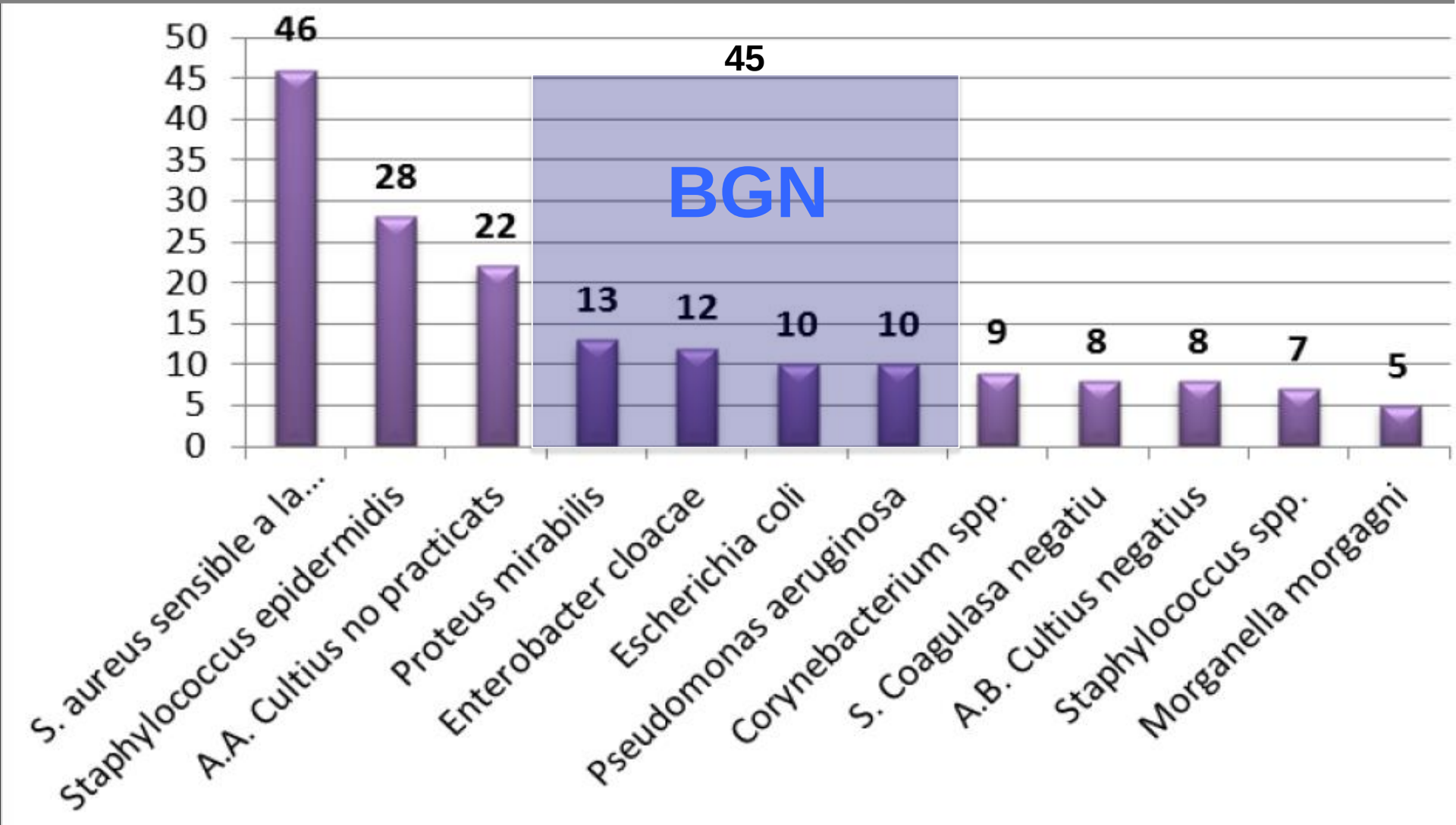
Tratamiento antibiótico local en la infección sobre prótesis articulares

Alex Soriano
Hospital Clínic de Barcelona

Programa de Vigilancia de Infecciones Nosocomiales de Catalunya (VINCat). Informe 2011-13 sobre infecciones en Cirugía Ortopédica electiva (prótesis de rodilla)

Factor	2011	2012	2013
Nº IQs	5668	6633	7047
Edad	72	-	-
ASA ≥3 (%)	24.5	-	-
Duración IQ >120’	14	13	10
ISQ (%)	2.5	2.6	2.7

Programa de Vigilancia de Infecciones Nosocomiales de Catalunya (VINCat). Informe 2013 sobre la etiología de las ISQ en prótesis de rodilla

