

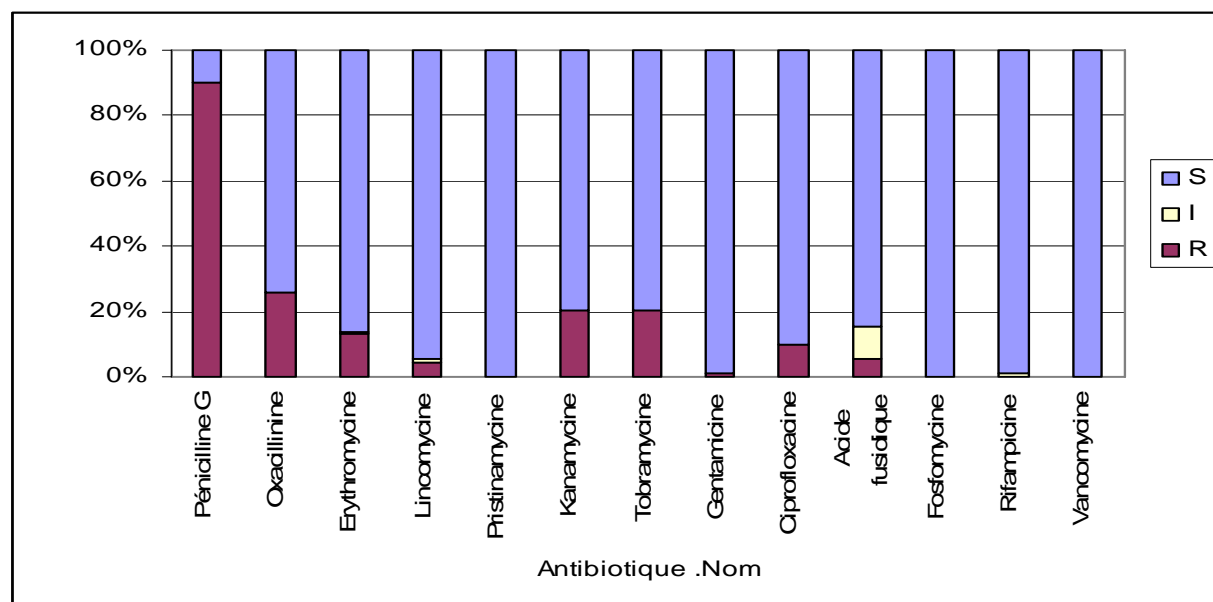


STATUS REPORT ON ANTIBIOTIC SENSITIVITY IN THE BACTERIA
ISOLATED AT THE LOUIS MALARDÉ INSTITUTE'S CLINICAL
LABORATORY

2005

STAPHYLOCOCCUS AUREUS

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>												
For 109 strains	<i>Penicillin G</i>	<i>Oxacillin</i>	<i>Erythromycin</i>	<i>Lincomycin</i>	<i>Pristinamycin</i>	<i>Kanamycin</i>	<i>Tobramycin</i>	<i>Gentamicin</i>	<i>Ciprofloxacin</i>	<i>Fusidic acid</i>	<i>Fosfomycin</i>	<i>Rifampicin</i>	<i>Vancomycin</i>
R	90	25.6	12.9	4.5	0	20	20	1	9.7	5.5	0	0	0
I	0	0	1.0	1.0	0	0	0	0	0	10.0	0	1	0
S	10	74.4	86.1	94.5	100	80	80	99	90.3	84.5	100	99	100

Penicillin G resistance involved 90% of the strains and resistance to oxacillin, the main β -lactam against staphylococcus, was 25%. These oxacillin-resistant strains were resistant to all the β -lactams.

A good level of sensitivity to macrolides and related antibiotics: 86% and 94% of the strains were still sensitive to macrolides and lincosamides, respectively. No pristinamycin-resistance strains were isolated in 2005.

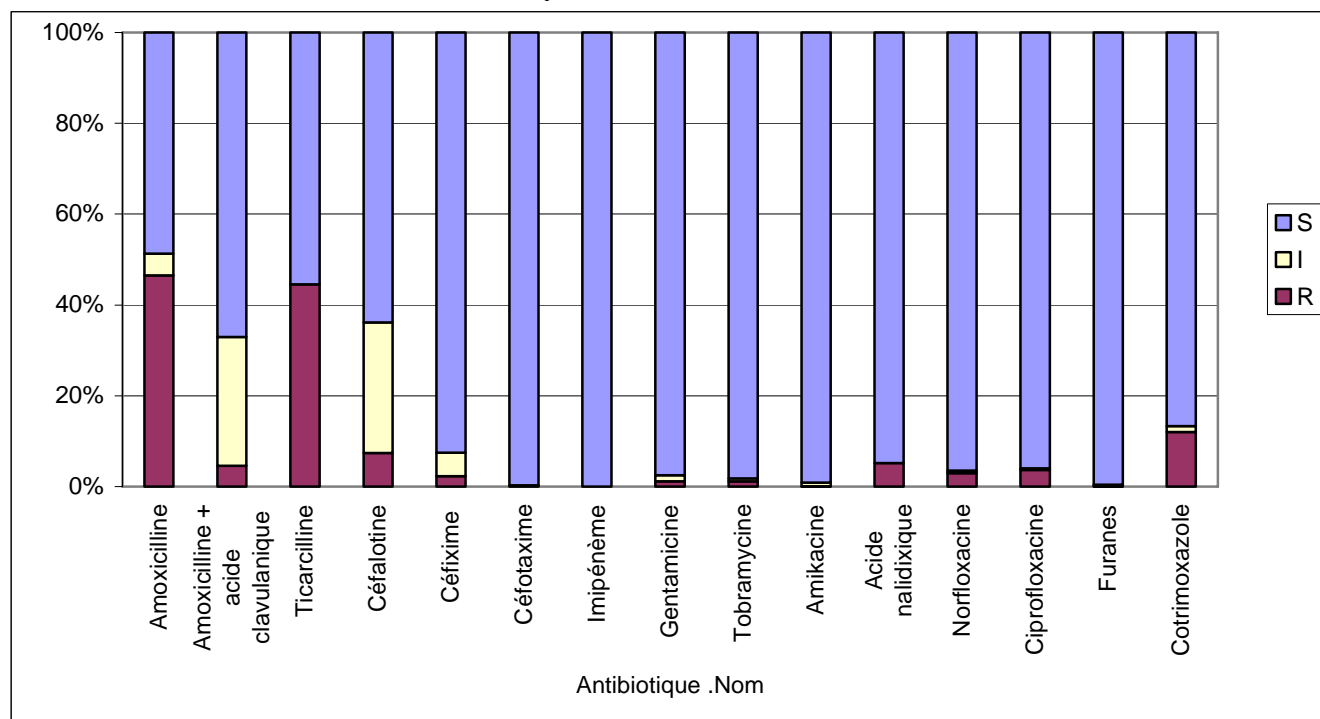
For aminoglycosides, gentamicin-resistant strains were still the exception.

