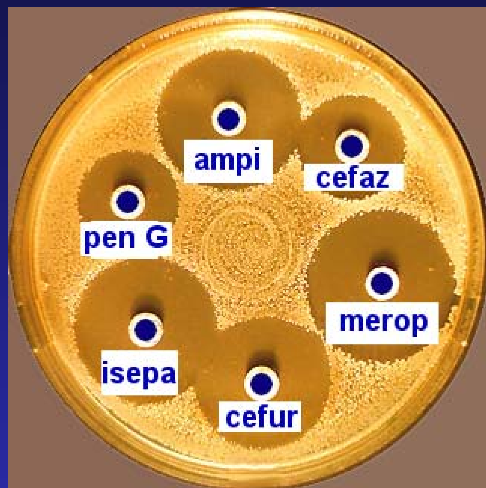
Antibiotics *in vitro* :



S-I-R

MIC

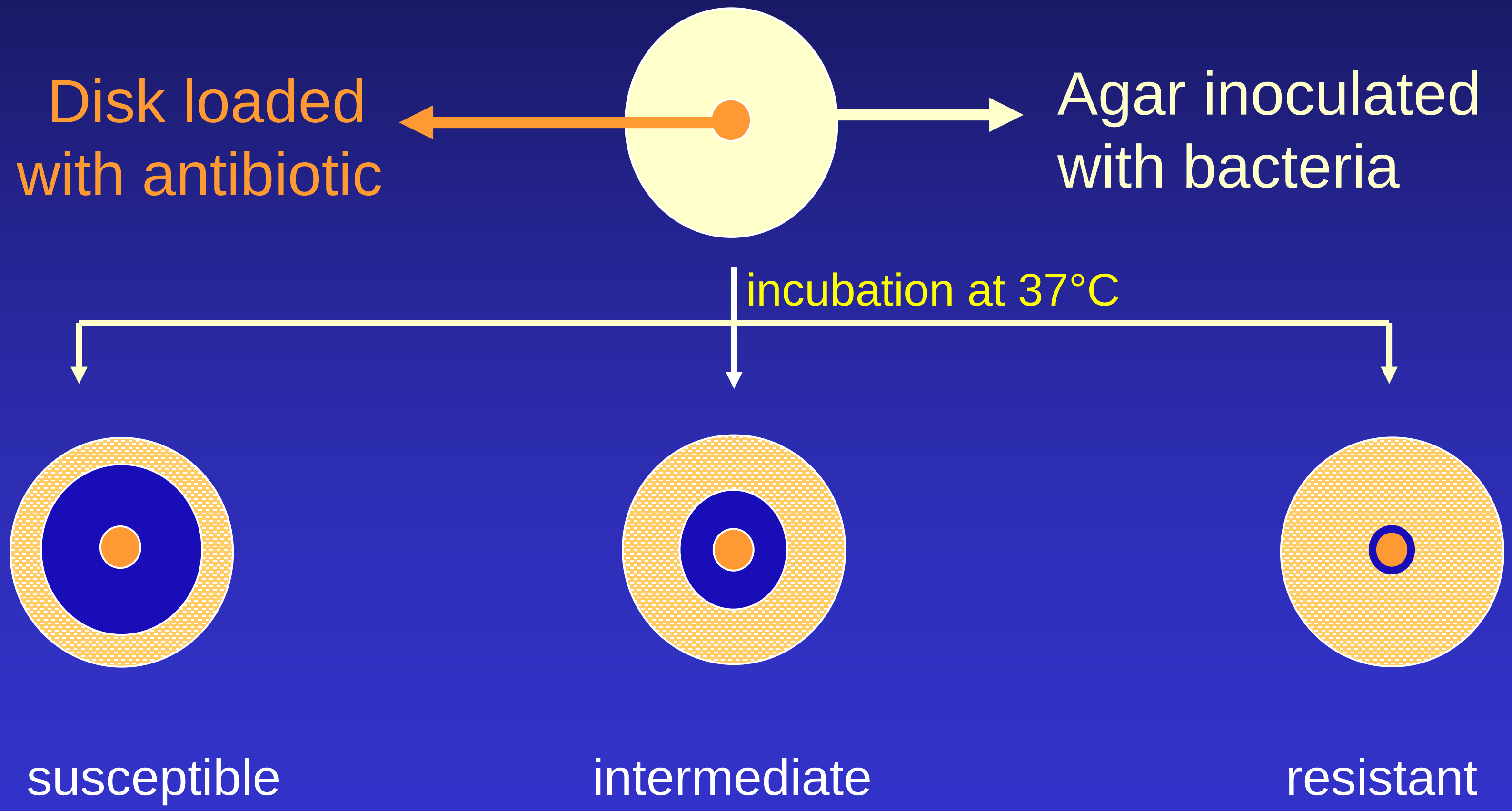
Spectrum

Which properties do we need to consider for optimizing our therapeutic choice ?

With the support of *Wallonie-Bruxelles-International*

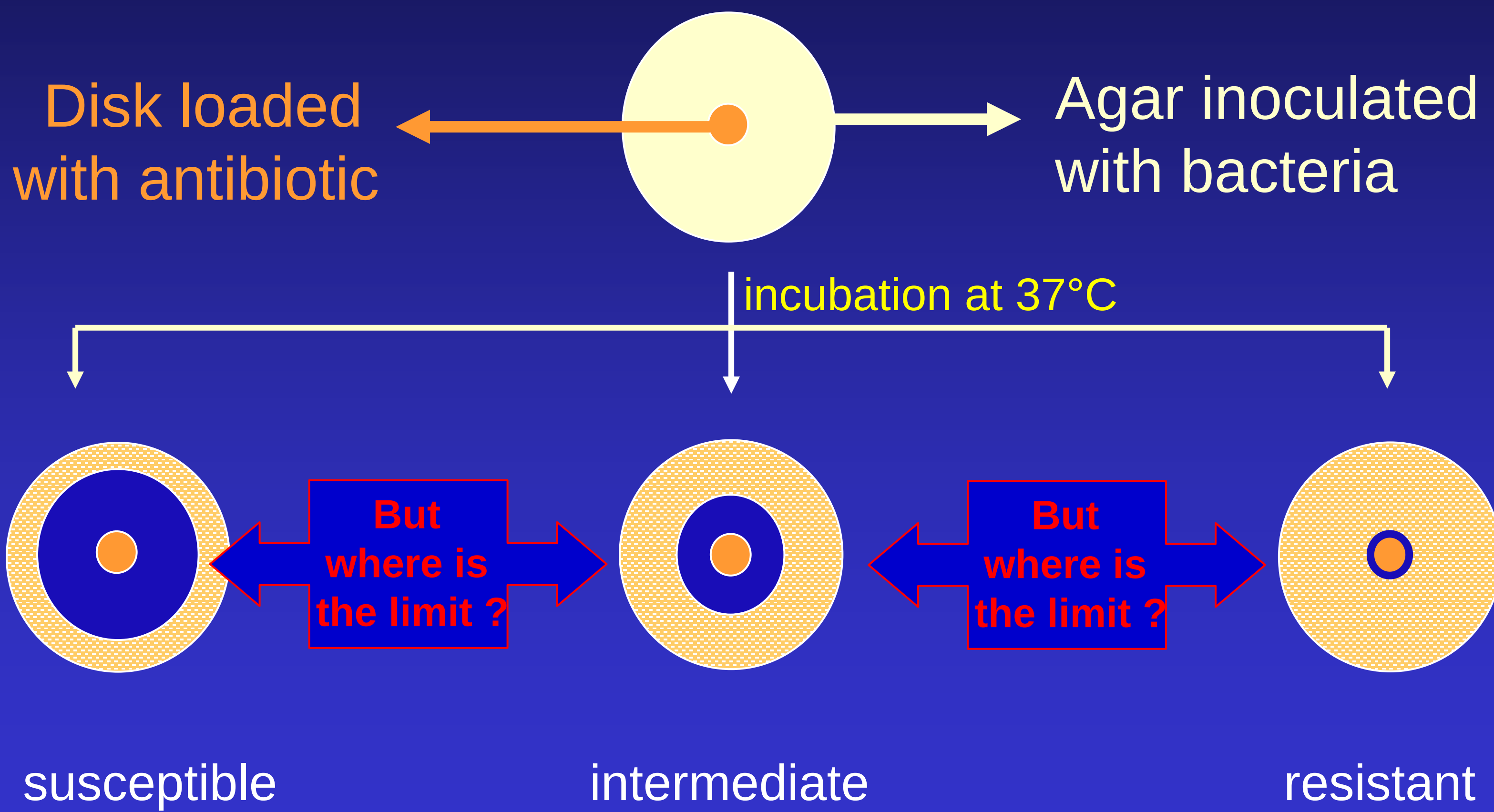
In vitro evaluation of antibiotics : the antibiogram