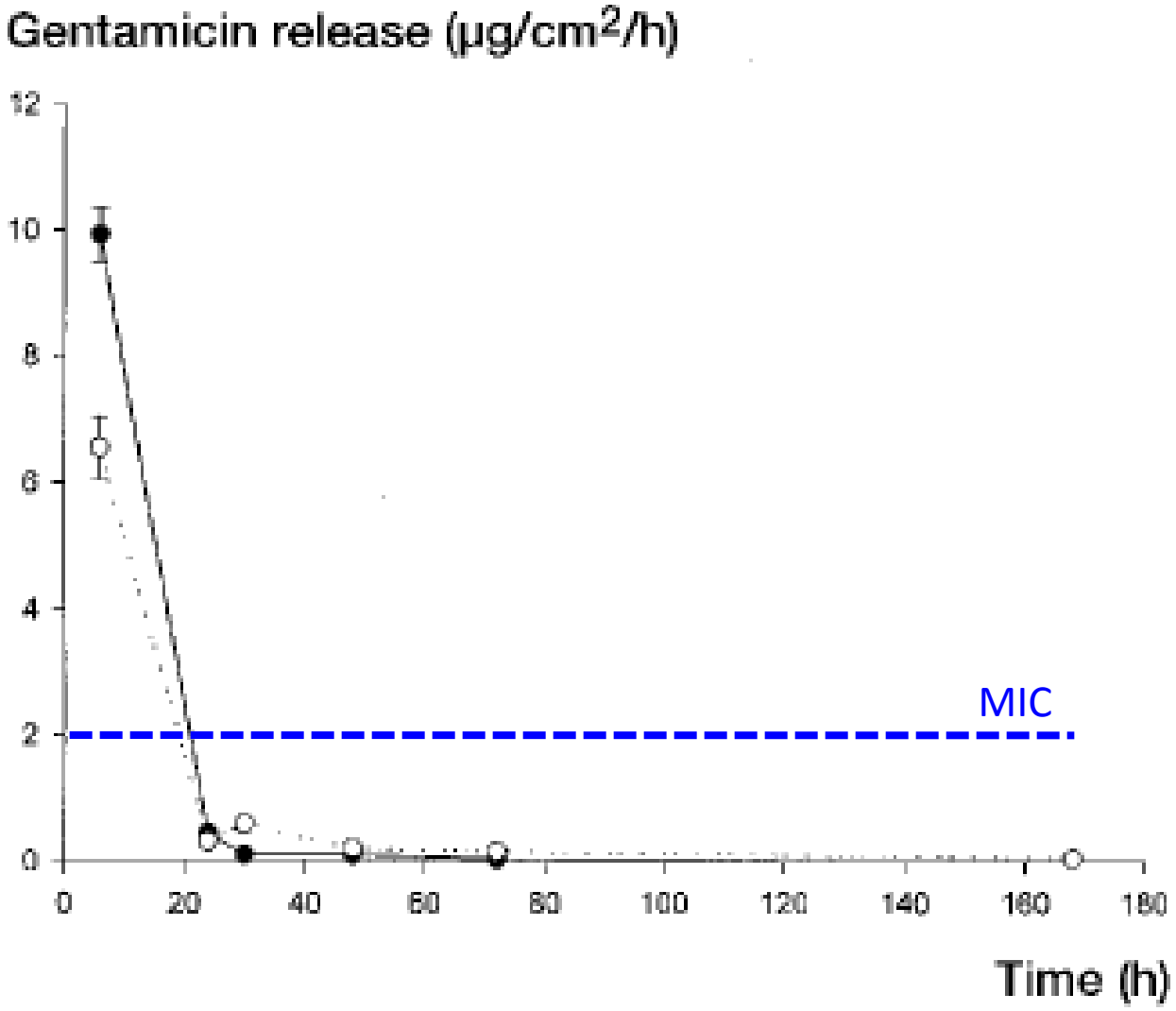


Gomez S, et al. Risk factors for prosthetic joint infection after primary knee arthroplasty: results from a prospective study. *EBJIS meeting in Loussane 2012.*

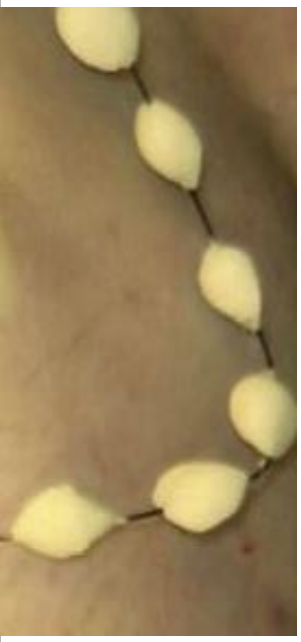
BMI (Kg/m^2)	Nº pat	Nº deep PJI	% PJI	
≤ 28	327	5	1.5	
28.1-31	340	5	1.5	
31.1-34	283	7	2.5	x 1.5
34.1-40	249	10	4	x 2.5
>40	57	3	5.3	x 3.5