With 100% and 99 % sensitivity levels, respectively, fosfomycin and rifampicin were still major anti-staphylococcus antibiotics.

It should be noted that there were not any significant differences in sensitivity between strains from the various hospitals (Taravao, Uuroa, Moorea, Tahioae) and community strains (clinics and private sector prescribers).

ESCHERICHIA COLI

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

RIS results (%)	<i>Antibiotics</i>														
For 582 strains	<i>Amoxicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Ticarcillin</i>	<i>Cefalotin</i>	<i>Cefixim</i>	<i>Cefotaxim</i>	<i>Imipenem</i>	<i>Gentamicin</i>	<i>Tobramycin</i>	<i>Amikacin</i>	<i>Nalidixic acid</i>	<i>Norfloxacine</i>	<i>Ciprofloxacine</i>	<i>Furans</i>	<i>Cotrimoxazole</i>
R	46.4	4.6	44.5	7.4	2.4	0.5	0	1.2	1.2	0	5.2	3.0	3.7	0.2	12
I	5.0	28.4	0	28.8	5.2	0	0	1.4	0.6	1	0	0.5	0.5	0.3	2
S	48.6	67.0	55.5	63.8	92.4	99.5	100	97.4	98.2	99	94.8	96.5	95.8	99.5	86

The most important thing to note is the high number of β -lactamase-producing strains. About 50% of the strains were resistant (categories R and I) to amoxicillin and 33 % were even resistant to a combination of amoxicillin and clavulanic acid.

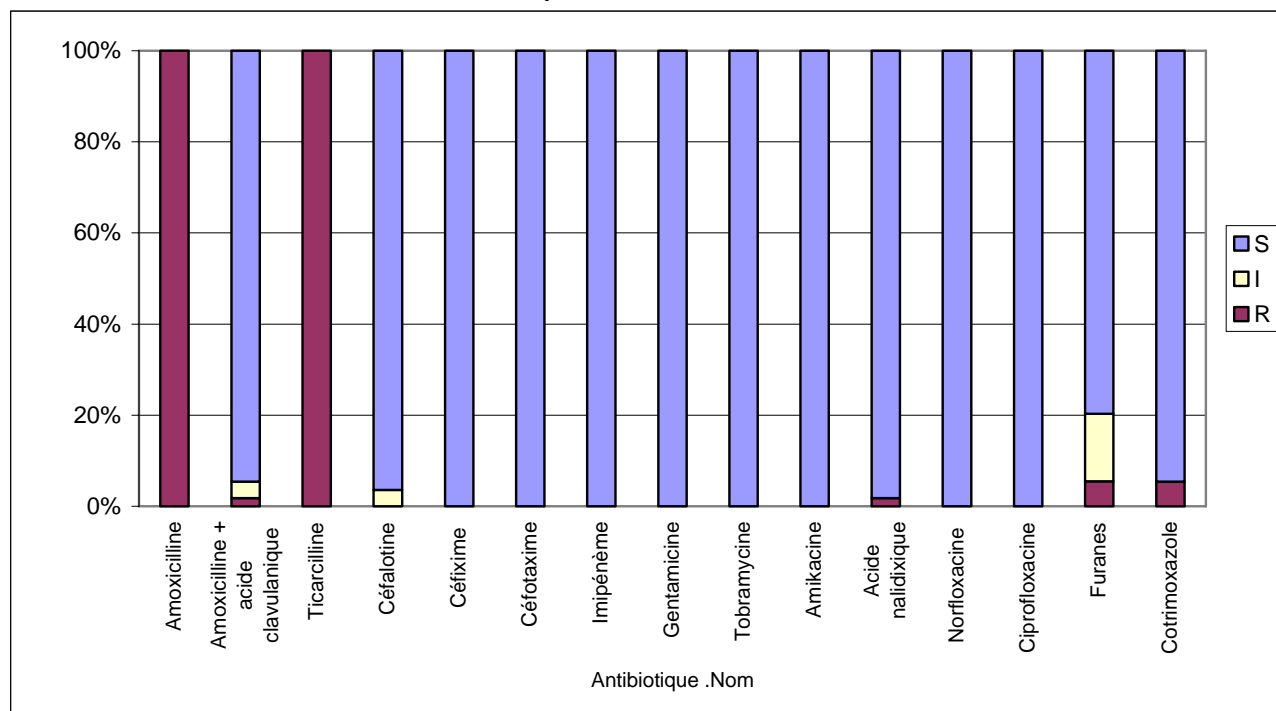
2 strains isolated this year had decreased sensitivity (R or I) to third-generation cephalosporins due to production of an ESBL.

In contrast, for the other classes of antibiotics (aminoglycosides, quinolones, furans) a good level of sensitivity was seen, i.e. more or less equal to or higher than 90%. These results were even more noteworthy given that quinolones and furans are first-line antibiotics for treating urinary infections which *E. coli* remains the primary causative agent for.

No significant difference in sensitivity between the strains from hospitals (Taravao, Uturoa, Moorea, Tahioae) and community strains (clinics and private sector prescribers).

