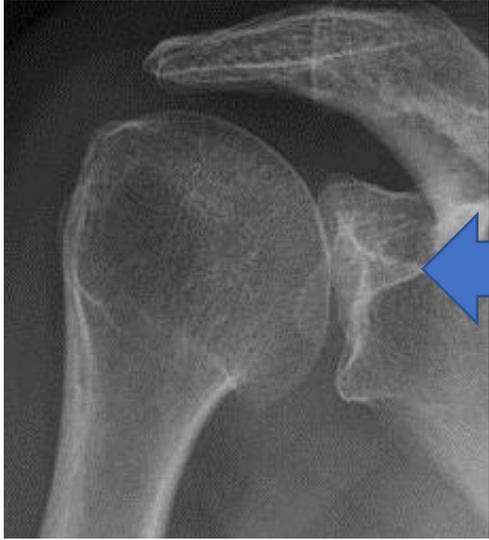
# Comment prévenir l'infection des prothèses inversées d'épaule?

Hervé Thomazeau

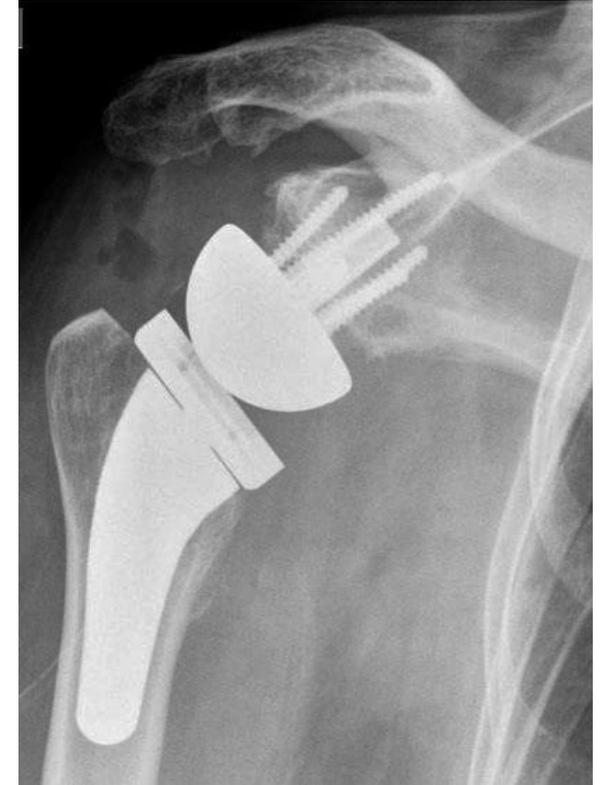
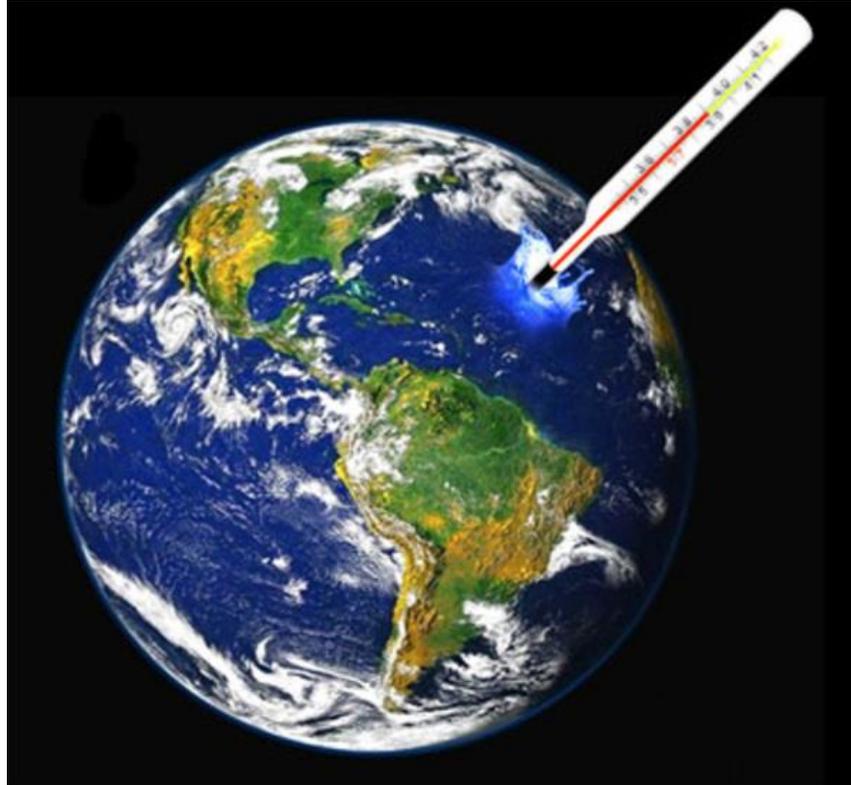


Stéphane Corvec



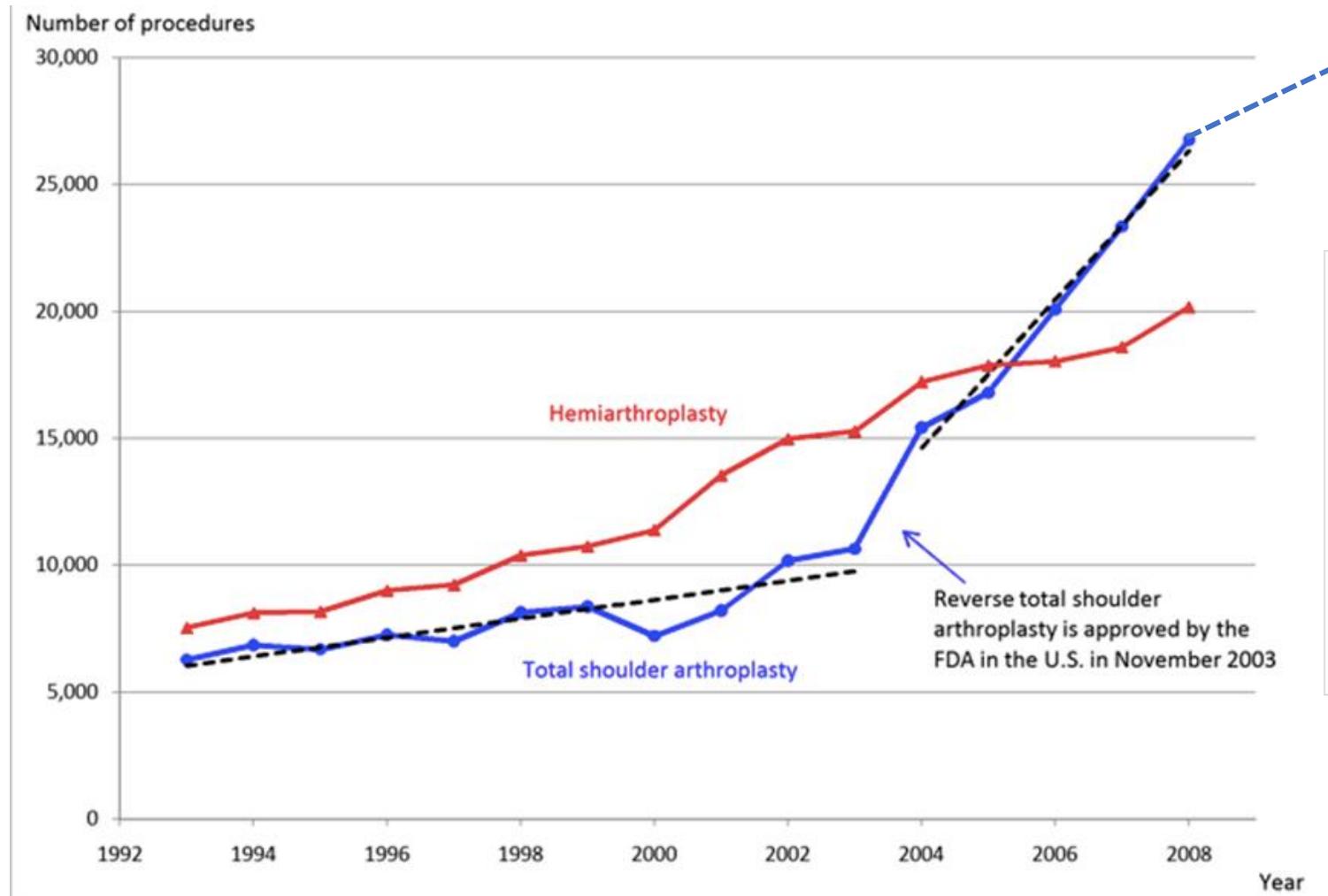


Mon inquiétude, tous les matins: *PTI* “global warming”