1331 consecutive primary knee arthroplasties prospectively followed-up. *Endpoint*: deep prosthetic joint infection after 90 days. PJI rate was 2.4% (32 out of 1331)

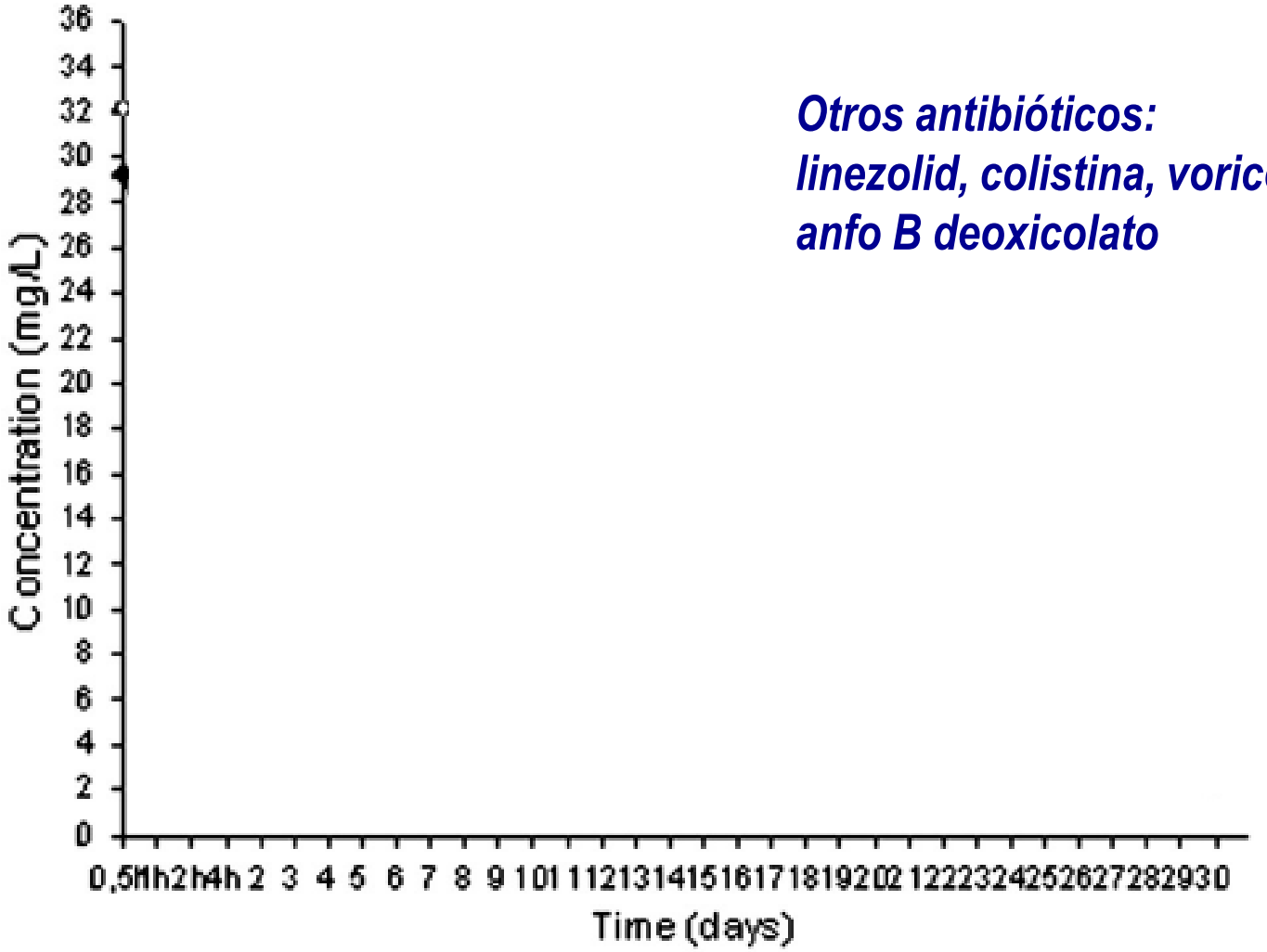
Hilbrand van De Belt, et al. Gentamicin release from polymethylmethacrylate bone cements and Staphylococcus aureus biofilm formation. *Acta Orthopaedica 2000; 71: 625-29*