KLEBSIELLA PNEUMONIAE

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>														
For 55 strains	<i>Ampicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Ticaracillin</i>	<i>Cefalotin</i>	<i>Cefixim</i>	<i>Cefotaxim</i>	<i>Imipenem</i>	<i>Gentamicin</i>	<i>Tobramycin</i>	<i>Amikacin</i>	<i>Nalidixic acid</i>	<i>Norfloxacin</i>	<i>Ciprofloxacine</i>	<i>Furans</i>	<i>Cotrimoxazole</i>
R	100	2.0	100	0	0	0	0	0	0	0	1.8	0	0	5.5	5.4
I	0	3.5	0	3.6	0	0	0	0	0	0	0	0	0	15.0	0
S	0	94.5	0	96.4	100	100	100	100	100	100	98.2	100	100	79.5	94.6

Amoxicillin and ticarcillin resistance corresponds to a natural resistance by this species through secretion of a natural penicillinase.

It can be noted that in contrast to *E. coli*, a good level of activity continued with the amoxicillin + clavulanic acid combination, with only 5% of the strains showing resistance

Excellent activity by the other antibiotic families:

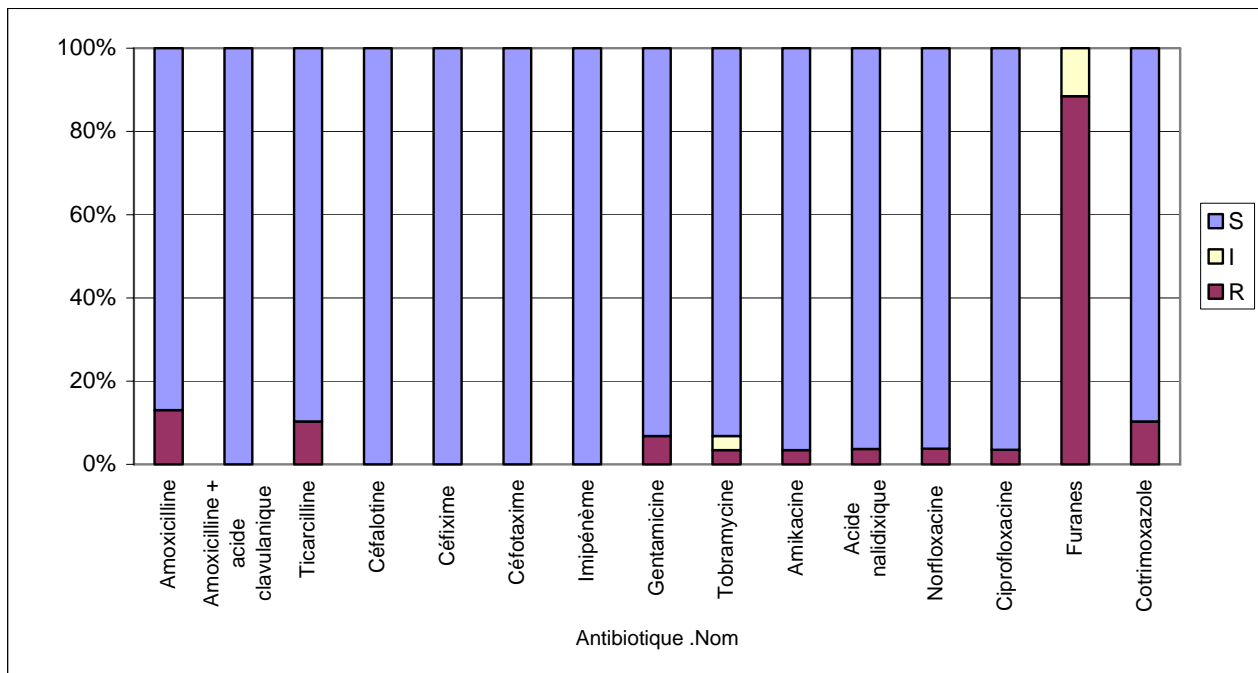
For aminoglycosides and quinolones, sensitivity was about 100%

80% of the strains were still sensitive to furans

Cotrimoxazole (Bactrim) with 94% of the strains sensitive to this product.

PROTEUS MIRABILIS

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

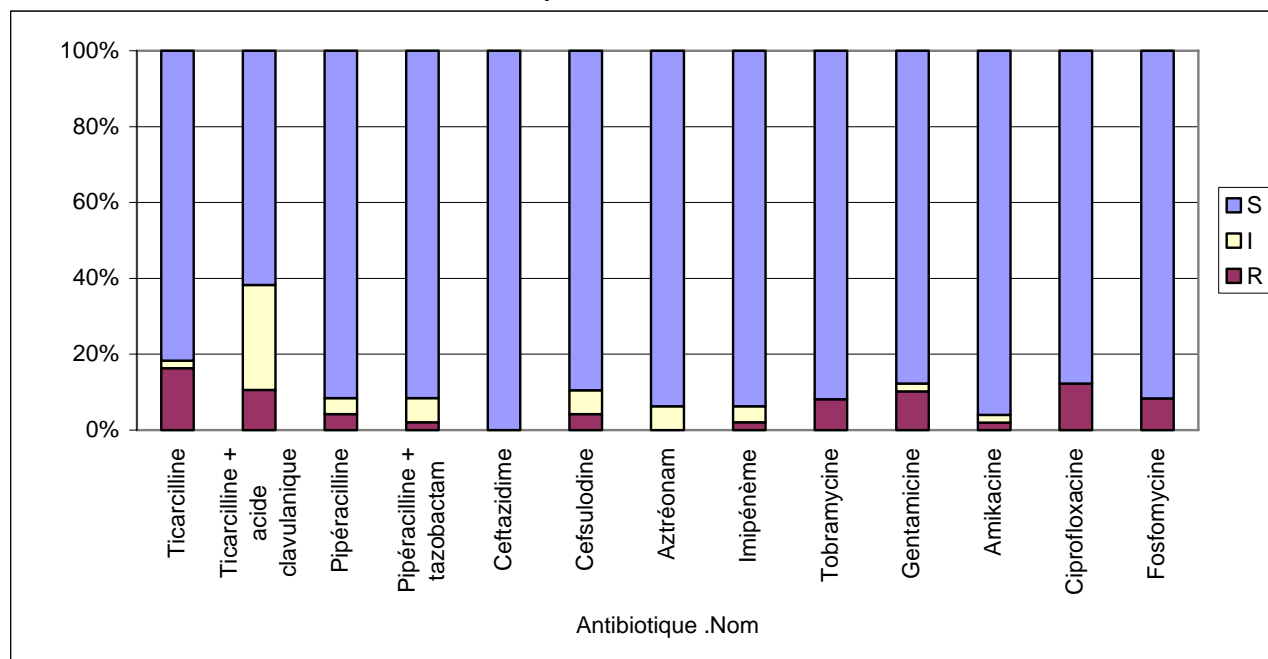
<i>RIS results (%)</i>	<i>Antibiotics</i>														
For 29 strains	<i>Ampicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Ticarillin</i>	<i>Cefalotin</i>	<i>Cefixim</i>	<i>Cefotaxim</i>	<i>Imipenem</i>	<i>Gentamicin</i>	<i>Tobramycin</i>	<i>Amikacin</i>	<i>Nalidixic acid</i>	<i>Norfloxacine</i>	<i>Ciprofloxacine</i>	<i>Furans</i>	<i>Cotrimoxazole</i>
R	13	0	13	0	0	0	0	6.8	3.5	3.5	3.7	3.8	3.5	88.5	10.3
I	0	0	0	0	0	0	0	0	3.5	0	0	0	0	11.5	0
S	87	100	87	100	100	100	100	93.2	93.0	96.5	96.3	96.2	96.5	0	89.7

