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Resistance to the main germs responsible for infections isolated at the Louis Malardé Institute's Clinical Laboratory (2003)

The bacterial strains tested came from medical clinics in Tahiti and the islands and from the outlying hospitals in 2003. They are a representative sample of germ sensitivity throughout French Polynesia over a 1000-km radius[1].

Two techniques were used for this study: the ATB Expression and Api ATB gallery from bioMérieux (liquid medium method) and the agar medium diffusion test (BioRad disks and Osiris analyser) recommended by the Société française de microbiologie (French Laboratory Society).

Streptococcus pyogenes (36 strains isolated)

1. ß-lactamines

Still sensitive to ß-lactamines.

2. Macrolides

Of the 36 strains isolated in 2003, two showed an MLSBi phenotype and none was MLSBc.

Phenotype resistance to macrolides	
MLSBc	**0%**
MLSBi	**5.5%**

Streptococcus pneumoniae (no strains isolated in 2003)

Staphylococcus aureus (121 strains tested)

Antibiotic	**R %**	**I %**
Penicillin G	95	
Oxacillin	23	
Gentamicin	5	
Kanamycin	31	
Tobramycin	25	
Erythromycin	26	2
Lincomycin	9	2
Pristinamycin	<1	0
Pefloxacin	5.8	3.3
Fusidic acid	10	10

[1] This report does not indicate the sensitivity of isolated germs at the Territorial Hospital where antibiotic pressure is much higher.

1. ß-lactamines

More than 20% of the strains were resistant to antibiotics from the ß-lactamines family (oxacillin resistant, OXAR).
Only 5% of the *Staphylococcus aureus* isolated were wild strains (Peni S).

2. Aminoglycosides

5% of the strains were KTG resistant (KTGR) phenotypes, 25% were KT resistant (KTR) phenotypes and 5.7% were isolated K resistant (KR) phenotypes. Most of the OXAR strains were also KTR.

3. Macrolides

11.5% of the strains were MLSB inducible resistance phenotypes (isolated resistance to erythromycin) and 9% were MLSB constitutive resistance phenotypes.
Note that there was no LinSA-type resistance.

4. Other families of antibiotics

20% of the strains were I or R to fusidic acid.
About 10% of the strains had diminished sensitivity (5.8% resistance) to fluoroquinolones.

Haemophilus influenzae (31 strains isolated)

1. ß-lactamines

Resistance to ß-lactamines	
ß-lactamase production*	**20%**
PLP mutation	**6%**

* Céfinase BioMérieux test, ref. 55622

2. Cotrimoxazol

4 were resistant to Bactrim®, i.e. 13%.

Neisseria gonorrhoeae (26 strains in 2003 — 13 in the urethral samples)

1. ß-lactamines

4 strains produced a ß-lactamase (Céfinase BioMérieux test), i.e. about 15%.

2. Fluoroquinolones

No fluoroquinolone resistance.

Enterobacteria identified in urine

1) Escherichia coli (786 strains tested)

Antibiotic	R %	I %
Amoxicillin	54	4
Ticarcillin	48	3
Augmentin®	32	12
Cefalotin	25	27.4
Cefotaxime	0	0
1st generation quinolones	3.3	
Fluoroquinolones	3	
Bactrim®	10	

Very high level of strains producing ß-lactamase.

The high resistance to 1st generation cephalosporins (25%) can be explained by a natural chromosomal resistance, more or less expressed (27% intermediate sensitivity strains), and by the poor stability of this antibiotic in the face of high levels of penicillinases.

Note the high percentage of resistance (32%) to the "Amoxicillin + clavulanic acid" combination (Augmentin®); this often corresponds to a TRI-type phenotype or else to the presence of a derepressed chromosomal cephalosporinase.

2) Klebsiella pneumoniae (118 strains)

Antibiotic	R %	I %
Augmentin®	9	2.5
Cefalotin	2.5	8.5
Ceftriaxone	0	0
Cefotaxime	0	0
1st generation quinolones	3.5	0
Norfloxacin	1.7	0
Ciprofloxacin	2.5	0
Bactrim®	0	0

Klebsiella spp. are naturally resistant to penicillin A and to carboxypenicillins.
Low level of acquired resistance to the "penicillin A + inhibitor" combination (<10%) as well as to cephalosporins.

3) Enterobacter cloacae (15 strains tested)

Antibiotic	R %	I %
Ticarcillin	26	2
Cefotaxime	13	0
1st generation quinolones	13	0
Fluoroquinolones	6.6	0
Bactrim®	13	0

13% of the strains were resistant to 3rd generation cephalosporins whereas no resistance was noted for *Escherichia coli* (Group 1 enterobacteria) and *Klebsiella pneumoniae* (Group II

enterobacteria). This resistance corresponds to a derepressed natural chromosomal cephalosporinase.

Non-enterobacteria Gram negative bacillus

1) *Pseudomonas aeruginosa* (52 strains tested)

Antibiotic	R %	I %
Ticarcillin	21	25
Ticarcillin + clavulamic acid	9.5	27
Ceftazidime	6	11
Aztreonam	3	10
Imipeneme	11	2
Amikacin	6	0
Ciprofloxacin	17	2
Bactrim®	100	

About 75% of the strains were field phenotypes.
13% produced low levels of penicillinase (isolated resistance to Ticarcillin).
9.5% showed derepressed cephalosporinase.
None of the strains produced high-level penicillinase or ESBL.
11% of the strains showed impermeability to or active efflux of imipeneme.

Abbreviations

ATB	antibiotics
ß-lactamines	beta-lactamines: a family of antibiotics including the penicillins and cephalosporins
ESBL	extended-spectrum beta-lactamase
KR	kanamycin-resistant phenotype
KTR	kanamycin and tobramycin-resistant phenotype
KTGR	kanamycin, tobramycin and gentamycin-resistant phenotype
LinSa	isolate Lin SA resistant phenotype
MLSBc	resistance to macrolides, lincosamides, and streptogramin B acquired by mutation and methylation of the antibiotic's target; "c" for constitutive
MLSBi	resistance to macrolides, lincosamides, and streptogramin B acquired by mutation and methylation of the antibiotic's target; "i" for inducible
OXAR	*Staphylococcus* resistant to all beta-lactams due to mutation of the PLP
Peni S	penicillin sensitive
PLP	protein linking penicillin to peptidoglycan
TRI	TRI-type staphylococcus resistant phenotype = penicillinase not affected by clavulanic acid
S, I, R	The definitions of S, I or R strains have been set by the antibiogram committee of the *Société française de microbiologie* (French Microbiology Society): Definitions according to a clinical approach:

So-called sensitive (S) strains are those for which the probability of therapeutic success is high in cases of systemic treatment at recommended dosages.
So-called resistant (R) strains are those for which there is a high possibility of therapeutic failure, whatever the type of treatment.
So-called intermediate (I) strains are those for which therapeutic success is unpredictable.

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