Gálvez-López R, et al. Elution kinetics, antimicrobial activity, and mechanical properties of 11 different antibiotic loaded acrylic bone cement. *Diagn Microbiol Infect Dis 2014; 78: 70-4*

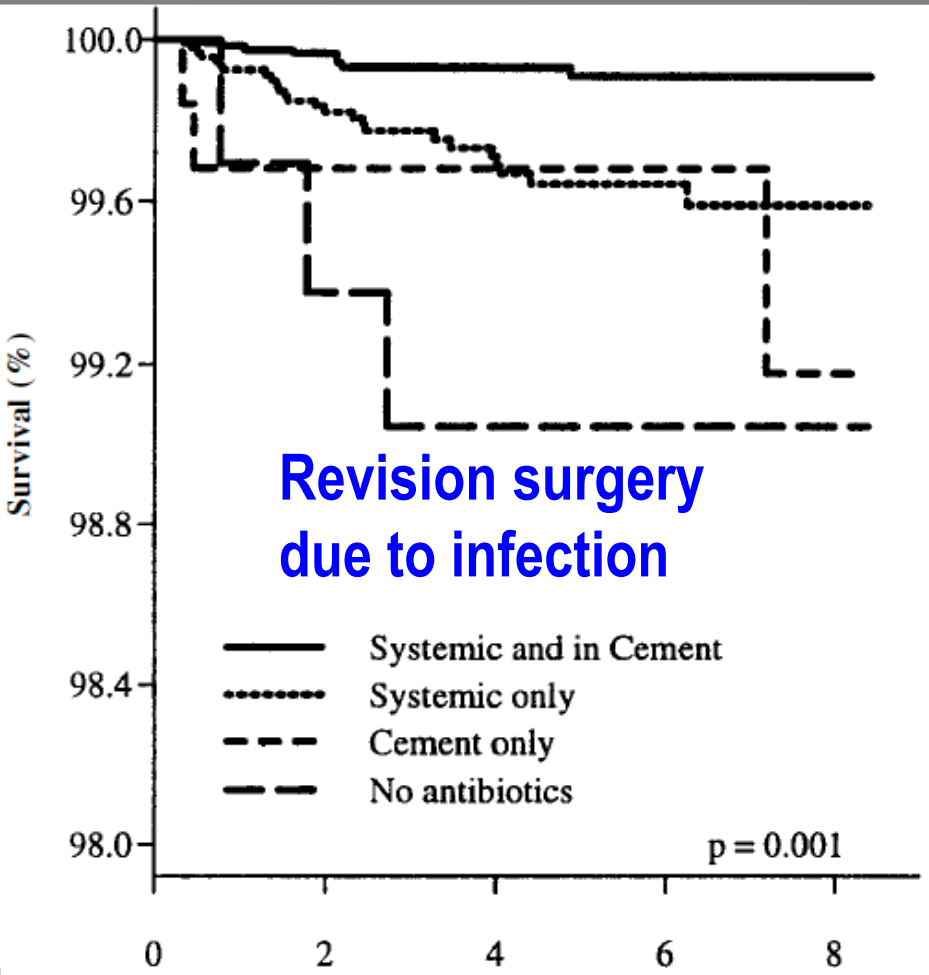


1-2 g ATB
10 g PMMA
Bolas 0.5 cm



Otros antibióticos:
linezolid, colistina, voriconazol, anfo B deoxicolato

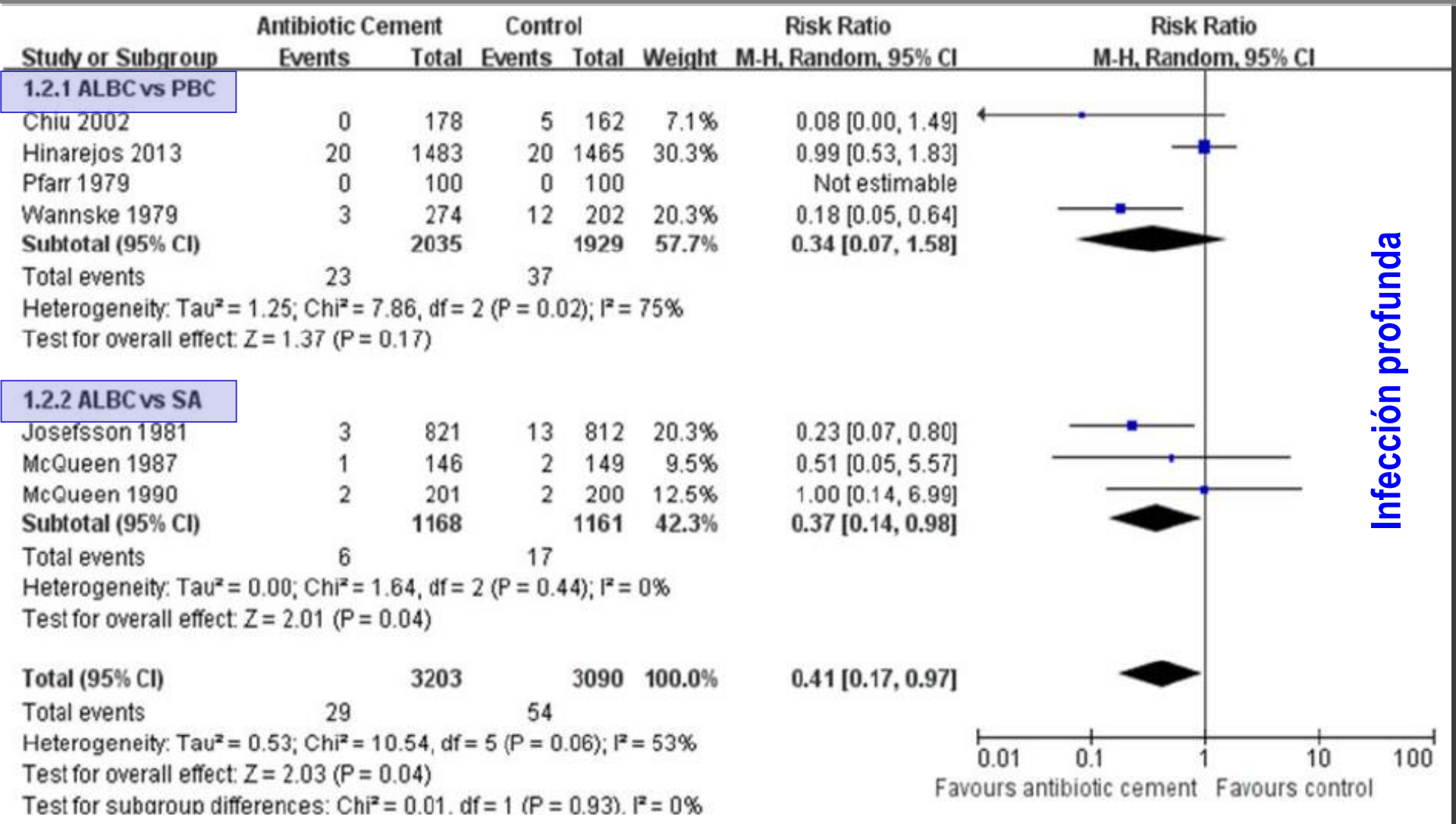
Espehaug B, et al. Antibiotic prophylaxis in total hip arthroplasty review of 10905 primary cemented total hip replacements reported to the norwegian arthroplasty register, 1987 to 1995. *J Bone Joint Surg [Br] 1997;79-B:590-5.*



0.5 g gentamicin per 40.0 g PMMA

Wang J, et al. A Systematic Review and Meta-Analysis of Antibiotic- Impregnated Bone Cement Use in Primary Total Hip or Knee Arthroplasty.

PloSONE 2013; 8: e82745



Hinarejos P, et al. The Use of Erythromycin and Colistin-Loaded Cement in Total Knee Arthroplasty Does Not Reduce the Incidence of Infection.

J Bone Joint Surg (Am) 2013;95:769-74

colistina+eritromicina

	Control Group* (N = 1465)		Study Group* (N = 1483)	
	No. of Knees	Rate (%) (95% CI)	No. of Knees	Rate (%) (95% CI)
Deep infection (n = 40)	20	1.37 (0.77-1.96)	20	1.35 (0.76-1.94)
Superficial infection (n = 45)	18	1.23 (0.66-1.79)	27	1.82 (1.14-2.50)
Total no. of infections (n = 85)	38	2.59 (1.78-3.41)	47	3.17 (2.28-4.06)

P> 0.05

Chiu FY, et al. Antibiotic-Impregnated Cement in Revision Total Knee Arthroplasty : A Prospective Cohort Study of One Hundred and Eighty-three Knees.