⇨semi-quantitative evaluation



In vitro evaluation of antibiotics : the antibiogram

⇨semi-quantitative evaluation



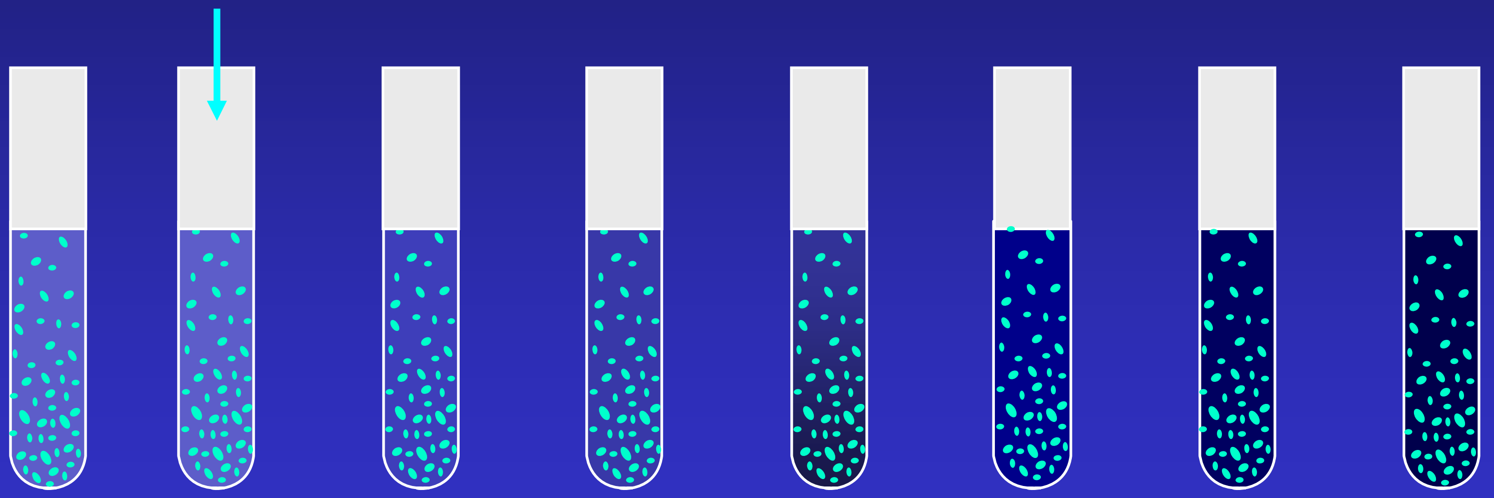
In vitro evaluation of antibiotics : MIC

Minimal Inhibitory Concentration

⇨quantitative evaluation

1. inoculation

Known amount of bacteria



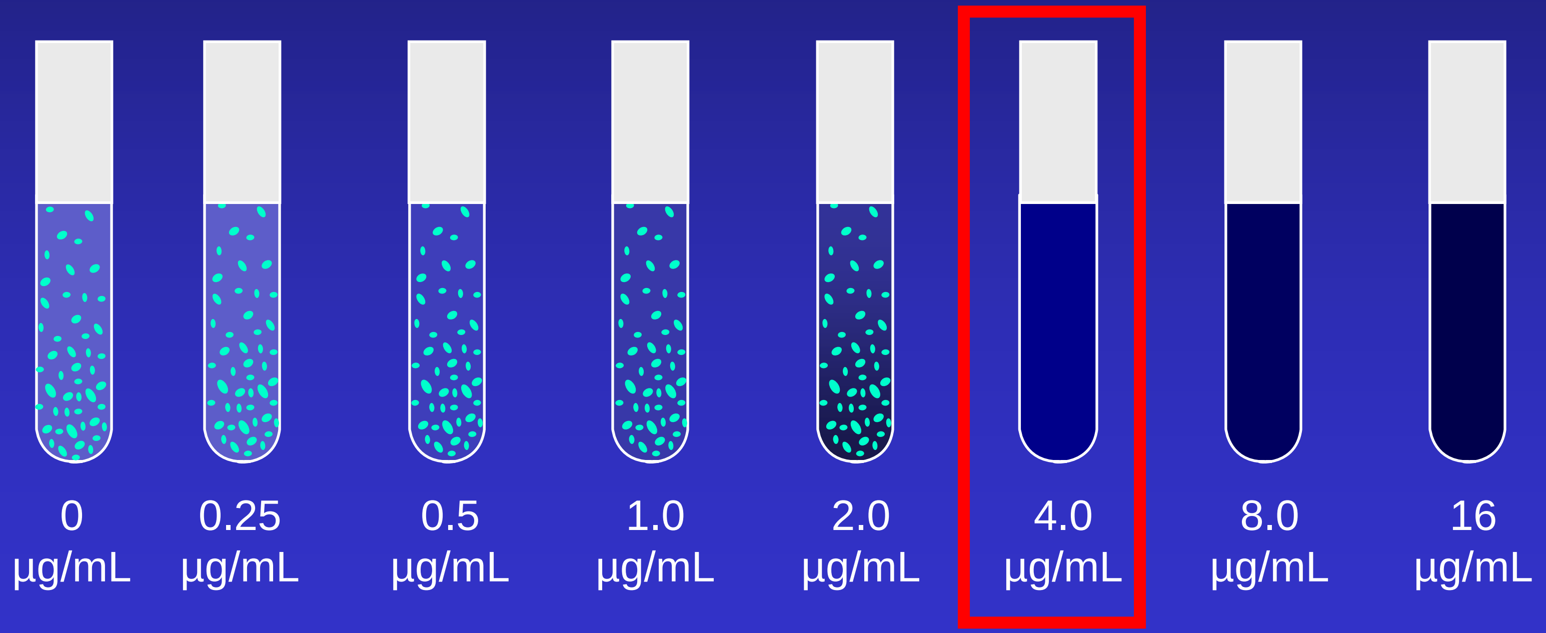
0 µg/mL | 0.25 µg/mL | 0.5 µg/mL | 1.0 µg/mL | 2.0 µg/mL | 4.0 µg/mL | 8.0 µg/mL | 16 µg/mL