Continued good activity for all the β -lactams and other classes of antibiotics (aminoglycosides, quinolones, cotrimoxazole), with 87 to 100% of the strains sensitive to these products.

Resistance to furans (100% R or I strains) corresponds to natural resistance by this species.

PSEUDOMONAS AERUGINOSA

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>												
For 49 strains	<i>Ticarclillin</i>	<i>Ticarclillin + clavulanic acid</i>	<i>Piperacillin</i>	<i>Piperacillin + tazobactam</i>	<i>Ceftazidim</i>	<i>Cefsulodin</i>	<i>Aztreonam</i>	<i>Imipenem</i>	<i>Tobramycin</i>	<i>Gentamicin</i>	<i>Amikacin</i>	<i>Ciprofloxacin</i>	<i>Fosfomycin</i>
R	16.4	10.6	4.2	2.2	0	4.2	0	2.2	8.2	10.2	2.0	12.2	8.4
I	2.0	27.6	4.2	6.4	0	6.4	6.4	4.2	0	2.0	2.0	0	0
S	81.6	61.8	91.6	91.4	100	89.4	93.6	93.6	91.8	87.8	96.0	87.8	91.6

Good sensitivity for all the β -lactams with about 80% “wild” strains (sensitive to ticarcillin and to the other β -lactams).

9 strains showed acquired resistance to carboxypenicillin and/or ureidopenicillins through acquired penicillinase or efflux. The higher percentage of I or R strains (38%) with regards to the ticarcillin + clavulanic acid combination can be explained by the induction effect that clavulanic acid has on the production of natural cephalosporinase by this species.

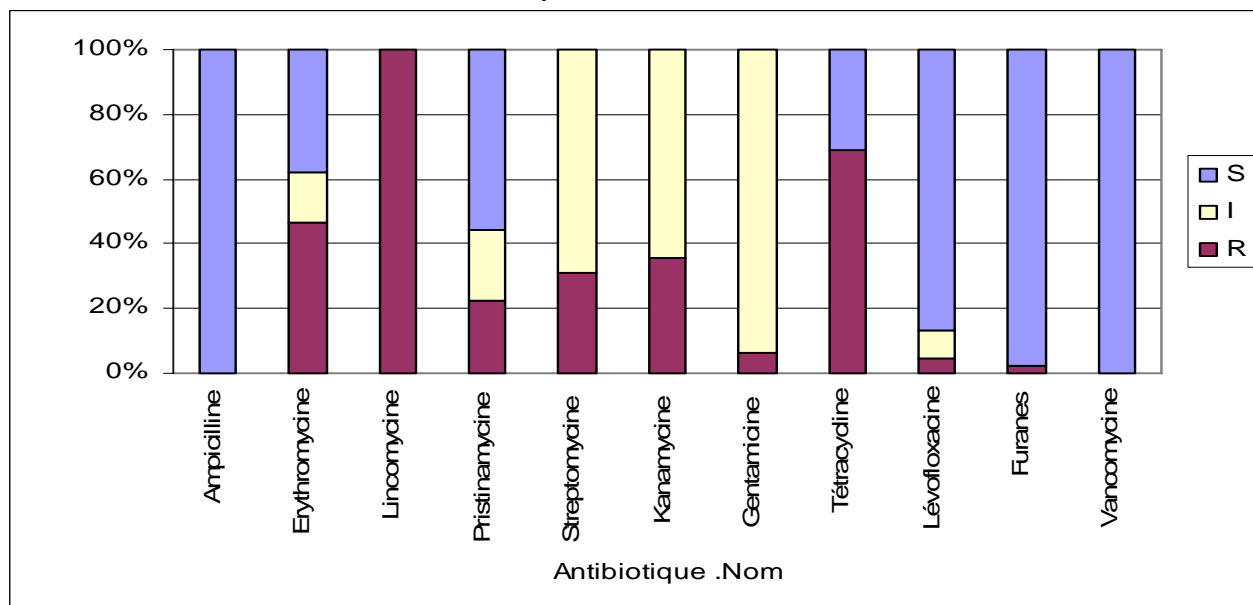
None of the strains isolated this year were resistant to ceftazidim through an overproduction of cephalosporinase.

It should be noted that slightly more than 6% of the strains had decreased sensitivity to imipenem. This resistance through changes to the porins was not linked to resistance to other β -lactams, but it might, however, be associated with another resistance mechanism (enzymatic or efflux) to this family of antibiotics.

Sensitivity to aminoglycosides remained high and 88% of the strains were sensitive to ciprofloxacin

ENTEROCOCCI

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>										
For 45 strains	<i>Ampicillin</i>	<i>Erythromycin</i>	<i>Lincomycin</i>	<i>Pristinamycin</i>	<i>Streptomycin</i>	<i>Kanamycin</i>	<i>Gentamicin</i>	<i>Tetracycline</i>	<i>Levofloxacin</i>	<i>Furans</i>	<i>Vancomycin</i>
R	0	46.6	100	22.2	31.2	35.5	6.6	68.8	4.4	2.2	0
I	0	15.6	0	22.2	68.8	64.5	93.4	0	9.0	0	0
S	100	37.8	0	55.6	0	0	0	31.2	86.6	97.8	100

Ampicillin remained the preferred antibiotic, with 100% sensitivity among these strains.