J Bone Joint Sur (Am) 2009;91:628-33

	Group 1 (N = 90)	1g vanco x 40g PMMA Group 2 (N = 93)
Age* *(yr)*	70 ± 7.8 (49-89)	71 ± 8.4 (55-90)
Sex†		
Male	55 (47%)	61 (53%)
Female	35 (53%)	32 (47%)
Side†		
Left	45 (47%)	51 (53%)
Right	45 (52%)	42 (48%)
Deep infection rate	6.7%	0
Total infection rate	7.8%	0

3 SARM
2 ECN
1 Strept

P< 0.05

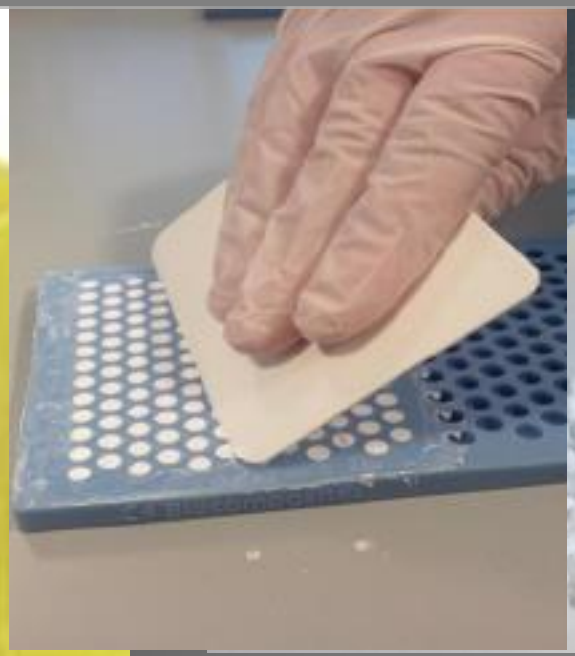
Conclusiones

1. ß-lactámicos (cefalosporinas y carbapenems), amino-glucósidos, glucopéptidos, daptomicina, linezolid o fluorquinolonas, voriconazol, anfotericina B deoxicolato, son estables al mezclarlos con cemento (PMMA).
2. La cinética de liberación del antibiótico al disolver el cemento+atb, se caracteriza por: 1) pico de 24-48h en general 10-100 mg/L y 2) rápida reducción de la concentración liberada hasta 10-15 días.
3. Puede considerarse el uso de cemento con antibiótico en pacientes con alto riesgo de infección (obesidad, artritis reumatoide, DM, portadores de SA) y en recambios protésicos.

colágeno

bolas de s. cálcico

atb polvo



hueso alogénico

Zebala LP, et al. Intrawound Vancomycin Powder Eradicates Surgical Wound Contamination: An in Vivo Rabbit Study.

J Bone Joint Sur (Am) 2014;96:46-51

	Fascia	Muscle	Bone	Wire
No. positive cultures/total no.				
Vancomycin-treated				
Control				
P value				

1.- Cefazolina en la inducción a todos los animales.
2.- Contaminación del material con 100 µL de una solución con 10^8 UFC/mL.
3.- Grupo de estudio (n=10), antes del cierre de la herida se administró vancomicina en polvo (100 mg).
4.- Sacrificio a los 4 días y cultivo de muestras.

Autor / Revista	IQ	control (n)	Nº inf (%)	V (n/dosis)	Nº inf (%)
O'Naill. Spine J 2011	Sp	54	7(13)	56/-	0
Sweet FA. Spine 2011	Sp	821	21(2.6)	911/ 2g	2 (0.2)
Molinari. Eur Spine J 2012	Sp	-	-	1512/ 1g	15 (0.99)
Strom. Spine 2013	Sp	92	10 (11)	79/ 1g	2 (2.5)
Strom. Clin Neur 2013	Sp	97	11 (11)	156/ 1g	0
Heller. J Sp Dis 2013	Sp	341	18 (5.2)	342/ 0.5-2g	9 (2.6)
Carrom. Spine 2013	Sp	72	11 (15)	40/ 1g	0
Total	Sp	1477	78 (5.3)	3096/ 1-2g	28 (0.9)

Tubaki, et al. Effects of Using Intravenous Antibiotic Only Versus Local Intrawound Vancomycin Antibiotic Powder Application in Addition to Intravenous Antibiotics on Postoperative Infection in Spine Surgery in 907 Patients. *Spine 2013; 38: 2149-55*