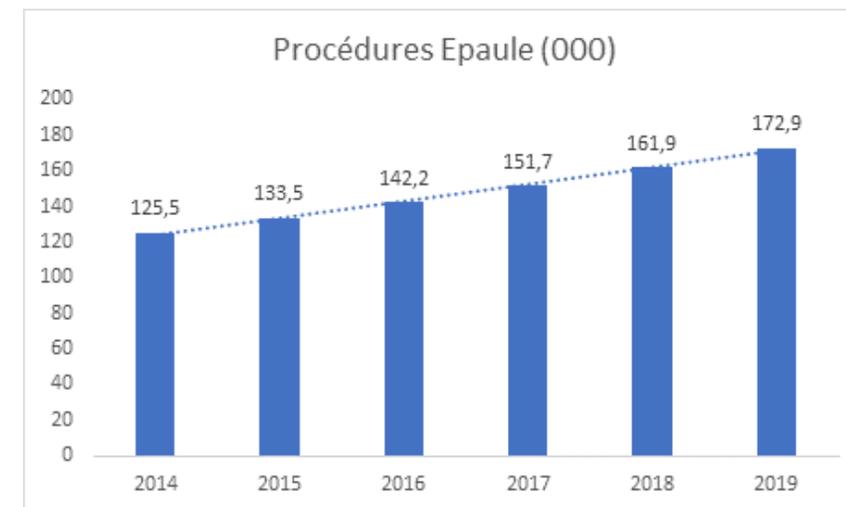


**PTI**infection

# PTInv *implantation*: une activité explosive



> 6A, + 38% en Europe

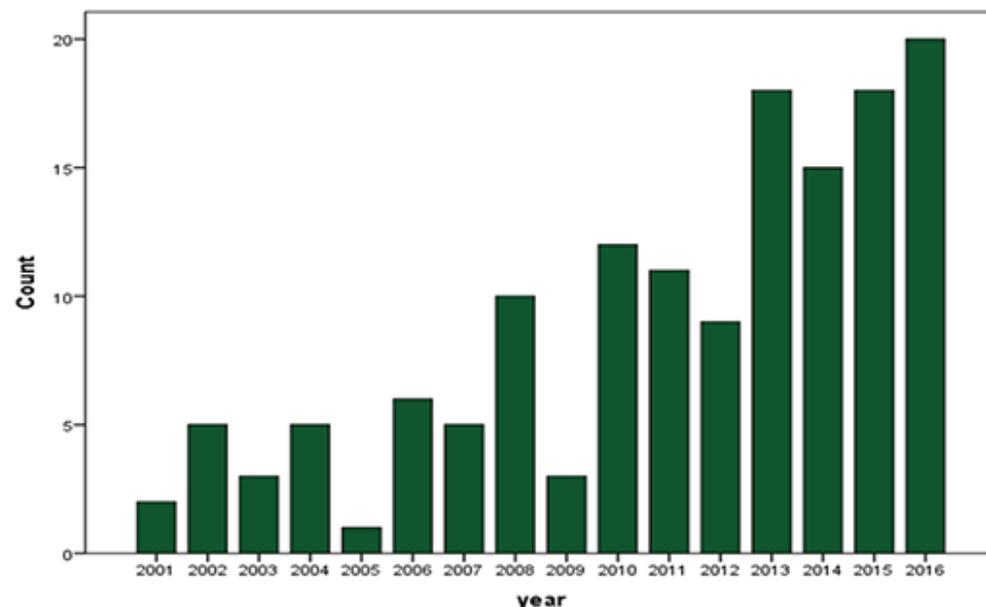


« Estimation Wright Medical »  
TSA 25 European Countries

*infection*: préoccupation croissante

Litterature  
publications

## Periprosthetic infection



### Search strategy (MeSH):

- Arthroplasty **OR** (Arthroplasty, Replacement) **OR** Hemiarthroplasty **AND**
- Shoulder **OR** Shoulder Pain **OR** Shoulder Joint **OR** Arthroplasty, Replacement, Shoulder **OR** Shoulder Fractures **OR** Shoulder Prosthesis **OR** Shoulder Injuries **OR** Rotator Cuff Tear Arthropathy **AND**
- Infection

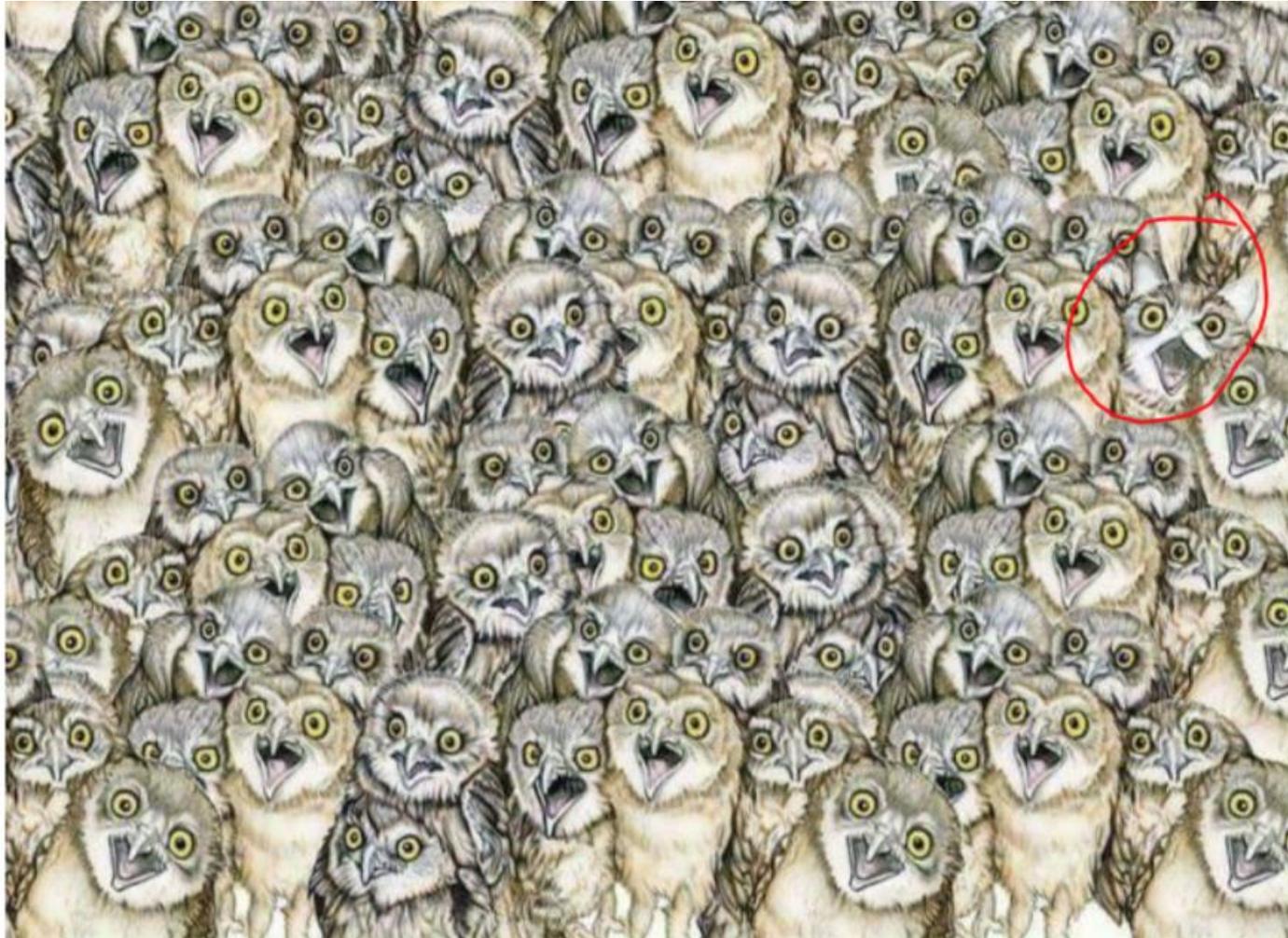
# Comment prévenir PTInfection?