Increasing antibiotic concentrations

In vitro evaluation of antibiotics : MIC

⇨ quantitative evaluation

2. incubation

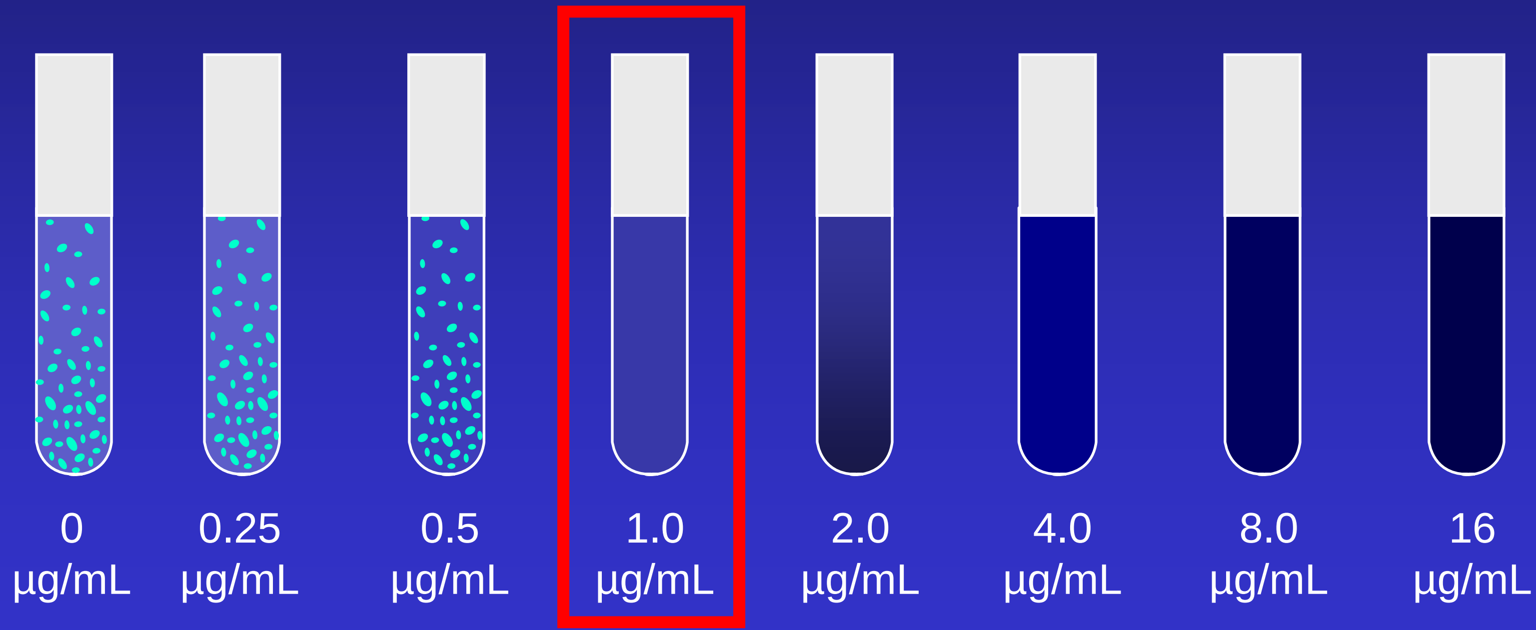


MIC = minimal antibiotic concentration able to prevent bacterial growth

In vitro evaluation of antibiotics : MIC