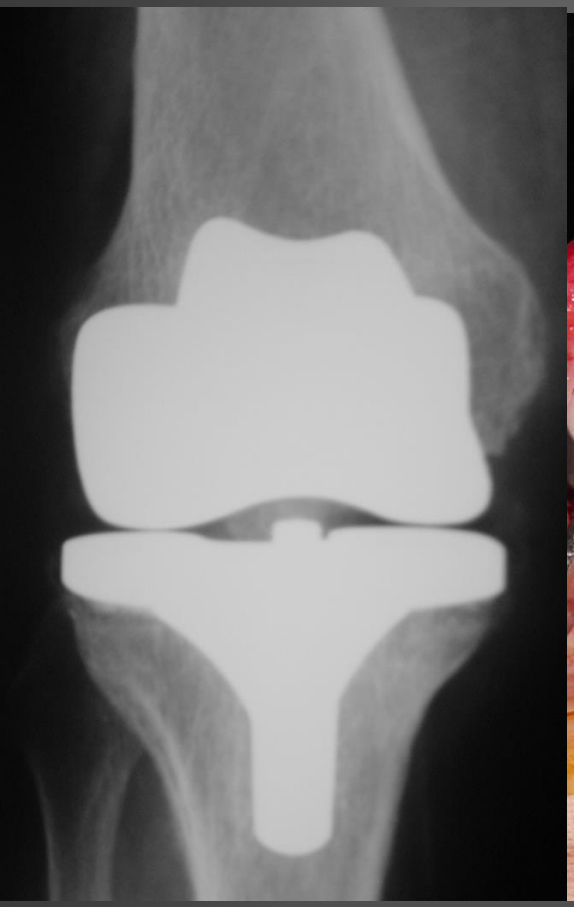
Spine Surgical Procedures	Infection	Control (No Vancomycin)	Treatment (Vancomycin)
	Not infected	298	296
Instrumented	Infected	6 (1.98%)	6 (1.99%)
	Total	304	302
	Not infected	168	130
Noninstrumented	Infected	2 (1.18%)	1 (0.76%)
	Total	170	131
Grand total		474	433
Total infection rate		1.68%	1.61%

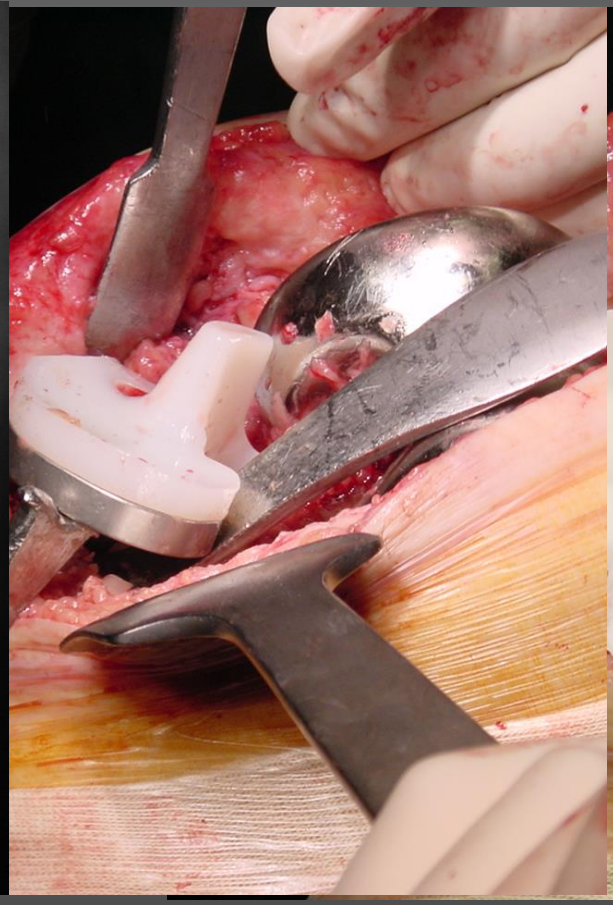
Estudio aleatorizado: 1 g de vancomicina en polvo al final de la IQ.

Infección sobre una prótesis articular

retirada

espaciador





Iarukov, et al. Clin Infect Dis 2012 (FDA)

Study by Arthroplasty Site	Study Period	Patients, No./ Joints, No.	Spacer Antibiotic Content (Dose, g/40 g Cement)	Infection Eradication Rate[a] By Review	Infection Eradication Rate[a] As Reported by Authors	Deaths[b]
Knee						
[43]	Not reported	12/12	Tobramycin (4.8) + vancomycin (4)	12/12 (100)	12/12 (100)	0
[17][c]	1995–2002	29/31	Tobramycin (4.6) + vancomycin (4)	25/31 (81)	29/31 (93)	0
[15][d]	1998–2005	102/102	Tobramycin (3.6) + vancomycin (4)	47/102 (46)	70/96 (73)	0
[20]	1986–1994	48/48	Tobramycin (3.6) + vancomycin (2)	43/48 (90)	44/48 (92)	0
[13][d]	1997–1999	58/58	Tobramycin (3.6) + vancomycin (1.5)	48/58 (83)	45/47 (96)	NA[e]
[44]	1998–2001	24/24	Tobramycin (2.4) + vancomycin (1)	22/24 (92)	22/24 (92)	0
[45]	1996–2001	28/28	Tobramycin (1.2) or gentamicin (1) + vancomycin (1)	25/28 (89)	25/28 (89)	0
[46]	2000–2005	36/36	Piperacillin-tazobactam (4.5) + vancomycin (2) + erythromycin (1)	32/36 (89)	32/36 (89)	0
[18]	1989–2001	50/50	Tobramycin (4.8)	44/50 (88)	44/50 (88)	NA
[22]	1994–2002	44/44	Tobramycin (4.8)	43/44 (98)	43/44 (98)	0
[14][d]				36/40 (90)	36/40 (90)	0
[19]				60/69 (87)	61/69 (88)	0
[47][f]				30/48 (63)	42/48 (88)	0
Hip						
[17][c]			ycin (4)	18/23 (78)	22/23 (96)	0
[48]			ycin (1)	12/12 (100)	12/12 (100)	0
[12][d]			ycin (1)	20/22 (90)	20/20 (100)	2 (9)
[10][d]			in	21/24 (88)	21/22 (95)	2 (8)
[16][d,f]		43/44	Gentamicin (0.25) + vancomycin (2)	35/44 (80)	38/41 (93)	3 (7)
[11][d]	1991–2001	42/42	Tobramycin (4.8)	26/42 (62)	26/27 (96)	8 (19)
[9][g]	1996–2003	38/38	Vancomycin (1)	32/38 (84)	34/38 (89)	2 (5)
[23][h]	2001–2006	40/40	Gentamicin (0.76)	38/40 (95)	39/40 (97.5)	0