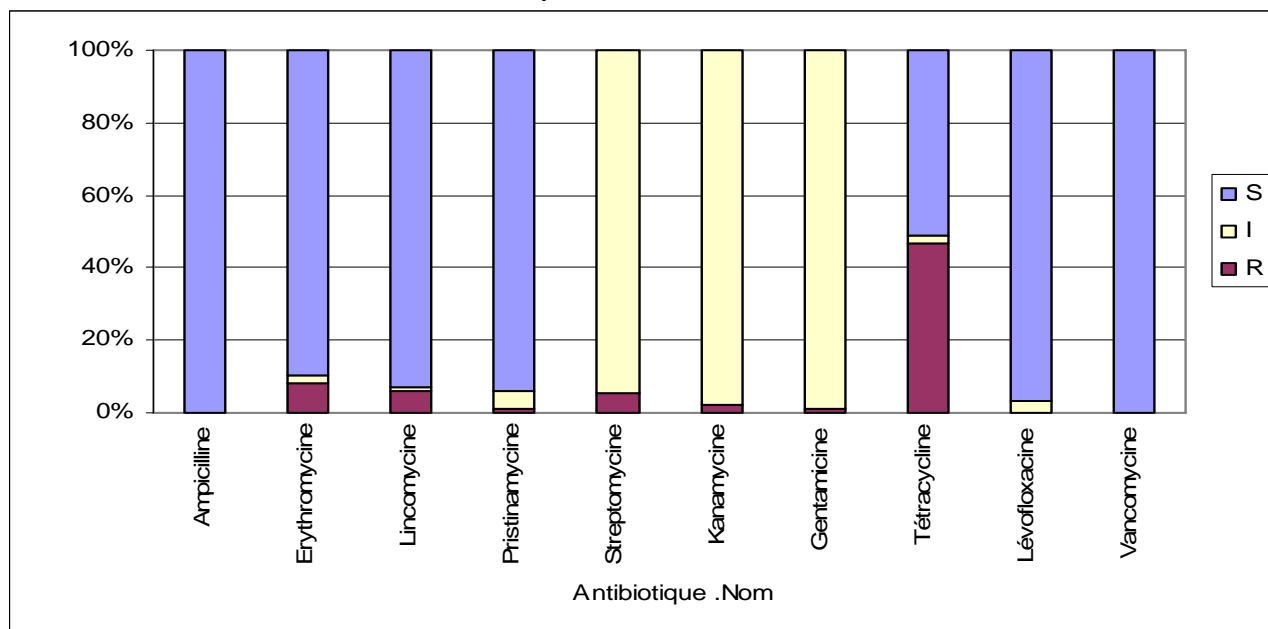
Among the aminoglycosides, in spite of the fact that 93% of the strains of gentamicin were categorised as I (through natural low-level resistance to aminoglycosides by all the Streptococci), it still had an excellent level of synergy with the β -lactams.

In contrast, resistance to macrolides and related antibiotics was significant. Resistance to lincomycin (100% R strains) corresponds to a natural resistance to *E. faecalis*, the most frequently isolated species.

An excellent level of sensitivity to furans, at 98% of the strains, should be noted. This interpretation is, however, only valid for strains isolated from urine. In 2005, 95 % of the 45 enterococci strains isolated in our laboratory came from urine cultures.

BETA-HAEMOLYTIC STREPTOCOCCUS

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>									
For 86 strains	<i>Ampicillin</i>	<i>Erythromycin</i>	<i>Lincomycin</i>	<i>Pristinamycin</i>	<i>Streptomycin</i>	<i>Kanamycin</i>	<i>Gentamicin</i>	<i>Tetracycline</i>	<i>Levofloxacin</i>	<i>Vancomycin</i>
R	0	8.2	5.8	1.2	5.5	2.4	1.2	46.5	0	0
I	0	2.3	1.2	4.6	94.5	97.6	98.8	2.5	3.2	0
S	100	89.5	93.0	94.2	0	0	0	51.0	96.8	100

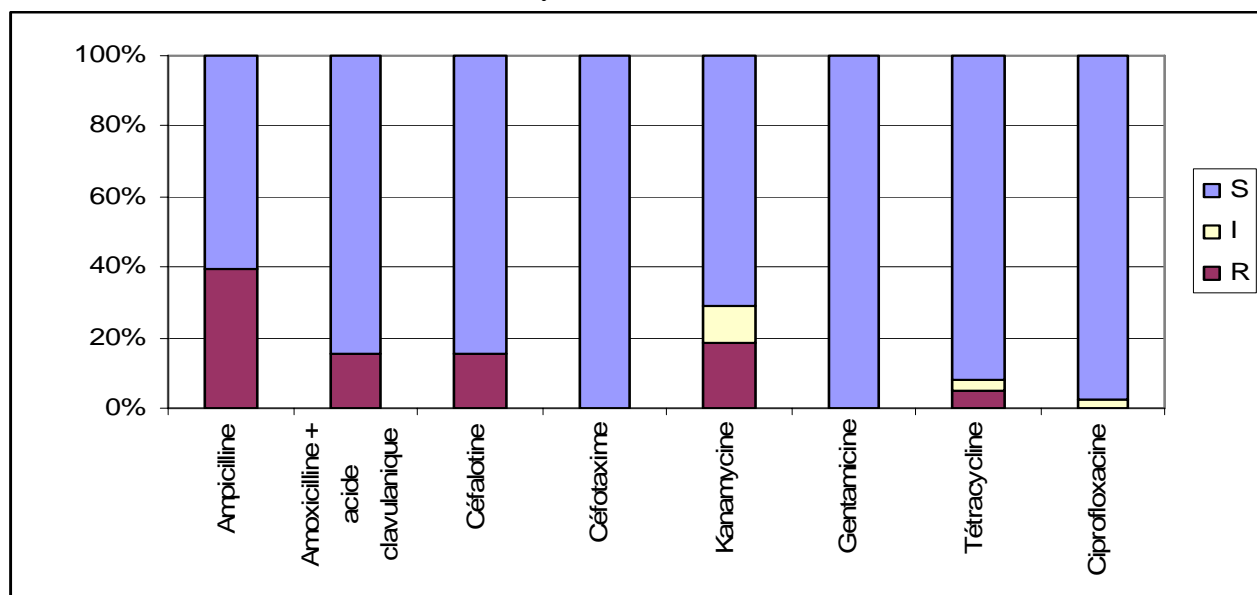
There was still remarkable sensitivity to β -lactams, with 100% of the strains sensitive to ampicillin.