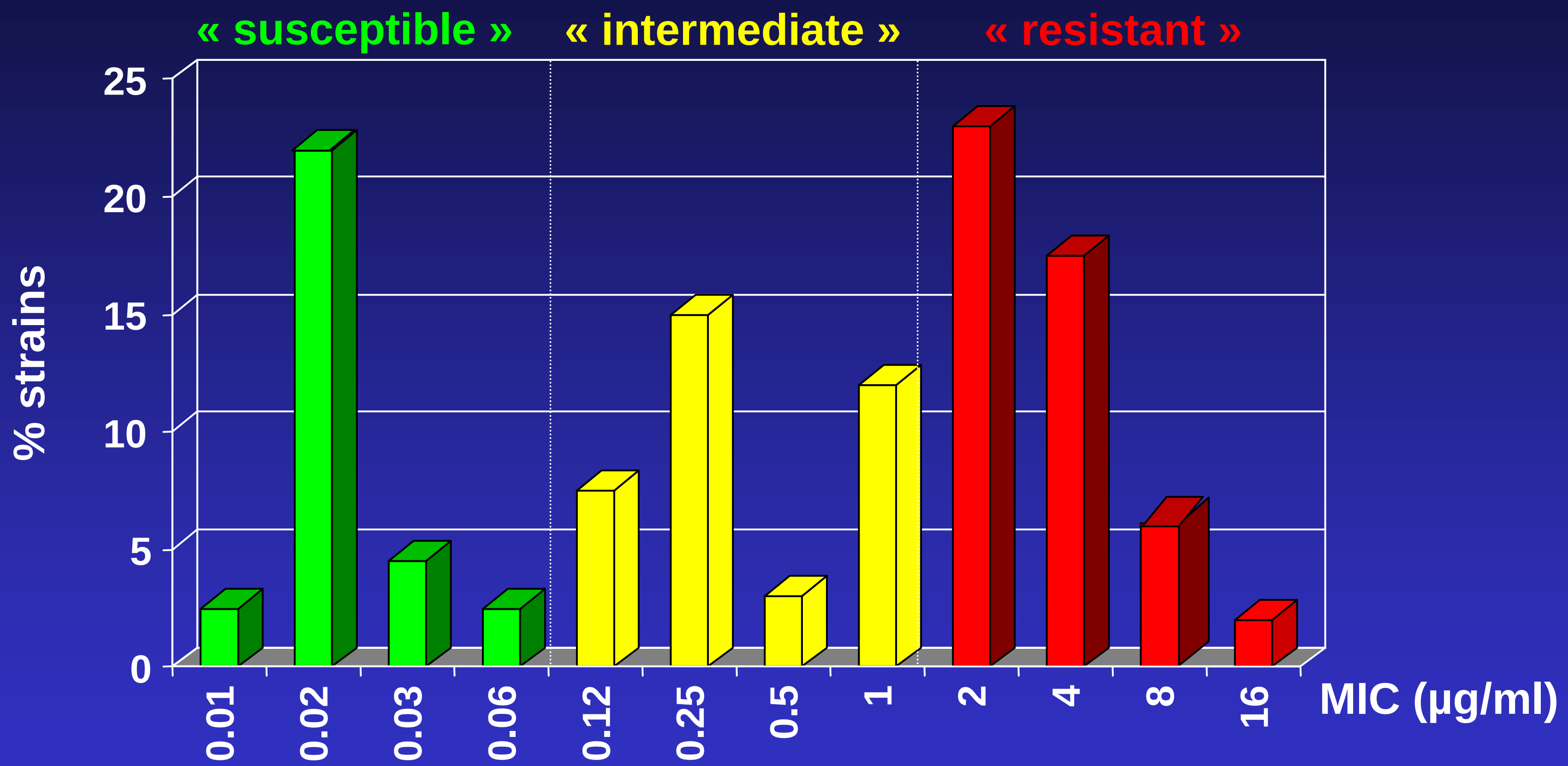
⇨ quantitative evaluation

3. interpretation



The most active is the drug, the smallest is the MIC

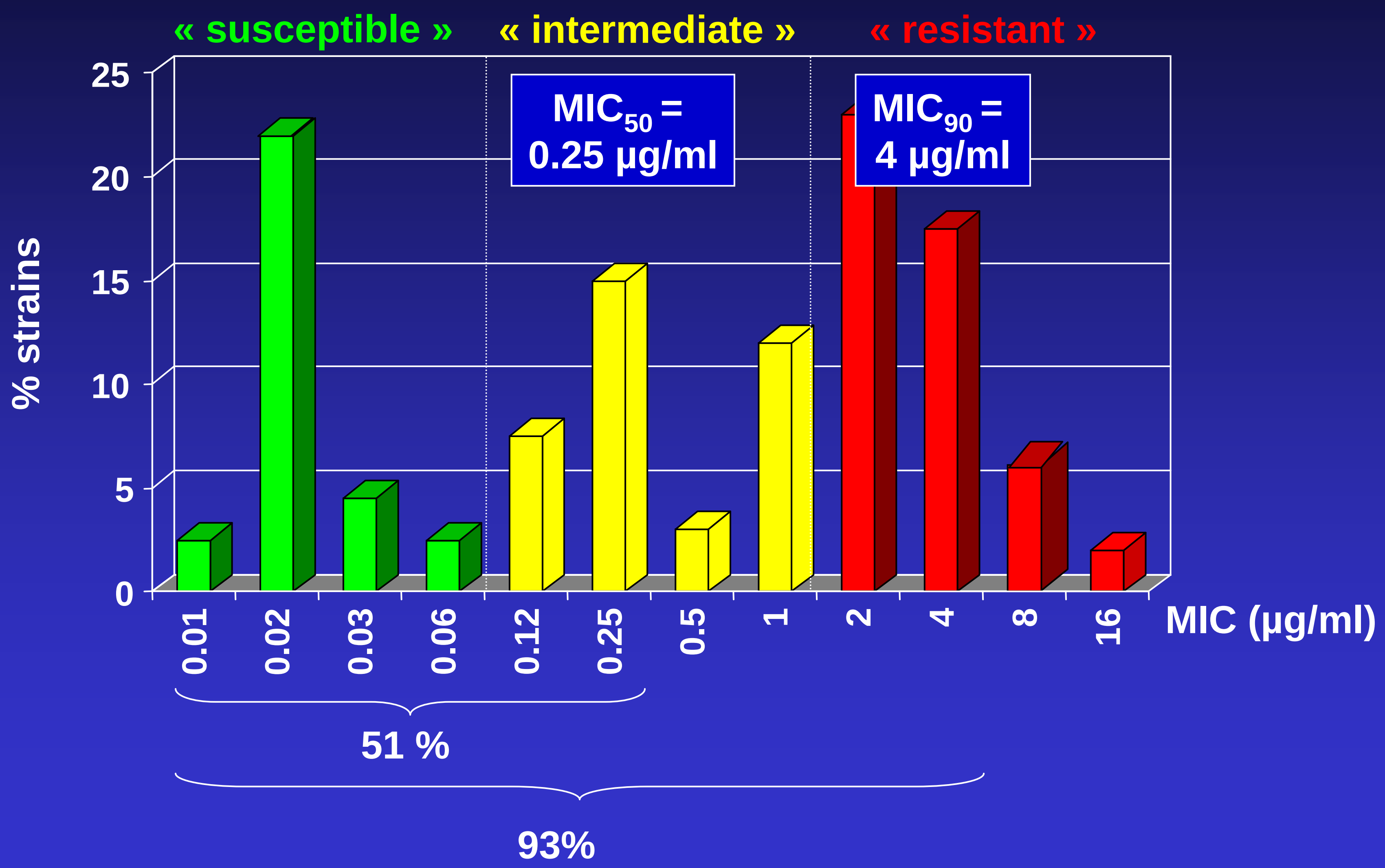
Susceptibilities of bacteria populations : MIC_{50} and MIC_{90}