= > pour s'améliorer

reconnaître la cible



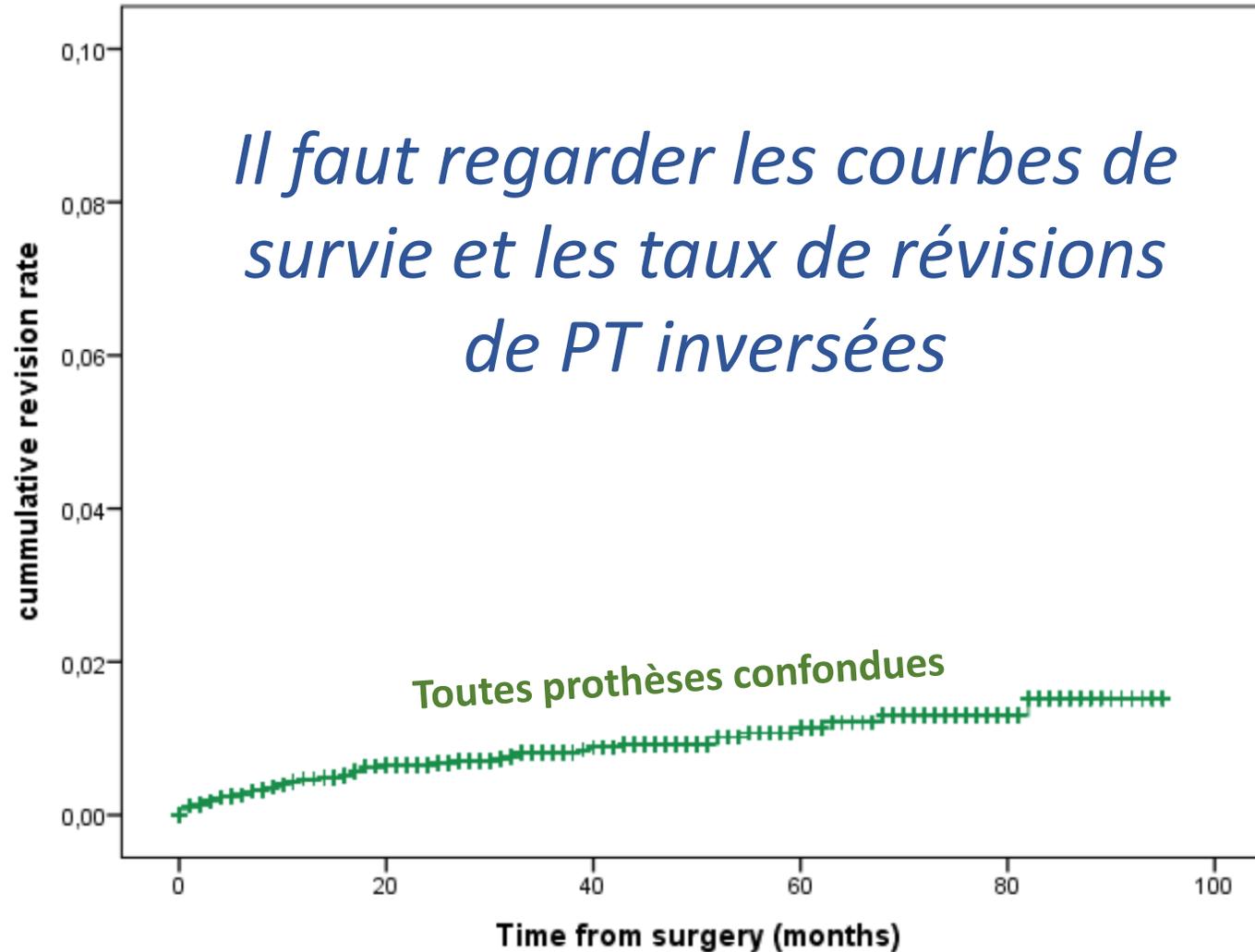
Chercher le “CATT”: “C Acnes Terrible Triad”



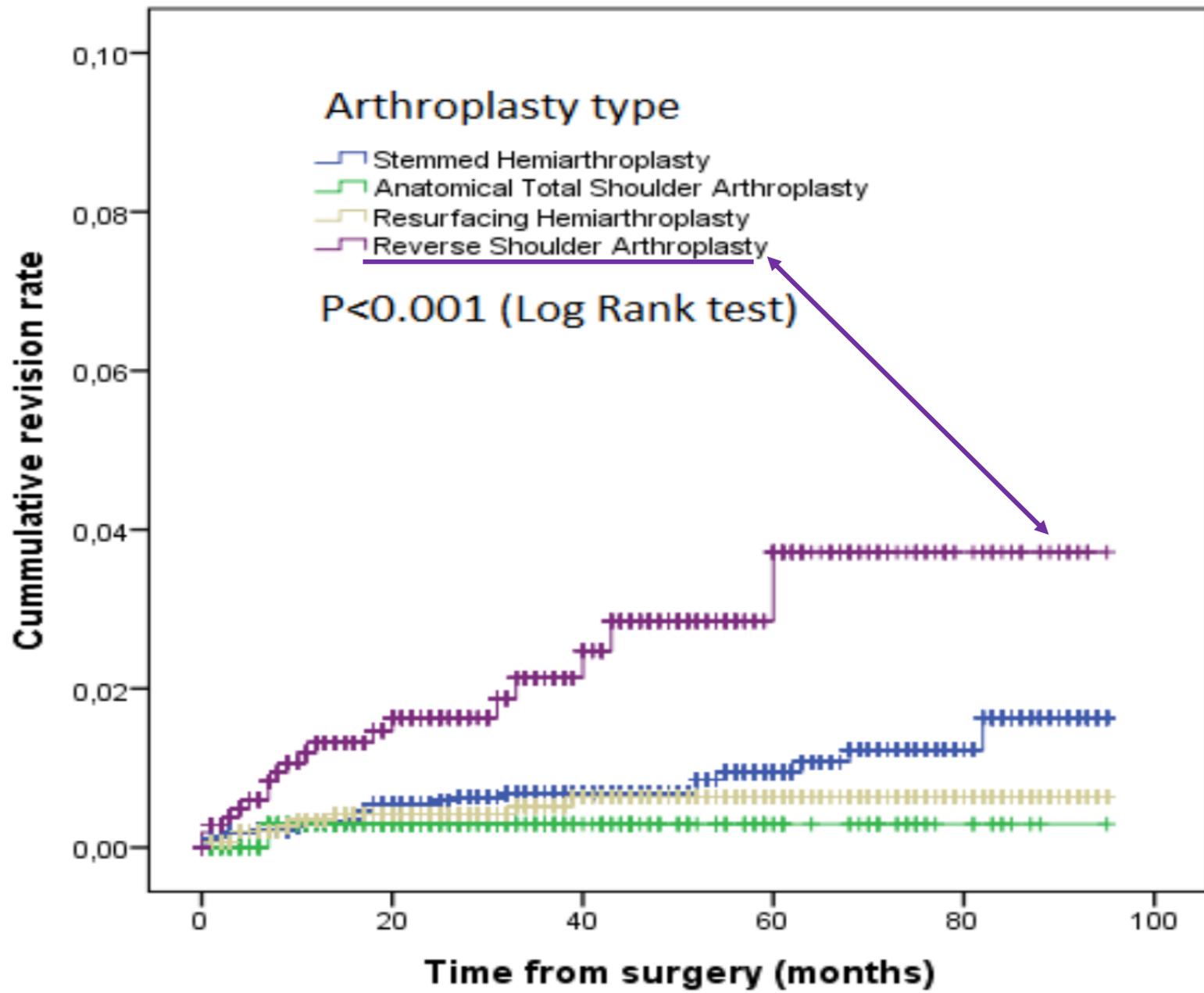
1) **les indices** dans la littérature!