For macrolides and related antibiotics, sensitivity hovered at about 90%.

Most of the other antibiotic products were still very active, except for the tetracyclines, with decreased sensitivity in 50% of the strains. This resistance mainly involved B group streptococci.

HAEMOPHILUS INFLUENZAE and PARAINFLUENZAE

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>							
For 38 strains	<i>Ampicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Cefalotin</i>	<i>Cefotaxim</i>	<i>Kanamycin</i>	<i>Gentamicin</i>	<i>Tetracycline</i>	<i>Ciprofloxacin</i>
R	39.5	15.7	15.7	0	18.5	0	5.2	0
I	0	0	0	0	10.5	0	2.6	2.7
S	60.5	84.3	84.3	100	71.0	100	92.2	97.3

About 40% of the strains had decreased sensitivity to β -lactams. There was nearly double the number of strains as compared to last year (22% in 2004).

Two resistance mechanisms could be incriminated: in about 24% of the cases there was secretion of a β -lactamase and in 15% of the cases there were changes to the PLP (penicillin liaison proteins). It should be noted that strains that produced β -lactamase were still sensitive to the amoxicillin + clavulanic acid combination. As far as changes to the PLP were concerned, they conferred a low level of resistance to all β -lactams.

While resistance through secretion of a β -lactamase is common in metropolitan France, i.e. between 30% (adults) and 50% (children), resistance through PLP changes is still rare, i.e. < 5%.

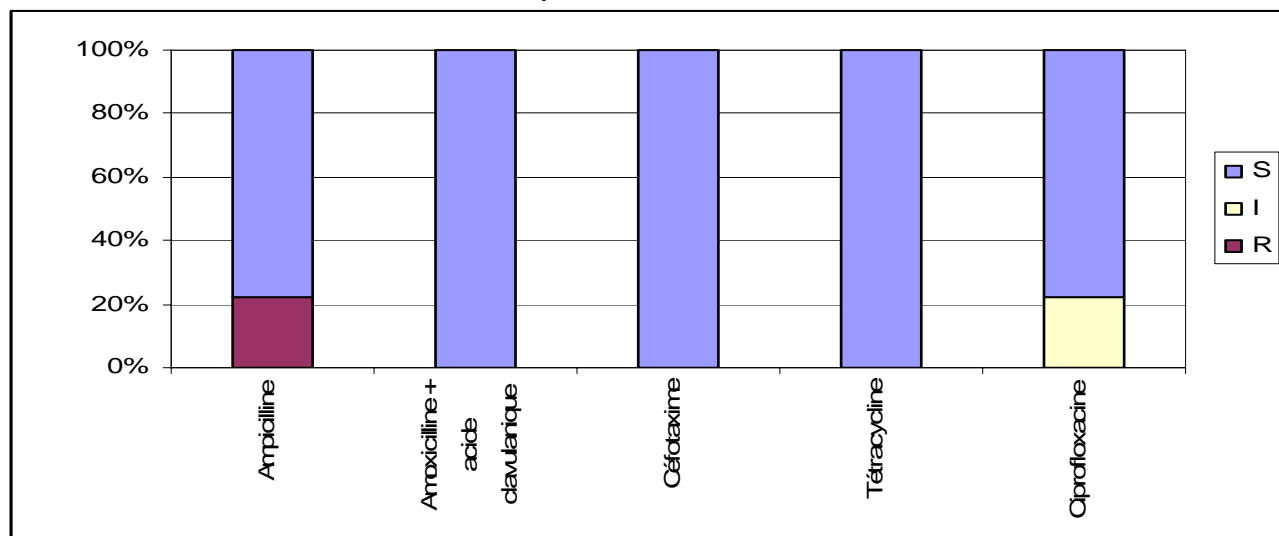
So the frequency at which such strains were isolated in French Polynesia in 2005, i.e. 15%, should be confirmed and monitored.

In contrast, whatever the mechanism might be, all the strains were sensitive to third-generation cephalosporins (Cefotaxim).

Apart from kanamycin, there was still good sensitivity to the other antibiotics tested, i.e. gentamicin, tetracycline and fluoroquinolones.

NEISSERIA GONORRHOEAE

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>					
For 9 strains	<i>Ampicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Cefotaxim</i>	<i>Tetracycline</i>	<i>Ciprofloxacine</i>	
R	22.2	0	0	0	0	
I	0	0	0	0	22.2	
S	77.8	100	100	100	77.8	

Of the 9 strains isolated in 2005, 2 strains produced β -lactamases, i.e. 22%. This β -lactamase confers resistance to aminopenicillin but the activity of this product is restored when it is combined with clavulanic acid and the third-generation cephalosporins remain still active.