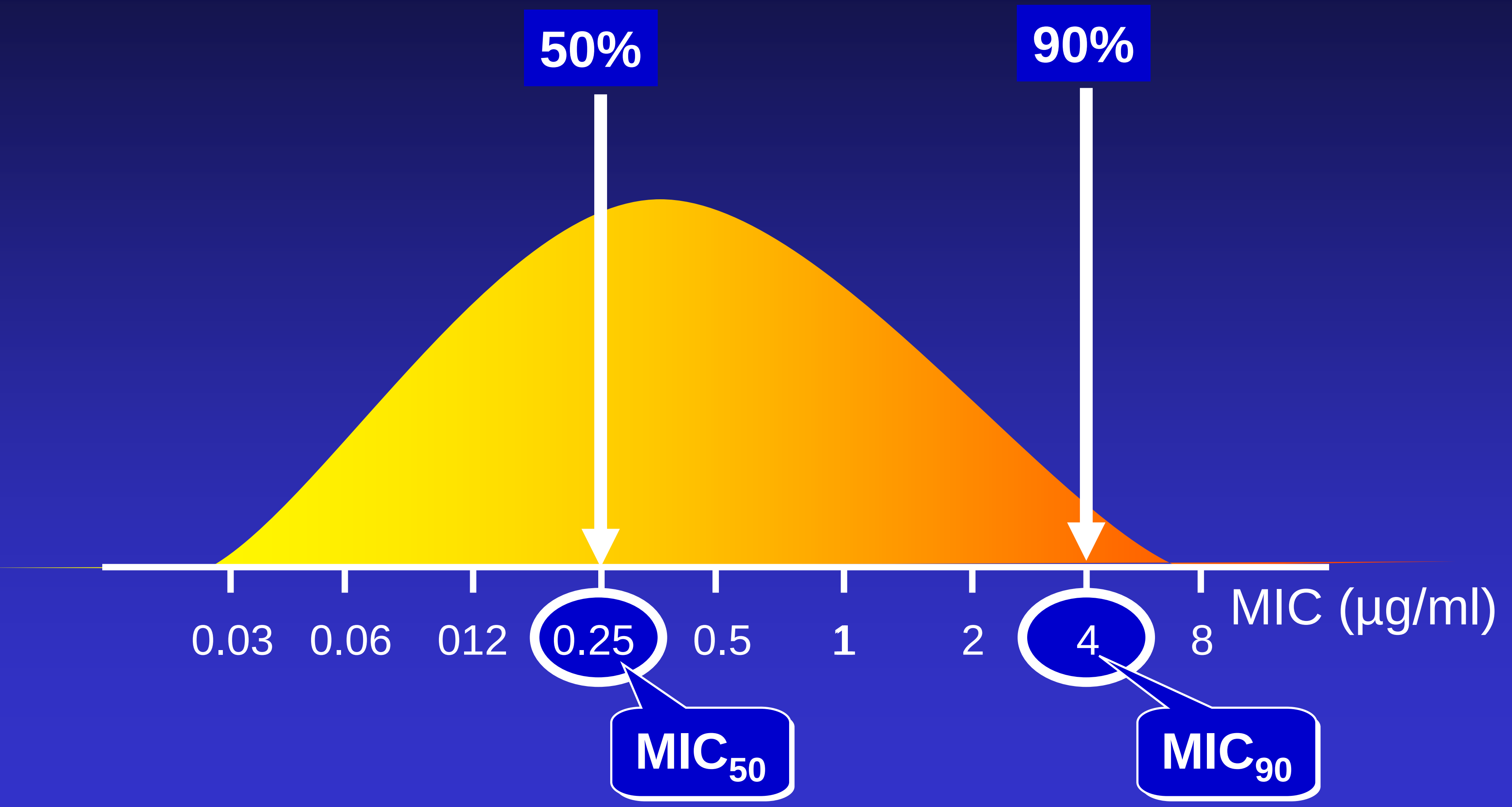
Susceptibilities of bacteria populations : MIC_{50} and MIC_{90}

« susceptible » « intermediate » « resistant »

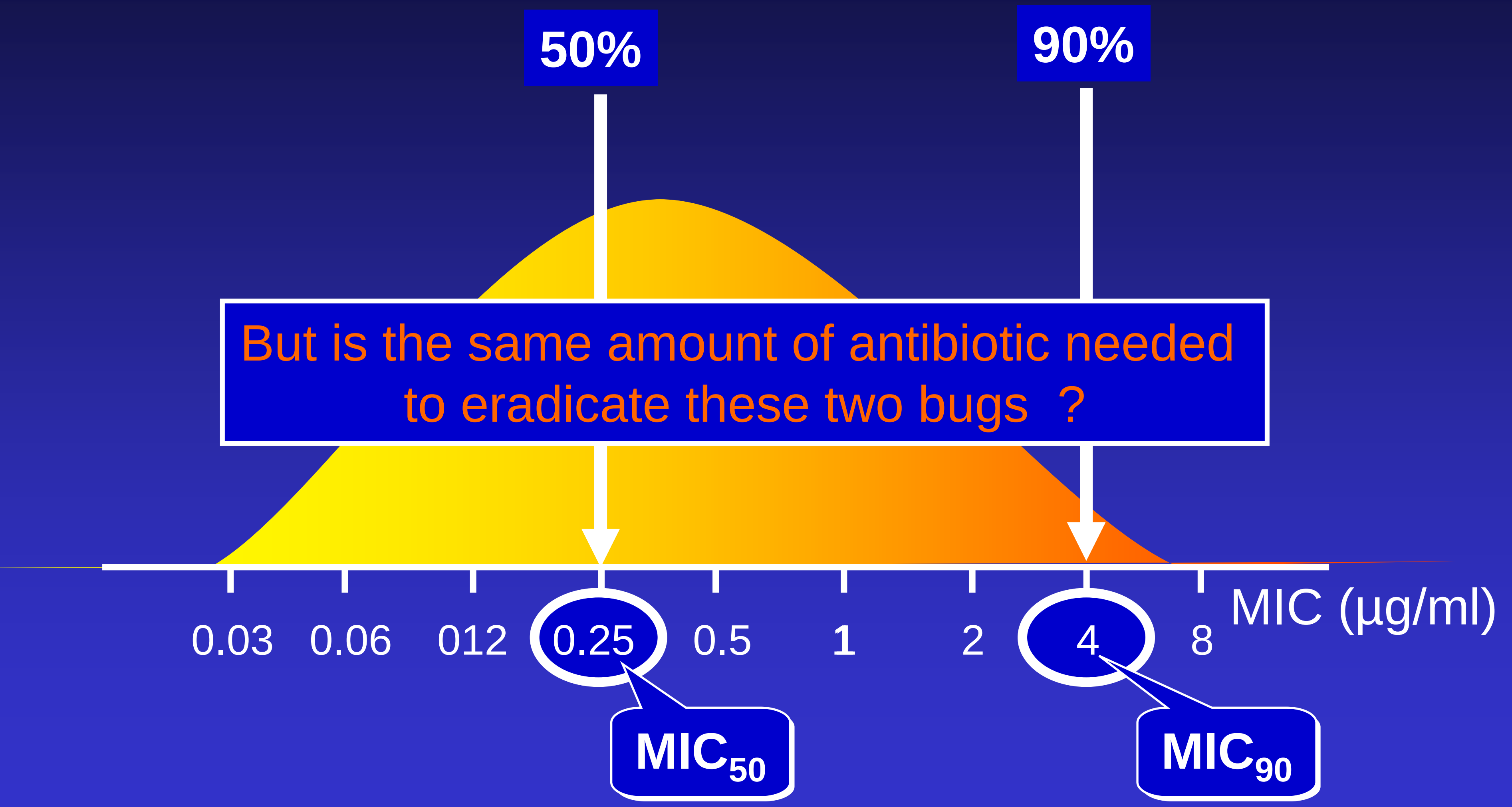
Susceptibilities of bacteria populations : MIC_{50} and MIC_{90}