# The Danish Shoulder Arthroplasty registry

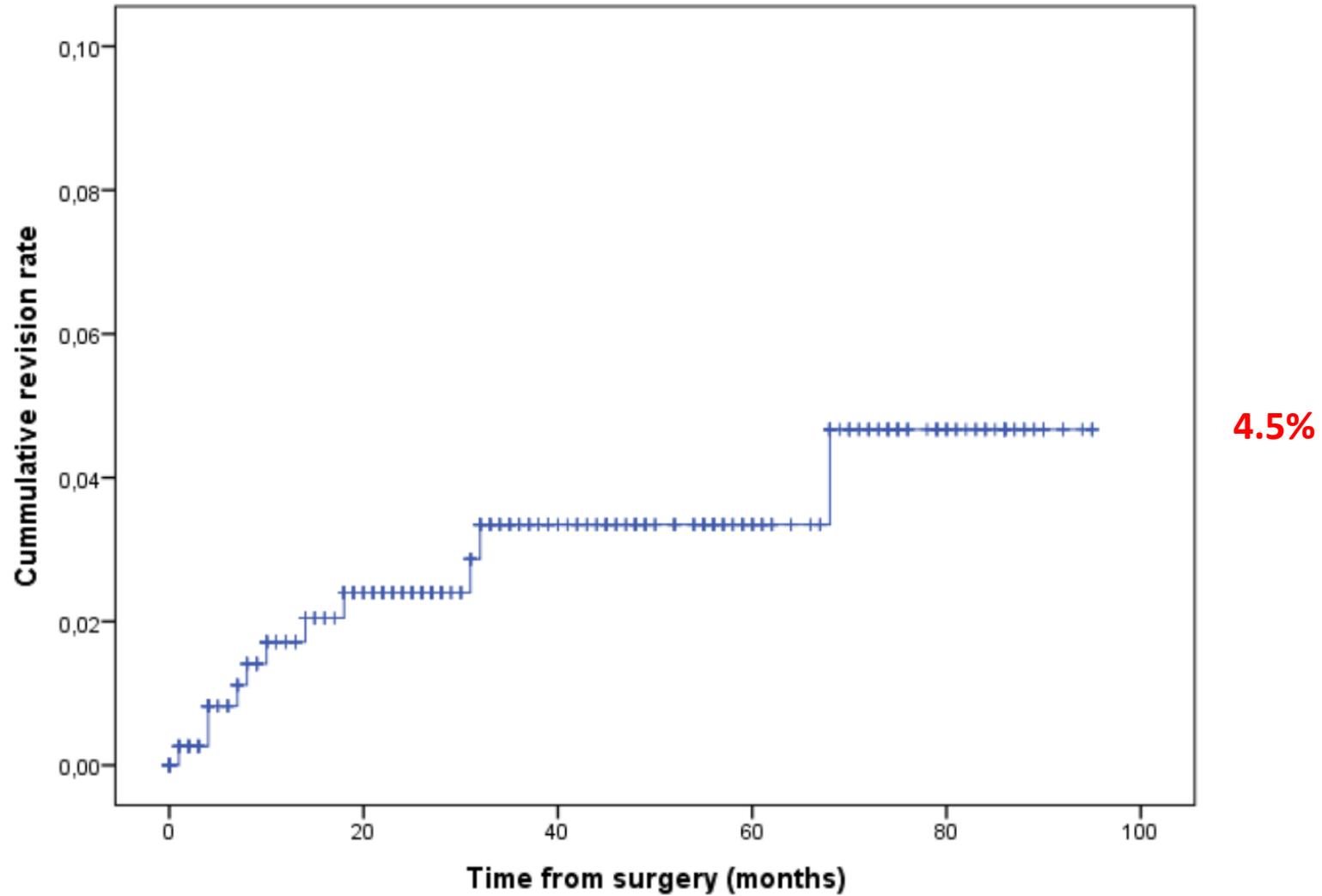
Overall cumulative revision rate



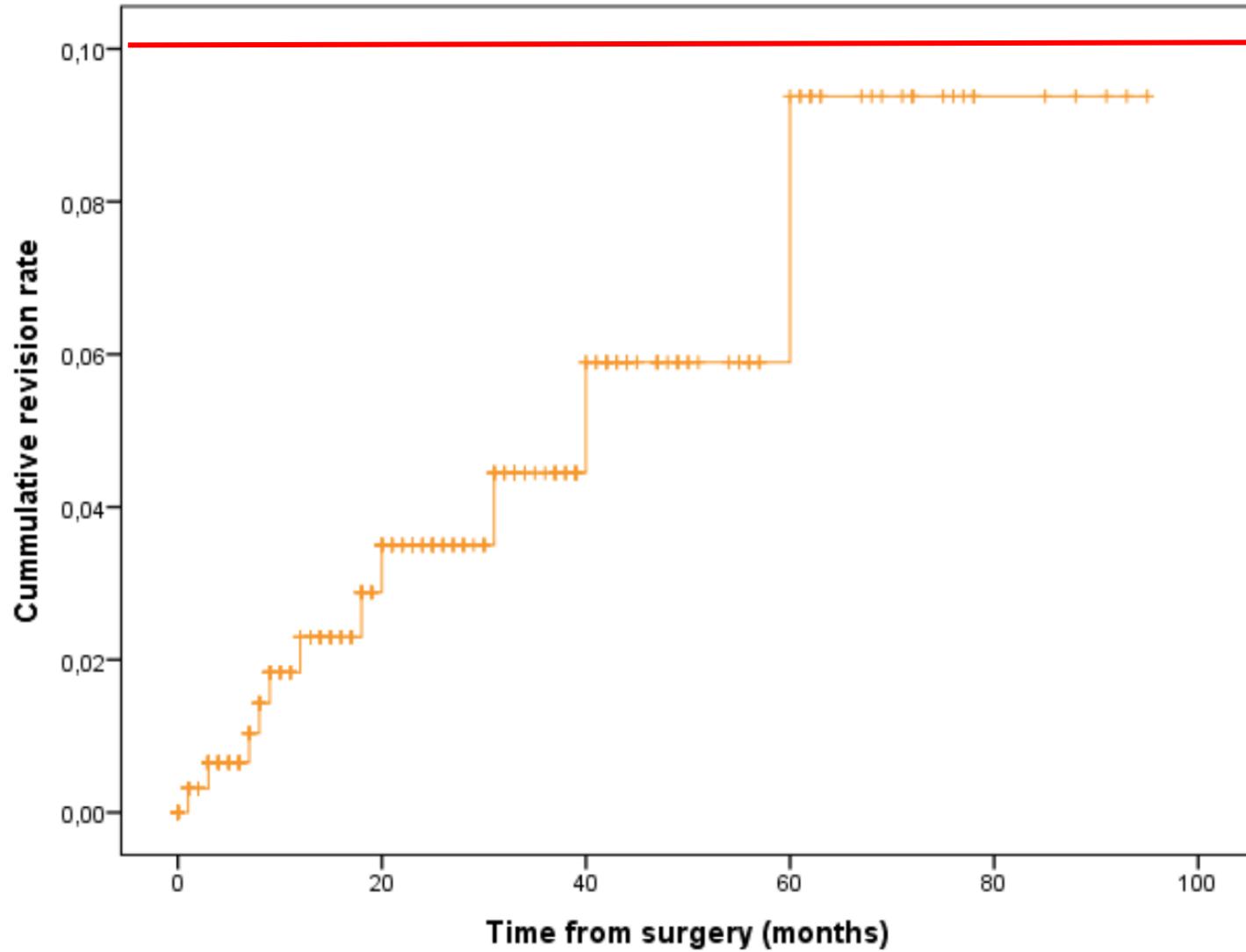
Courtesy Jeppe Rasmussen



Cumulative revision rate. male gender and previous Surgery



# Cumulative revision rate: male gender and reverse shoulder arthroplasty



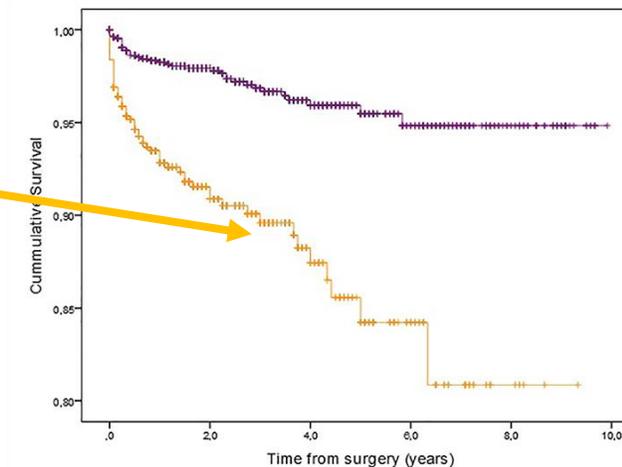
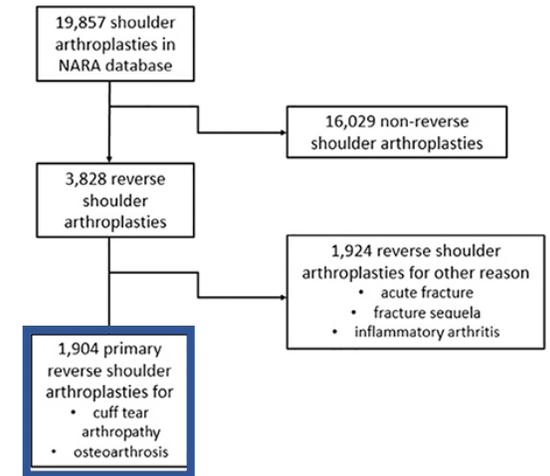
10%





+ ? = raison des révisions de PTI?