Although 31.5% of the isolates were GNB, the infection eradication rate was 89.1%. It suggests that infection was eradicated with systemic therapy without contribution of locally delivered antibacterials.

Cement spacers loaded with antibiotics. *Robert L. Barrack, Keith R. Berend, Quanjun Cui, Thomas K. Fehring, Craig J. Della Valle, Thorsten Gehrke, Adolph V. Lombardi, Michael A. Mont, Javad Parvizi, and Bryan D. Springer*

"the scholarly desire of representatives of the US Food and Drug Administration to address issues related to this dreaded complication is both logical and commendable.

However, the conclusions drawn by Iarikov are concerning and unfounded. We as clinicians, and scholars such as the authors, need to begin questioning the rationale and foundation behind many of our practices. The latter is a welcome step in delivery of cost- effective medical care. The reality of medicine is such that not every aspect of care can be subjected to scientific scrutiny without placing patients at risk. In fact, the basic tenet of the "hypothesis" posed by the authors has never been subjected to a level 1 study either. There is no randomized, prospective study to show that systemic administration of antibiotics is "necessary" during management of PJI. It is only clinical experience and wisdom that calls for such practice. Poly- methyl methacrylate is an important and effective clinical tool for local delivery of antibiotics and in surgical management of PJI"

Wimmer M, et al. **Spacer usage in prosthetic joint infections does not influence infect resolution: Retrospective analysis of 120 joints with two-stage exchange.**

J Infect 2013; 67:82-4

Factor	OR (CI95%)	P
Sexo	2.3 (0.9-6)	0.08
Inf polimicrobiana	0.2 (0.1-0.5)	<0.001
ASA	0.5 (0.3-0.7)	<0.001
Espaciador	1.2 (0.4-3.2)	0.7

Estudio retrospectivo en 120 pacientes sometidos a R2T.
Espaciador (N=50) y no espaciador (N=70).
Variable principal: LIBRE DE INFECCIÓN A 2 AÑOS

Wimmer M, et al. **Spacer usage in prosthetic joint infections does not influence infect resolution: Retrospective analysis of 120 joints with two-stage exchange.**

J Infect 2013; 67:82-4

Factor	OR (CI95%)	P
Sexo	17 (3-103)	<0.001
Inf polimicrobiana	0.4 (0.01-0.2)	<0.001
ASA	0.3 (0.1-0.7)	<0.001
Articulación	12 (1.6-87)	0.01
Espaciador	4.3 (0.7-28)	0.127

Estudio retrospectivo en 120 pacientes sometidos a R2T.

Espaciador (N=50) y no espaciador (N=70).

Variable principal: RESOLUCIÓN DE PARÁMETROS DE LABORATORIO

Wimmer M, et al. **Spacer usage in prosthetic joint infections does not influence infect resolution: Retrospective analysis of 120 joints with two-stage exchange.**

J Infect 2013; 67:82-4

Factor	OR (CI95%)	P
Sexo	5.6 (1.5-20)	0.01
Inf polimicrobiana	0.1 (0.02-0.3)	<0.001
ASA	0.2 (0.1-0.5)	<0.001
Articulación	9 (1.9-45)	0.005
Espaciador	4 (1-17)	0.056

Estudio retrospectivo en 120 pacientes sometidos a R2T.

Espaciador (N=50) y no espaciador (N=70).

Variable principal: RESOLUCIÓN CLÍNICA