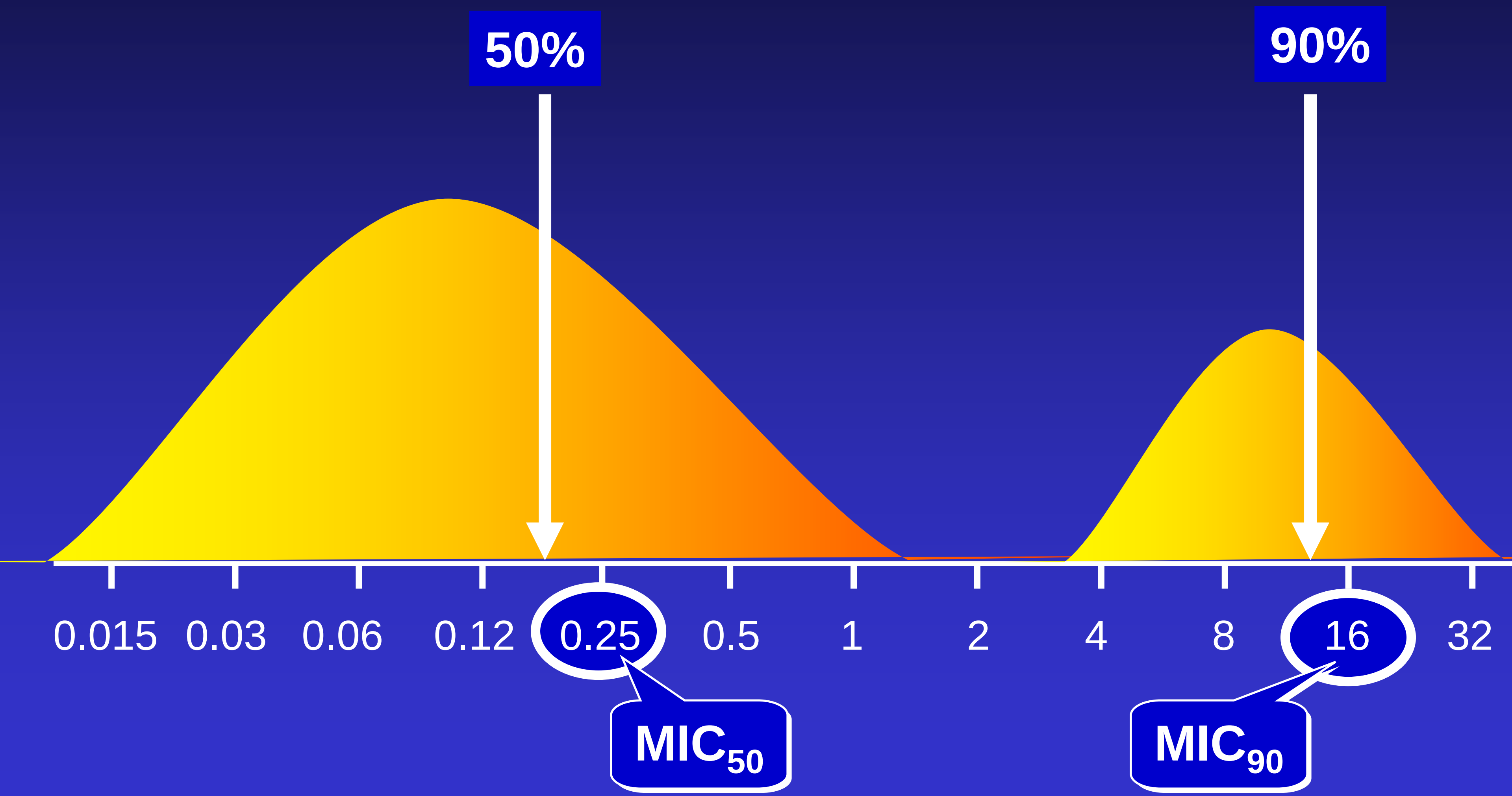
MIC distributions : unimodal populations



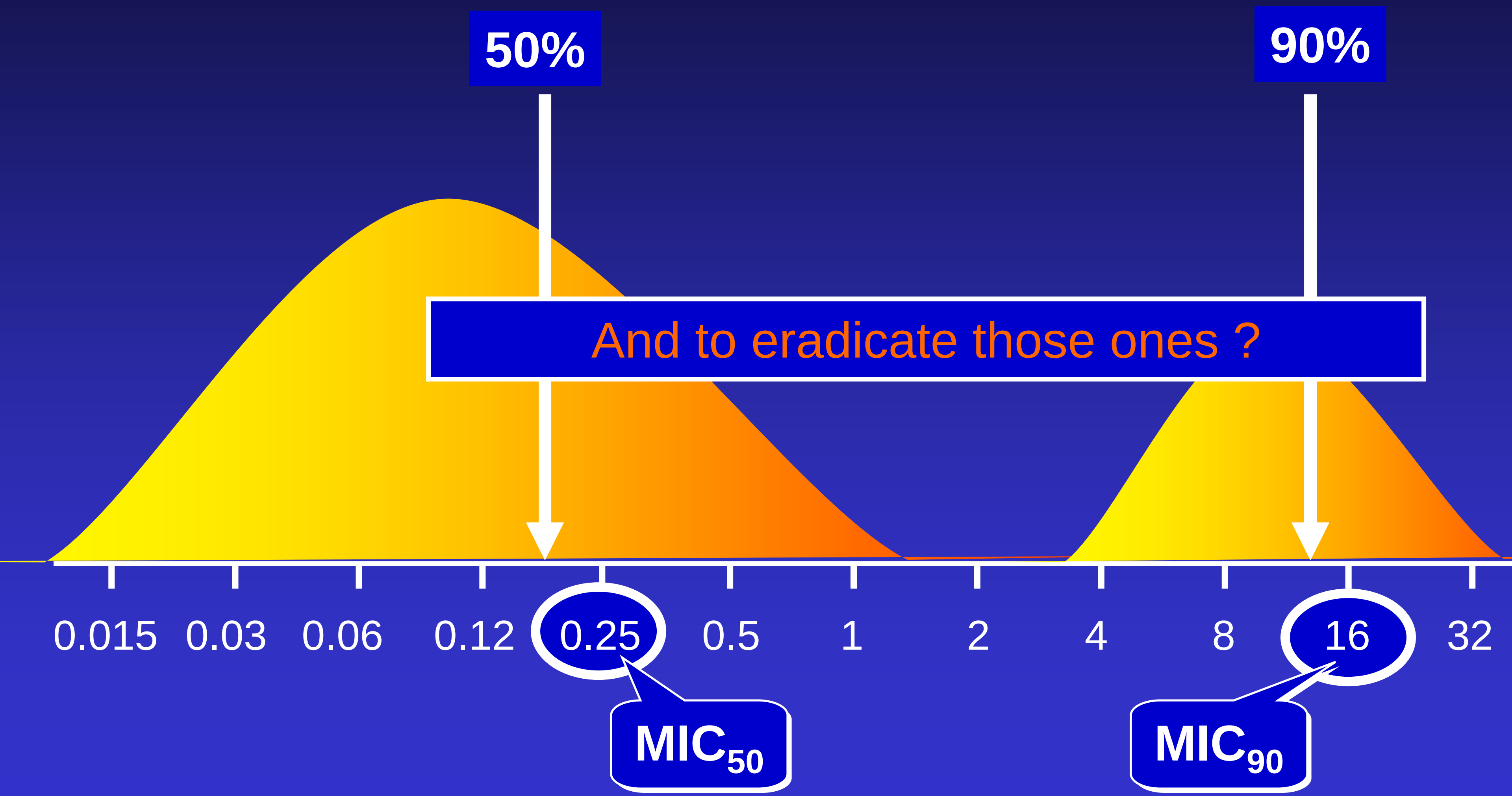
MIC distributions : unimodal populations