- **Retrospective studies** (predictive F for RTSA revision)
  - Age < 65 and previous TSA: *Morris BJ (JSES 2015)*
  - X 2 fold if non-arthroplasty surgery (@): *Werthel JM (JSES 2017)*
- **Prospective study** (register)
  - X 2.5 fold if male gender: Lehtimäki K (JSES 2018)

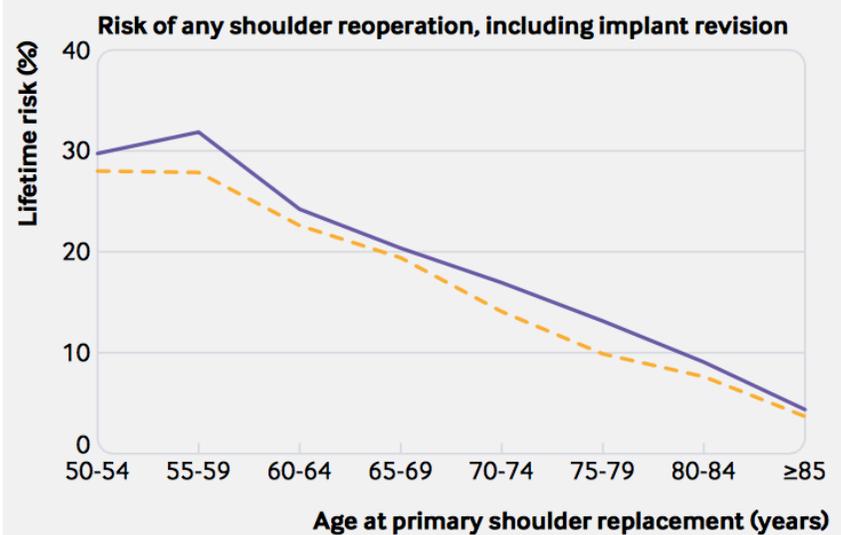
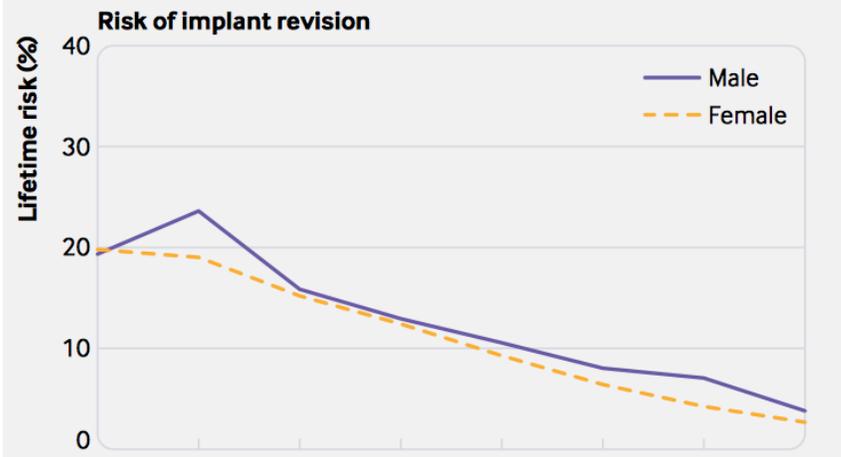


# Ou encore...

## **Serious adverse events and lifetime risk of reoperation after elective shoulder replacement: population based cohort study using hospital episode statistics for England**

Richard S Craig,<sup>1,3</sup> Jennifer C E Lane,<sup>1,3</sup> Andrew J Carr,<sup>1,3</sup> Dominic Furniss,<sup>1,3</sup> Gary S Collins,<sup>2,3</sup> Jonathan L Rees<sup>1,3</sup>

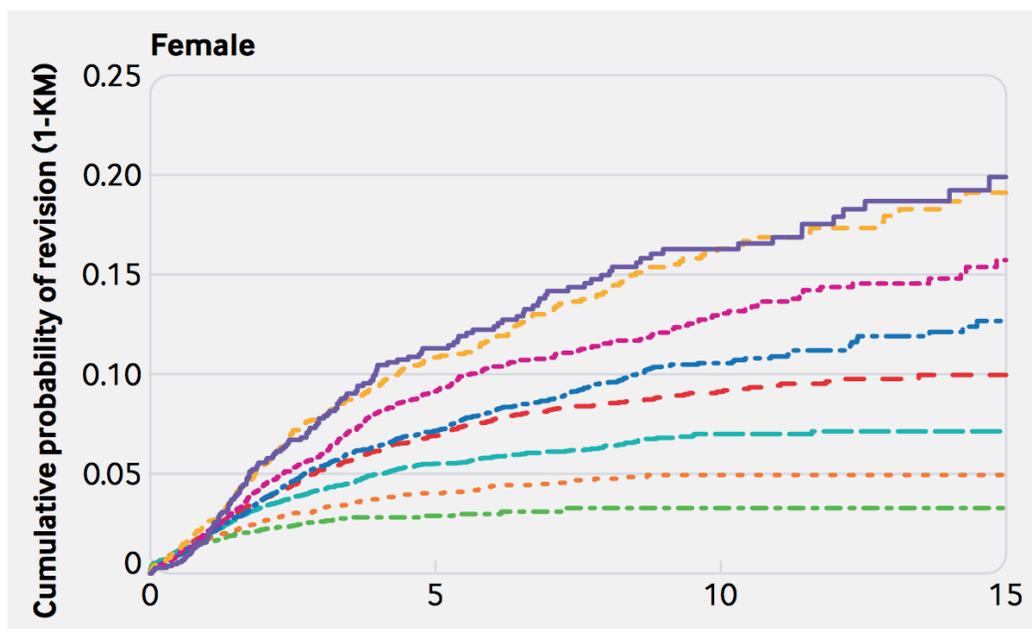
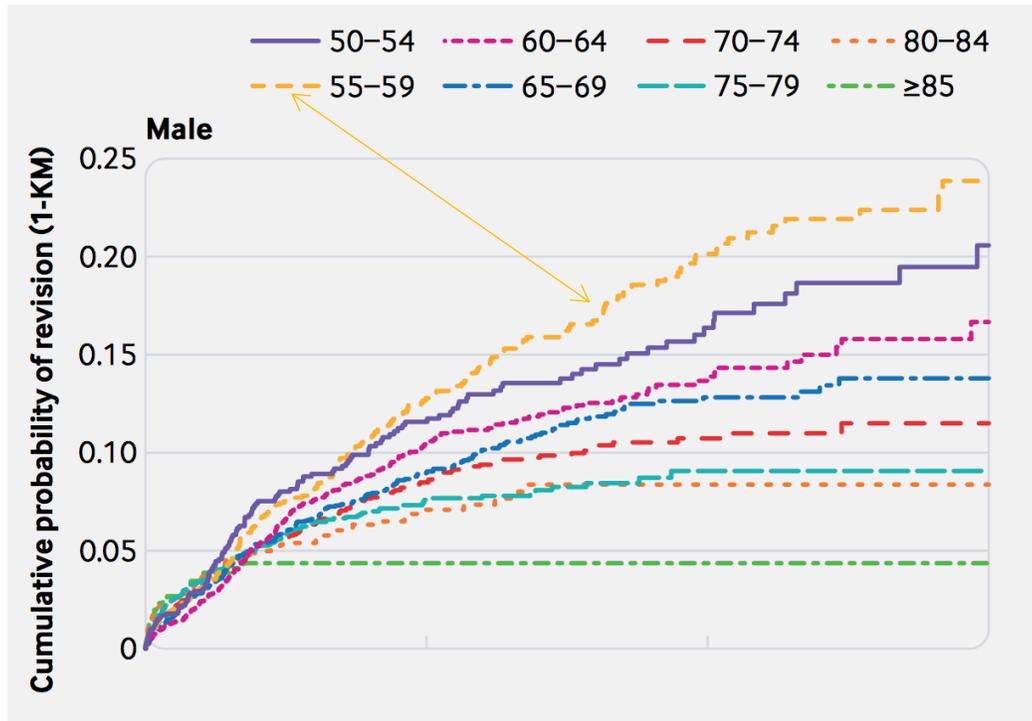
[thebmj](#) | *BMJ* 2019;364:l298 | doi: 10.1136/bmj.l298



**No of patients undergoing surgery by age and sex**

Male	1013	1491	2254	3092	3217	2786	1484	636
Female	1076	1942	3642	6306	8952	9902	6814	3446

**Fig 2 | Lifetime risk of revision and reoperation after elective primary shoulder replacement, stratified by age and sex at time of primary procedure**



Indice +++



*« Faut quand même  
admettre,  
c'est plutôt une  
complication d'homme »*

## 2) + infection = hypothèse n°1

- Operative wound is potentially a contaminated batterfield
- 10 to 40% U<sub>nexpected</sub> P<sub>ositive</sub> C<sub>ulture</sub>
- C *acnes* + S *epidermidis*



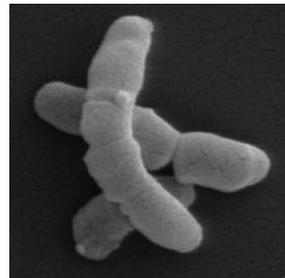
***Cutibacterium acnes* in primary reverse shoulder arthroplasty: from skin to deep layers**