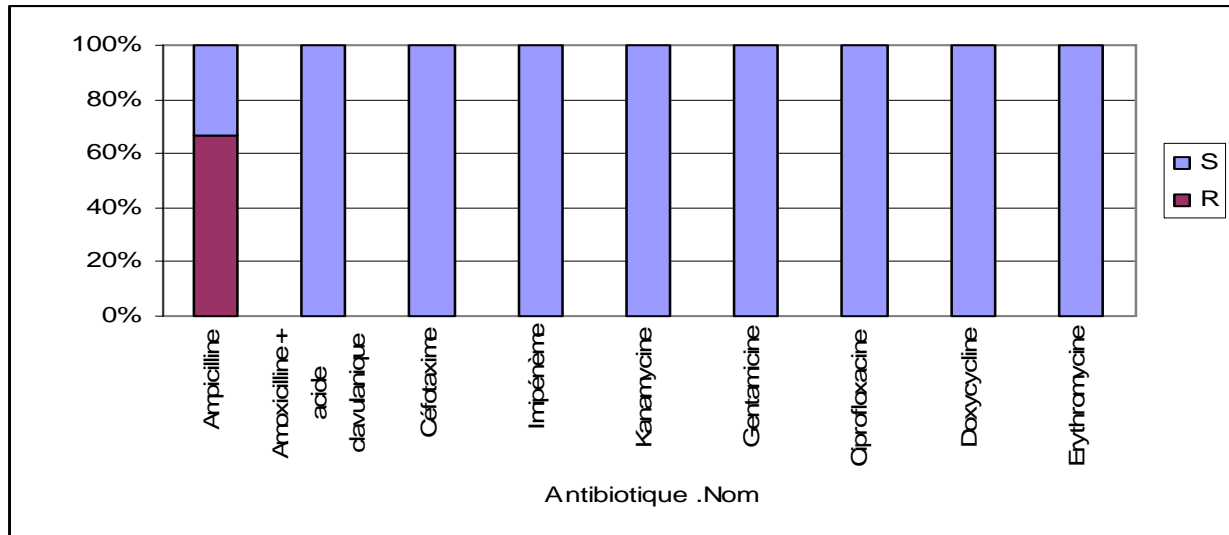
Two strains showed decreased sensitivity to fluoroquinolones. This decreased sensitivity to fluoroquinolones was not associated with resistance to ampicillin in our series. Different strains displayed these resistance mechanisms.

There was a steady increase in the number of gonococci strains with decreased sensitivity to fluoroquinolones, which accounted for 30% of the strains isolated (Cf. BEH, no. 1/2006).

Finally, 100% of the strains were sensitive to tetracyclines whereas nearly 30% of the strains isolated in metropolitan France are resistant to this family of antibiotics.

CAMPYLOBACTER JEJUNII

Sensitivity to antibiotics in 2005



(the name of the antibiotics appears in English in the table below ▼)

<i>RIS results (%)</i>	<i>Antibiotics</i>								
For 8 strains	<i>Ampicillin</i>	<i>Amoxicillin + clavulanic acid</i>	<i>Cefotaxim</i>	<i>Imipenem</i>	<i>Kanamycin</i>	<i>Gentamicin</i>	<i>Ciprofloxacin</i>	<i>Doxycycline</i>	<i>Erythromycin</i>
R	66.6	0	0	0	0	0	0	0	0
I	0	0	0	0	0	0	0	0	0
S	33.4	100	100	100	100	100	100	100	100

66% of the strains produced β -lactamase. This β -lactamase confers resistance to aminopenicillins but the product's activity is restored when it is combined with clavulanic acid.

For other antibiotics that are active against *Campylobacter*, i.e. aminoglycosides, cyclines, fluoroquinolones and macrolides, sensitivity was 100%.

SALMONELLA SPP. AND SHIGELLA SPP.

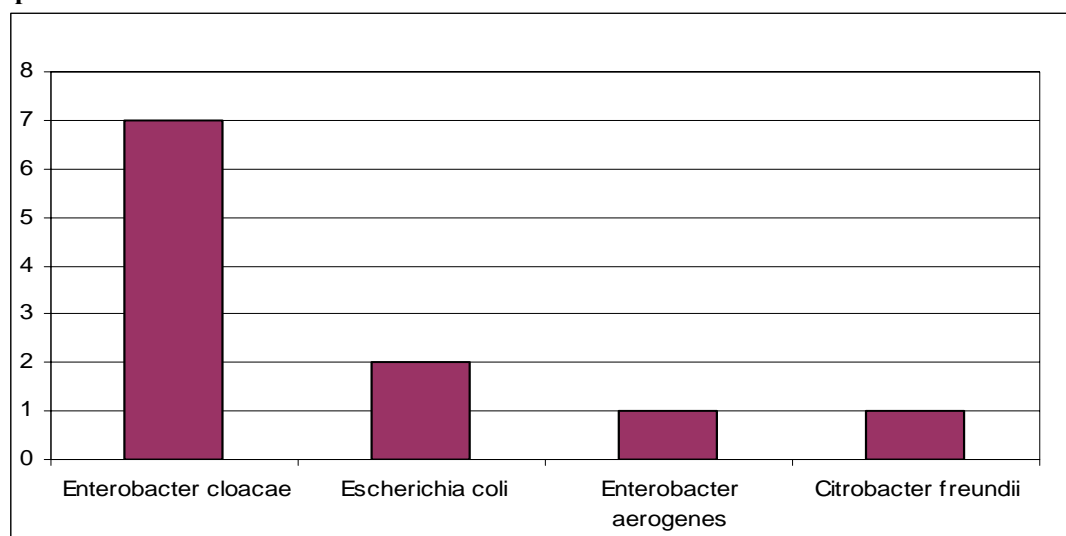
Sensitivity to antibiotics in 2005

None of the strains isolated this year (salmonella : 8 strains and shigella : 7 strains) displayed resistance mechanisms to the antibiotics tested.

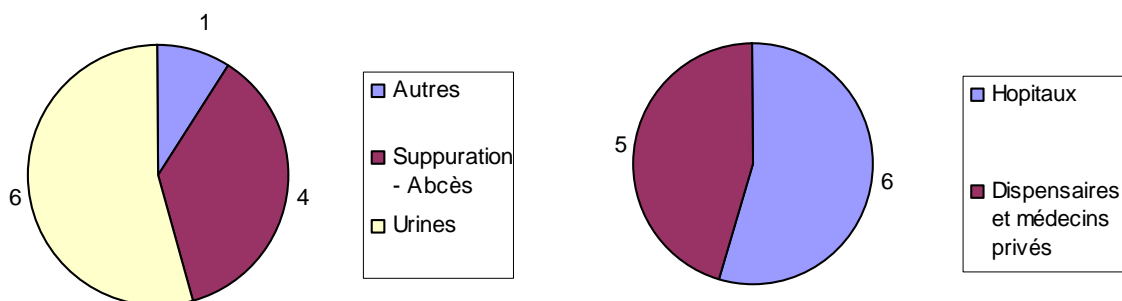
So the β -Lactams (amoxicillin or cephalosporins), aminoglycosides, fluoroquinolones, cotrimoxazole remained fully effective against these enteropathogen bacteria.