Carlos Torrens, MD, PhD<sup>a,\*</sup>, Raquel Marí, MD<sup>a</sup>, Albert Alíer, MD, PhD<sup>a</sup>,  
Lluís Puig, MD, PhD<sup>a</sup>, Fernando Santana, MD, PhD<sup>a</sup>, Stéphane Corvec, PharmD, PhD<sup>b,c</sup>

<sup>a</sup>Department of Orthopedics, Hospital del Mar, Parc de Salut Mar, Barcelona, Spain

<sup>b</sup>Bacteriology and Infection Control Unit, Centre Hospitalier Universitaire Nantes, Nantes University Hospital, Nantes, France

<sup>c</sup>Center for Research in Cancerology and Immunology, Université de Nantes, Unit 1232, Nantes, France

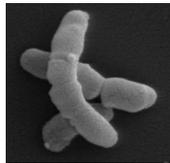
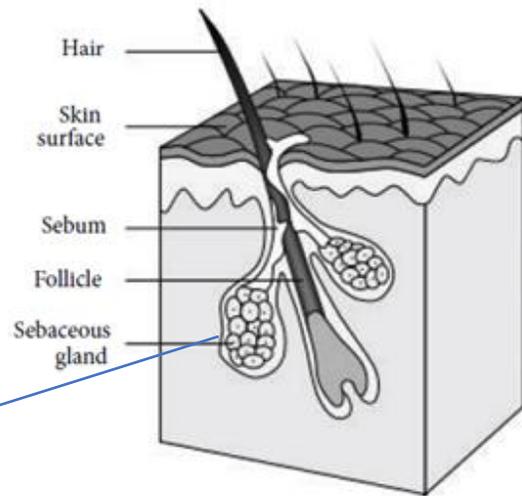


Almost 20% of *C. acnes* in the deep layers  
Same clusters than in RTSA infection



*CA = normal superficial shoulder resident*

80-100 follicles/cm<sup>2</sup>

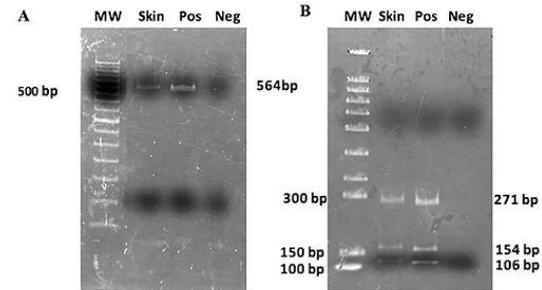


10<sup>6</sup> germs/follicles

• C Acnes = *résident normal du rez de chaussée*

➤ mais pas de la cave

➤ *Qiu B (JSES 2018)*

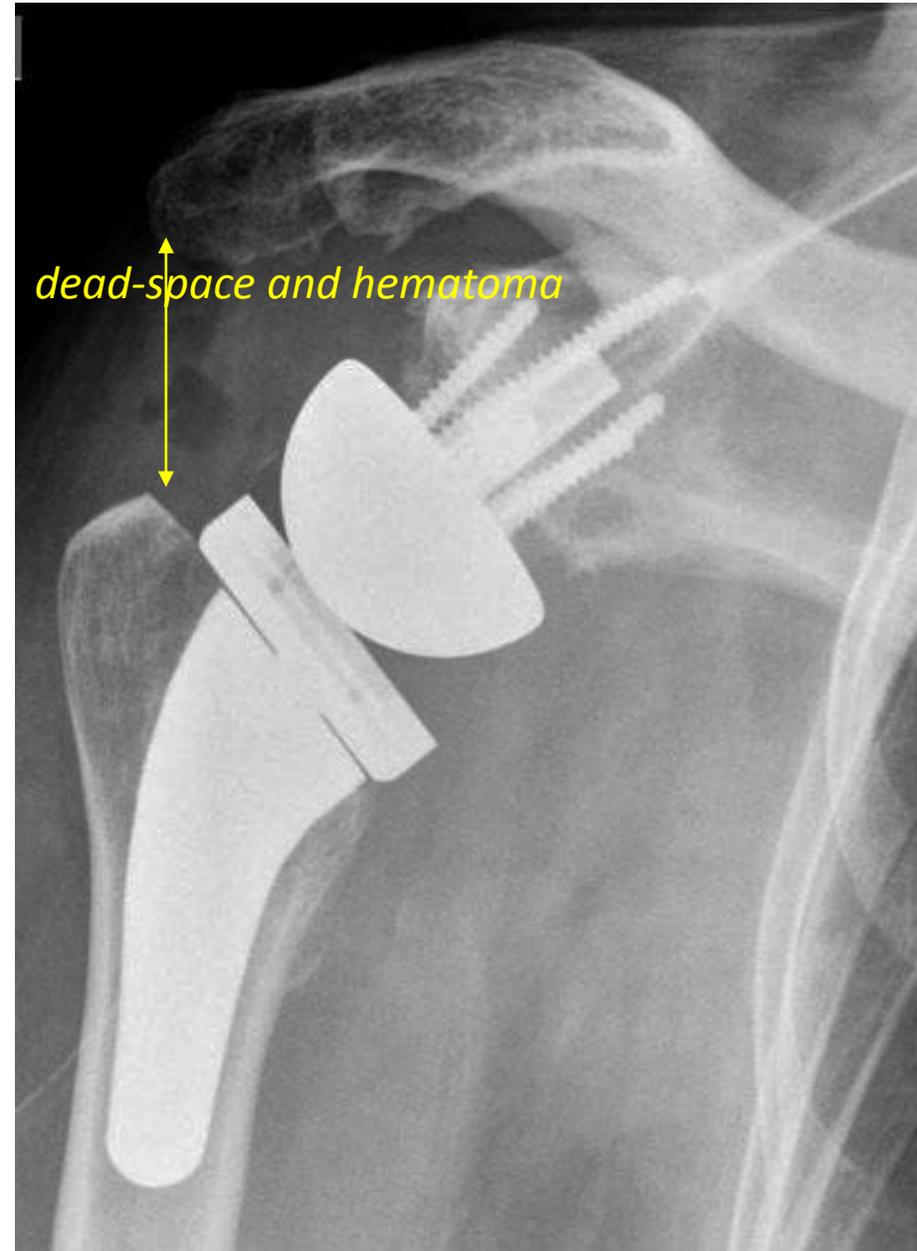


**Chirurgie préalable à une PT inv**

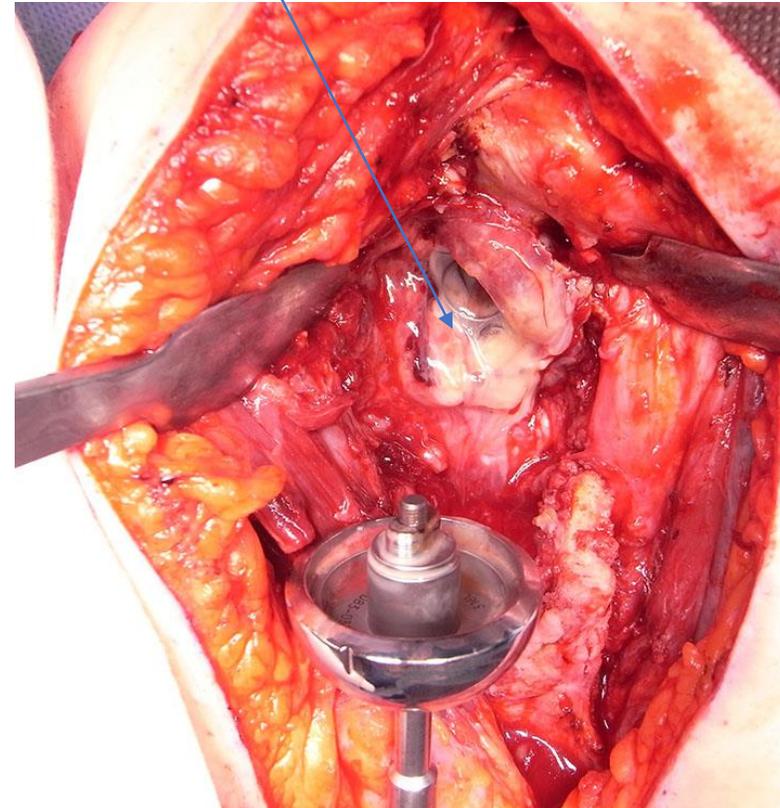
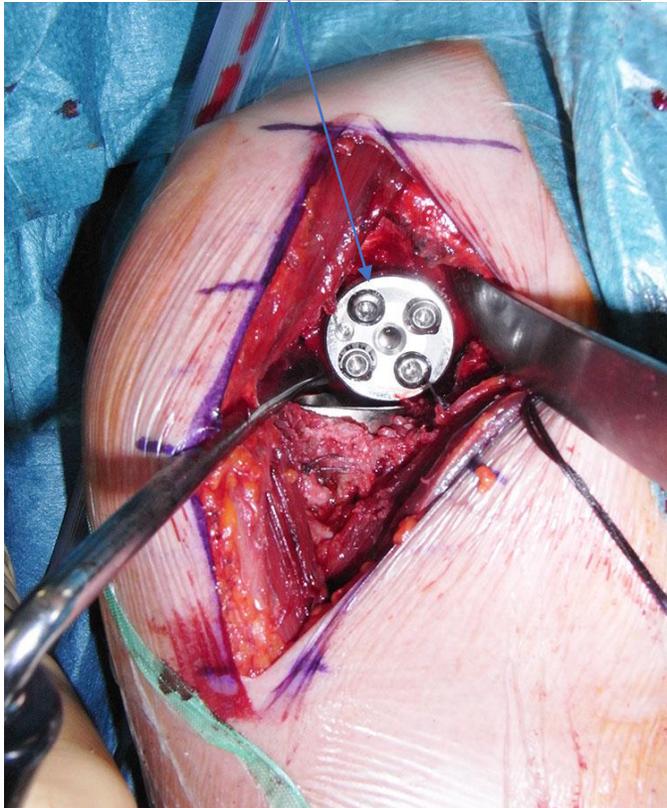
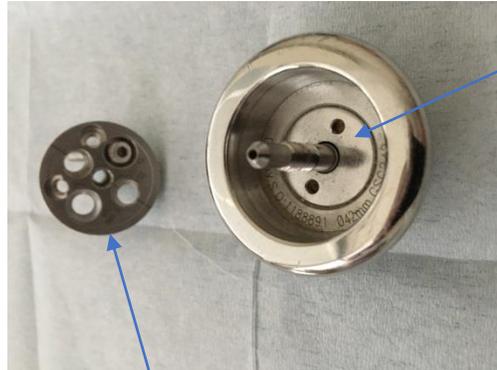
- Descend le CA à la cave
- (37° recommandée)
- attend son consommateur > PTinv



Contamination => “unexpected” PC => TRSAI<sub>nf</sub>



# Implant back-side cloaca



# 1<sup>ère</sup> prévention: identifier les patients "à risque"

- Histoire clinique: "CATT"



➤  + < 65A + déjà opéré@ = CA Terrible Triade

- Etablir un score de charge en C Acnes?

➤ Hsu JA et al (*JSES 2018*)

Specimen source	Culture Result	Specimen Propi Value (SpPV)	
Skin culture	3+ Propionibacterium acnes	3.0	→ Skin SpPV: 3.0
Collar membrane	1+ Propionibacterium acnes	1.0	
Humeral head explant	1+ Propionibacterium acnes	1.0	} Shoulder Propi Score (ShPS): 4.2
Humeral stem explant	1+ Propionibacterium acnes	1.0	
Humeral canal tissue	One colony Propionibacterium acnes	0.1	
Glenoid poly explant	One colony Propionibacterium acnes	0.1	
Periglenoid tissue	1+ Propionibacterium acnes	1.0	

**Figure 1** Sample calculation of the skin specimen *Propionibacterium* (Propi) value (*skin SpPV* = 3 in this example) and total shoulder Propi score (*ShPS* = 4.2). There were 6 deep specimens harvested, and so the averaged ShPS for this shoulder was  $4.2/6 = 0.7$ .

## 2) Prévention si indication à risque?



### • Regular

- co morbidities
- laminar flow
- surgical helmet
- skin barrier drapes
- gloves
- changing knife blades
- irrigation pre and per operative
- local antibiotics
- antibiotic loaded cement
- dressings
- etc...

J Shoulder Elbow Surg (2018) 27, 1333–1341



ELSEVIER

REVIEW ARTICLES

### Preventing infection in shoulder surgery

Jason “J.C.” Clark, MD<sup>a</sup>, Jeffrey T. Abildgaard, MD<sup>b</sup>, Jeffrey Backes, MD<sup>c</sup>,  
Richard J. Hawkins, MD<sup>d,\*</sup>

### • Specific

- Prophylactic antibiotics
- Skin preparation
- Pre incision decontamination

JOURNAL OF  
SHOULDER AND  
ELBOW  
SURGERY

[www.elsevier.com/locate/ymse](http://www.elsevier.com/locate/ymse)

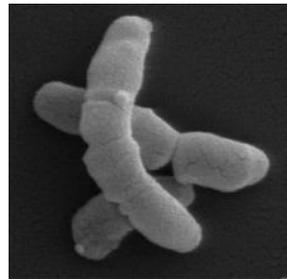


# Antibioprophylaxie générale= insuffisante

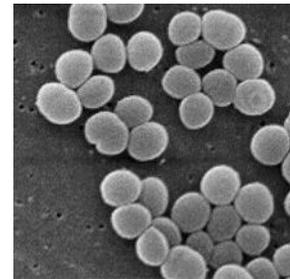
- Cefazolin: *Phadnis J (JSES 2016)*
  - Ceftriaxone + vancomycine > Cefazoline alone: *Matsen FA (JSES 2015)*
  - Doxycycline: *Namdari S (JSES 2017)*
  - Etc...
- 
- Cefazoline (2gr-1h) remains the recommendation

*Propionibacterium acnes*: from Commensal to Opportunistic Biofilm-Associated Implant Pathogen

Yvonne Achemann,<sup>a</sup> Elle J. C. Goldstein,<sup>b</sup> Tom Coenye,<sup>d</sup> Mark E. Shirtliff<sup>a,b</sup>  
Department of Microbial Pathogenesis, Dental School, University of Maryland, Baltimore, Maryland, USA<sup>a</sup>; Department of Microbiology and Immunology, School of Medicine, University of Maryland, Baltimore, Maryland, USA<sup>b</sup>; R. M. Alden Research Laboratory, Santa Monica, CA, USA, and David Geffen School of Medicine at UCLA, Los Angeles, California, USA<sup>c</sup>; Laboratorium voor Farmaceutische Microbiologie, Ghent University, Ghent, Belgium<sup>d</sup>



no way for *C. acnes*



OK for *S. epidermidis*

# Préparation cutanée:



- Aller vers l'avant de l'épaule: => **VA delto-pect> supérieure ?**
  - *Hudeck R (JSES 2014)*
- **Faible efficacité de la Chlorexidine** with various techniques:
  - *Phadnis J (JSES 2016)*
  - *Heckman et al (Arthroscopy 2018)*



**Aucune préparation cutanée n'est efficace à 100% pour éradiquer CA**

# Benzoyl Peroxydase (BPO) en pré opératoire?

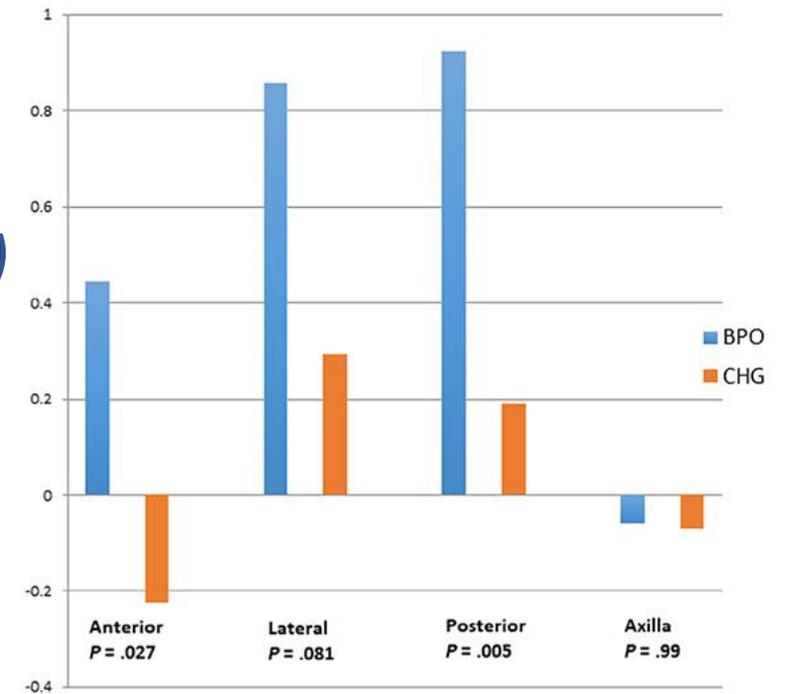
- Dermatologists litterature



- *Kolakowki (JSES 2018)*

➤ BPO reduces skin CA burden (x 10 fold)