THIRD-GENERATION CEPHALOSPORINE-RESISTANT ENTEROBACTERIA ISOLATED IN 2005

Species isolated



Sample origins



Autres = Other
Suppuration-Abcès = Suppuration-Abscess
Urines = Urine

Hôpitaux = Hospitals
Dispensaires et médecins privés =
Clinic and private doctors

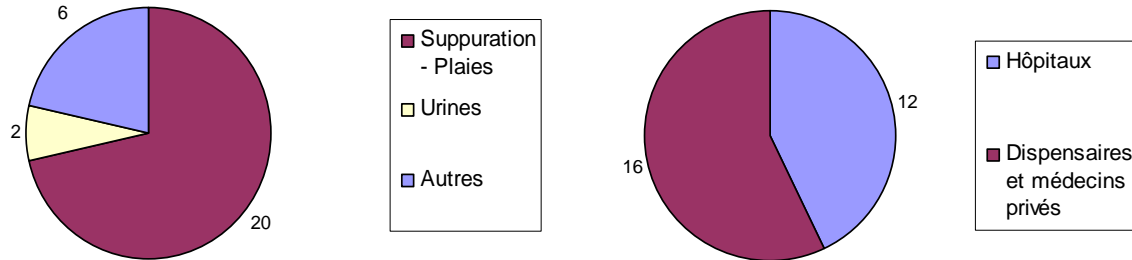
Resistance mechanisms involved and associated types of resistance by species

Species isolated	Number	Resistance mechanisms	Associated types of resistance	
			R Aminoglycosides	R Fluoroquinolones
<i>Enterobacter cloacae</i>	7	Overproduction of cephalosporinase	1/3 strains	2/3 strains
<i>Escherichia coli</i>	2	ESBL	yes	yes
<i>Enterobacter aerogenes</i>	1	Overproduction of cephalosporinase	no	yes
<i>Citrobacter freundii</i>	1	Overproduction of cephalosporinase	no	yes
Total	11			

It should be noted that an associated resistance to fluoroquinolones in these enterobacteria strains was common (8 out of 11 strains). This was much more frequent than resistance to aminoglycosides (4 out of 11 strains).

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS ISOLATED IN 2005

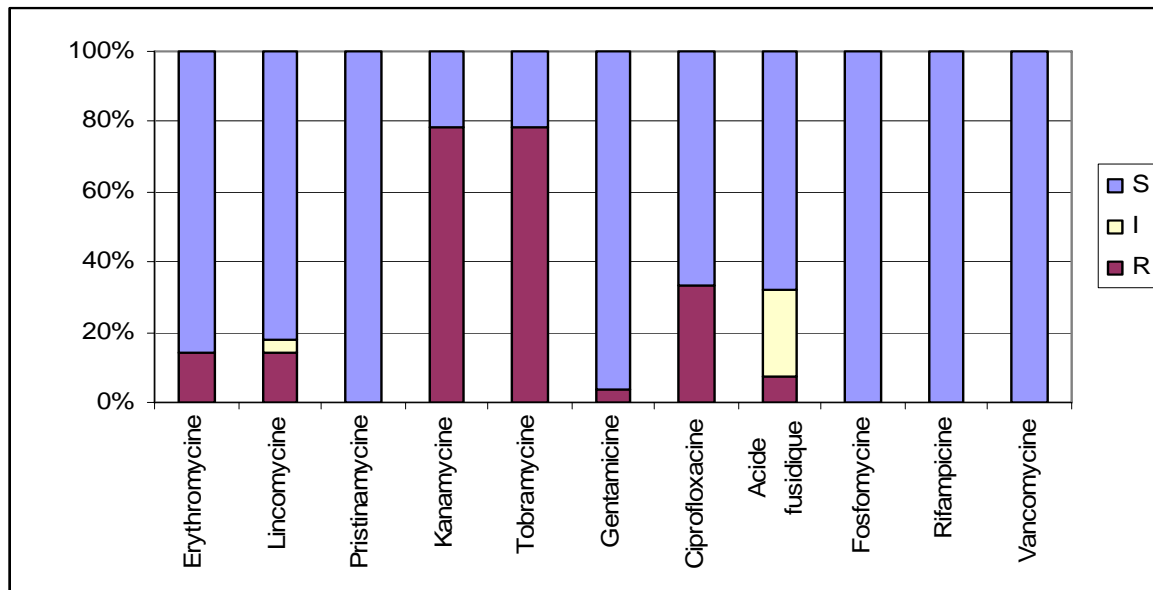
Sample origins



Suppuration-Plaies = Suppuration-wounds
 Urines = Urine
 Autres = Other

Hôpitaux = Hospitals
 Dispensaires et médecins privés =
 Clinics and private doctors

Sensitivity to other families of antibiotics



In English = Erythromycin Lincomycin Pristinamycin Kanamycin Tobramycin Gentamicin Ciprofloxacin Fusidic acid Fosfomycin Rifampicin Vancomycin

With 25% of the strains resistant to oxacillin (28 out of 109 strains), the level of resistance was fairly high and almost equivalent to that found in the hospital setting in France (20 to 40% depending on the series).

It should be recalled that these strains were resistant to all the β -lactams.

Aminoglycoside resistance did not display any differences between the OxaS strains and the OxaR strains, with 80 % of the strains resistant to kanamycin and to tobramycin. In contrast, the kana-tobra-gentamycin (KTG) resistant phenotype conventionally associated with OxaR strains was rare (3.5% of the strains). It should be noted that this phenotype is on the decrease in metropolitan France but still involves 15 to 20% of the OxaR strains.

These methicillin-resistant strains were, instead, characterised by a higher level of resistance to fluoroquinolones (30 % as compared to 10%) and fusidic acid (32% as compared to 15%).

There was still a good level of sensitivity to macrolides and related antibiotics, since more than 80% of the strains were sensitive to these products. With regards to pristinamycin, it was still active against all the strains.