Superficial sampling



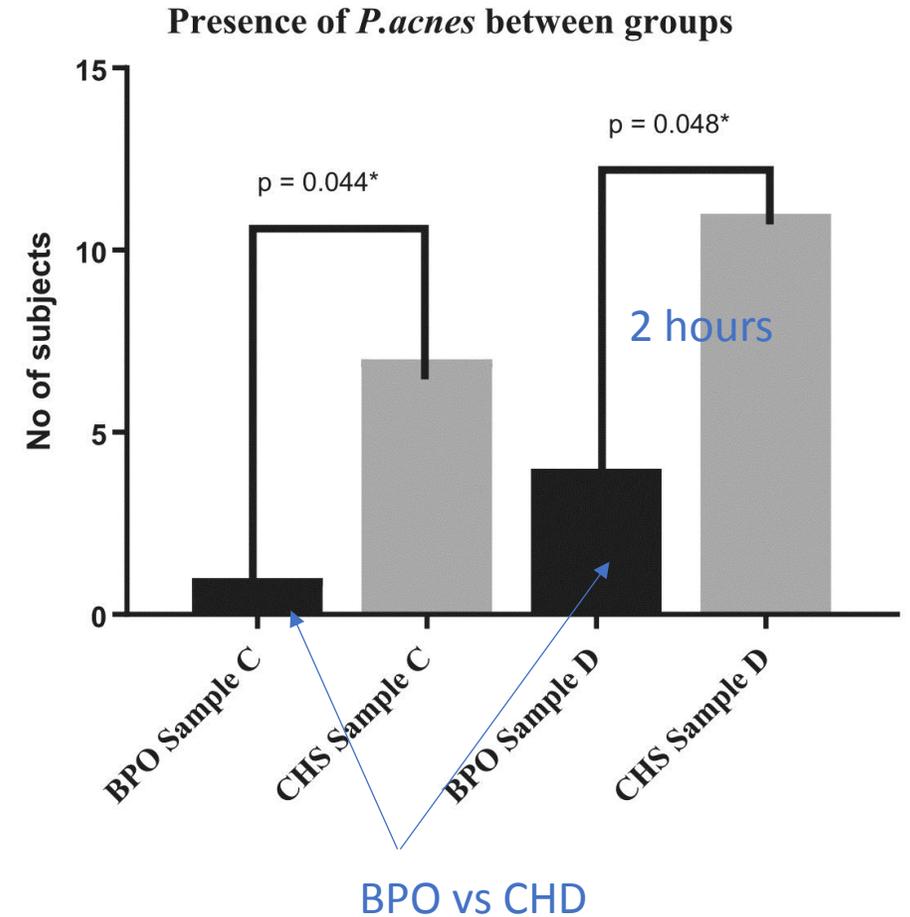
Rate of reduction of CA burden with BPO vs CHD



- *Sheer VM (JSES 2018)*

- *BPO reduces skin CA burden*
- *120 mn (D)*

Superficial sampling

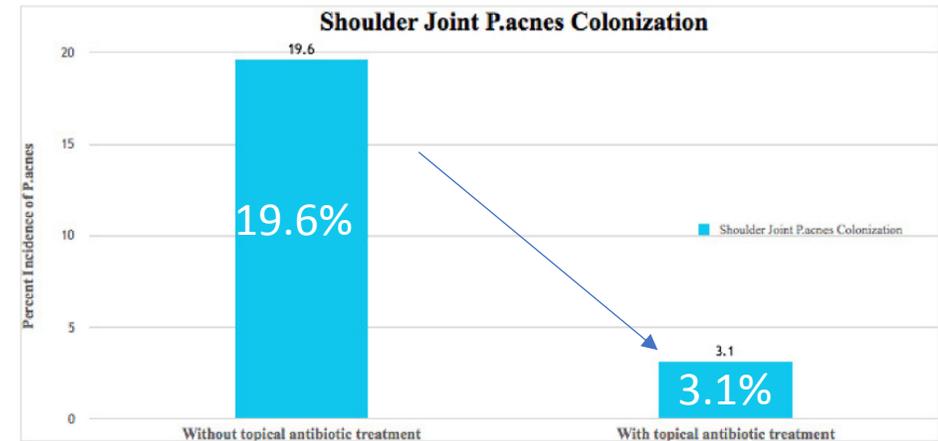


- BPO 5% alone: *Sabetta JR*: —————> 6% positive with BPO Vs 29%  
(JSES 2015)

- BPO + *Cindamycine*: *Dizay HH*  
(JSES 2017)



Deep layers @ sampling



**Figure 2** Shoulder joint inoculation with *P. acnes* at the surgical site deep tissue was decreased to 3.1% from 19.6%<sup>5</sup> ( $P = .006$ ) with the use of a topical benzoyl peroxide and clindamycin gel applied preoperatively.

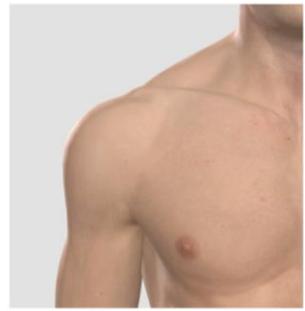
“pre-op BPO” pour le démontrer:



- Etude prospective randomisée:
  - cohortes suffisantes et nécessité de **prélèvements profonds**
- Corrélations cliniques avec le taux d'infection et de révision à 2 ans:  
*on process*



PHRC Régional: OPRICA



V1 = visite d'inclusion

5 jours pré op = application de Cutacnyl

Prélèvement Cutané N°1



Au bloc, avant désinfection

Prélèvement Cutané N°2



Au bloc, avant incision

Prélèvement Cutané N°3



Au bloc, avant incision

Prélèvement Derme N°4



Au bloc, après incision

Prélèvement Derme N°5



Au bloc, après incision

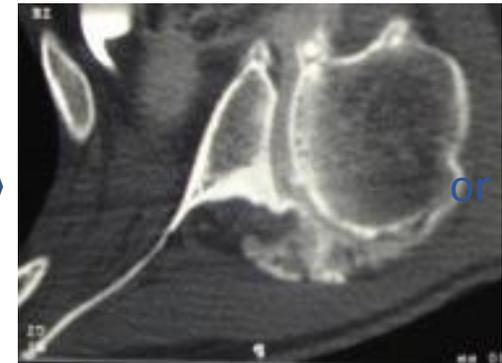
Prélèvement Capsule N°6

# 1- Take home messages:

- Identifies les patients à risque **CATT**
- Ne modifier pas l'antibioprophylaxie IV
- Agissez sur la préparation cutanée: BPO (\$8.66 US per patient)
- Continuez les études randomisées
- Interrogez-vous sur les nouvelles indications



The Journal of Bone & Joint Surgery  
YOUNG, HEALTHY, LEAN MEN ARE AT INCREASED RISK FOR HAVING  
SUBSTANTIALLY POSITIVE DEEP CULTURES FOR CUTIBACTERIUM  
(PROPIONIBACTERIUM) AT PROSTHETIC REVISION ARTHROPLASTY  
--Manuscript Draft--



## 2- questions non résolues dans ces cas:



- **En pré opératoire:**

- ponction systématique?
- voire biopsie?

- **En per-opératoire?**

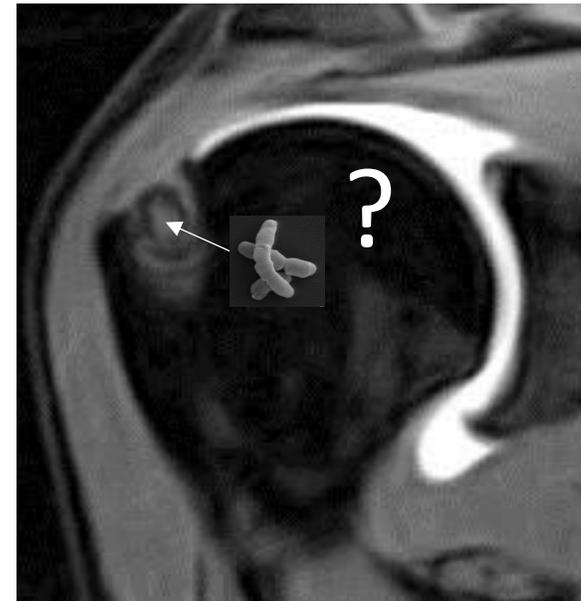
- PCR?

- **En post-opératoire:**

- antibiothérapie curative jusqu'au retour des prélèvements?

- *Prudence dans l'indication des premières interventions notamment arthroscopiques chez l'homme*

*male + @previous surgery*



# 3- Take home paper:

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