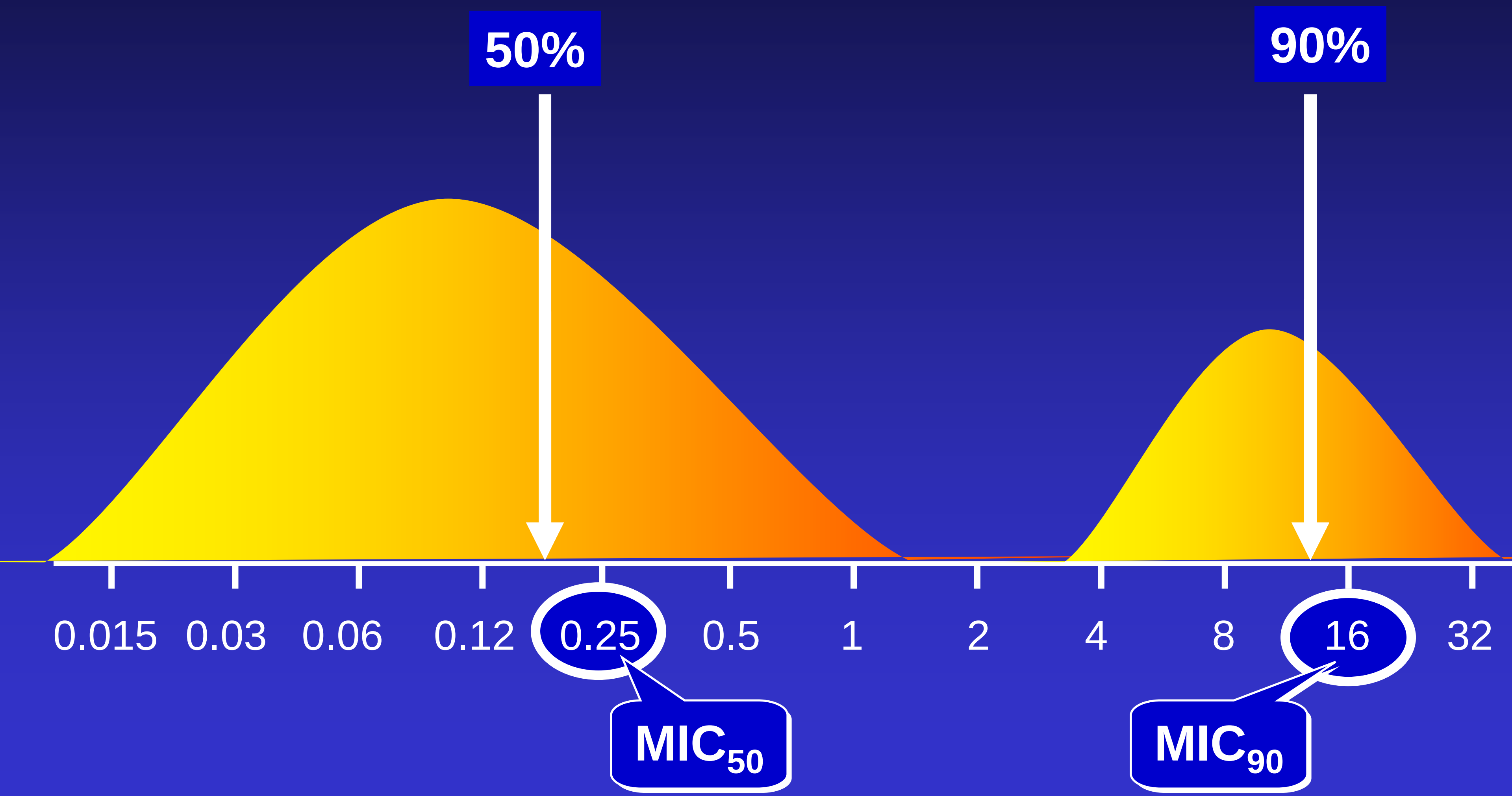
MIC distribution : bimodal populations



MIC distribution : bimodal populations



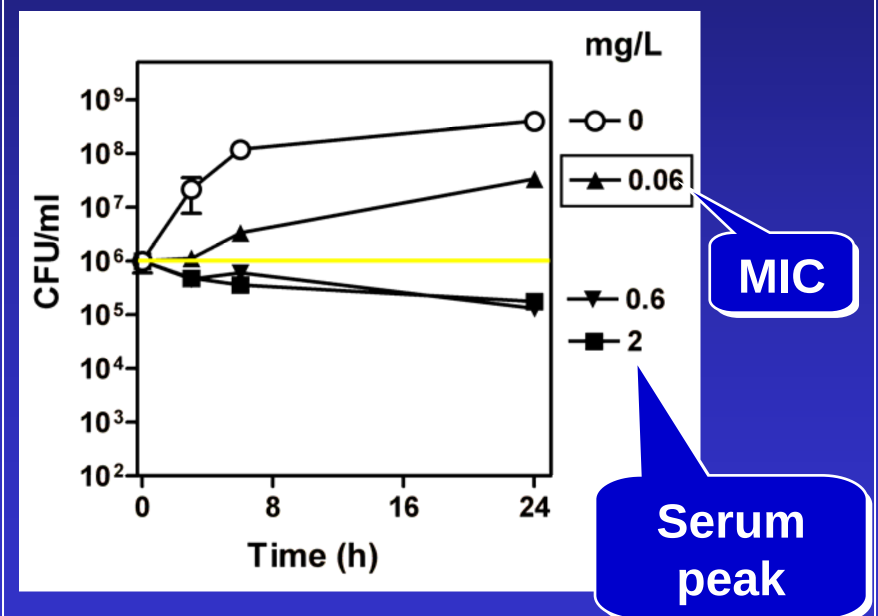
MIC distribution : bimodal populations



bacteriostatic >< bactericidal activity

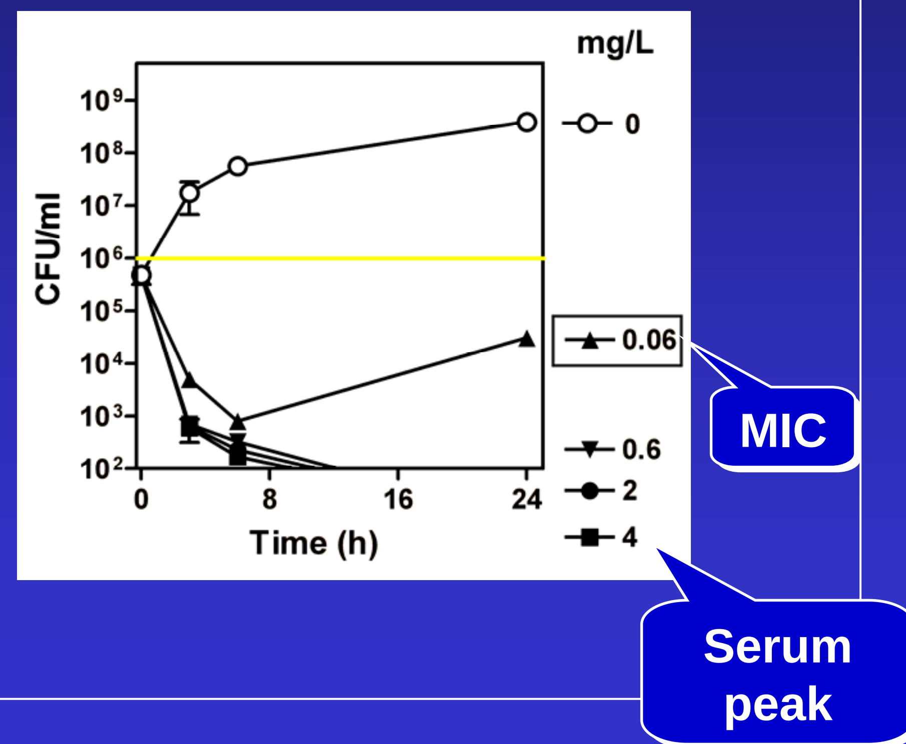
- **Bacteriostatic** :
  prevents bacterial growth

Telithromycin vs *S. aureus*



- **Bactericidal :**
  kills bacteria

Moxifloxacin vs *S. aureus*



Seral *et al*, AAC (2003) 47:228 3-2292

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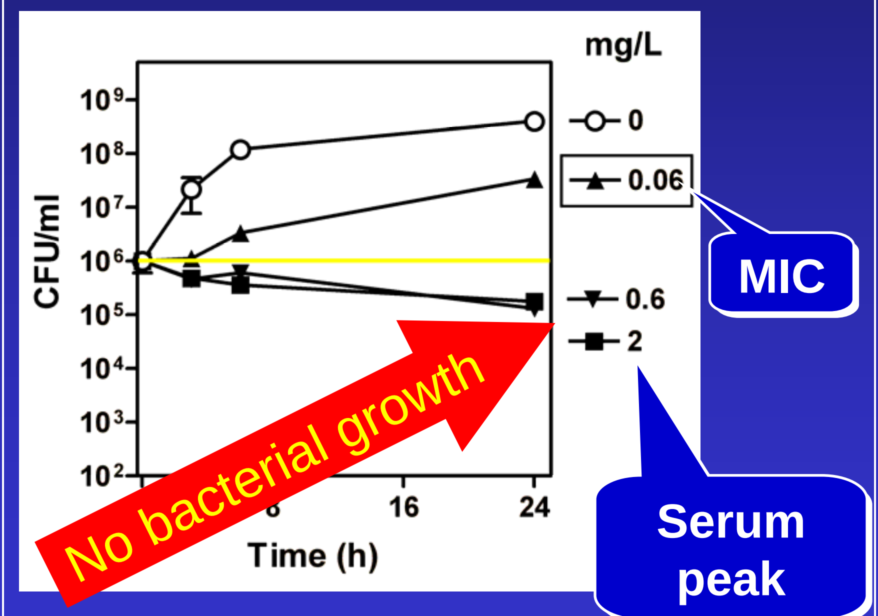
Telithromycin vs *S. aureus*



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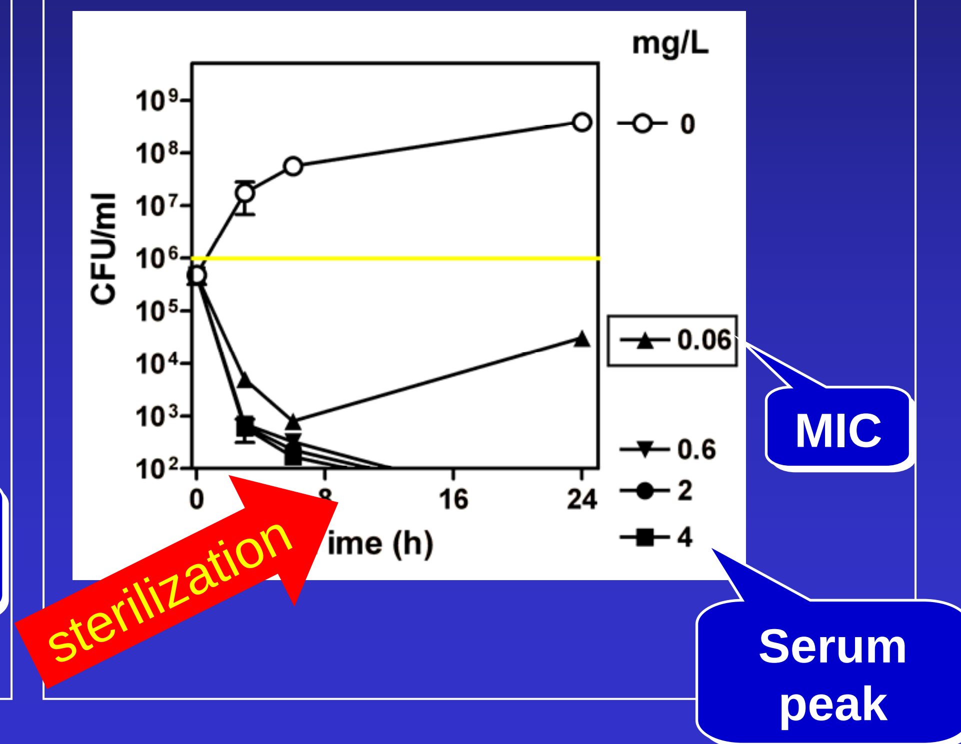
Moxifloxacin vs *S. aureus*



Seral *et al*, AAC (2003) 47:228 3-2292

bacteriostatic >< bactericidal activity

- **Bacteriostatic** :
  prevents bacterial growth

  ⇨ cooperation with host defences needed

Immunosuppressed patients

macrolides
tetracyclines
glycopeptides

- **Bactericidal :**
  kills bacteria

  ⇨ able to eradicate infection by itself

fluoroquinolones
aminoglycosides
β-lactams

narrow >< broad spectrum

- **Narrow spectrum :** active on a small number of bacterial species

  ⇨ Targetted treatment of documented infections

- **Broad spectrum :** active on a large number of bacterial species

  ⇨ Empiric treatment of non documented infections

  ! Risk for selection of resistance

some β-lactams
glycopeptides

macrolides
aminoglycosides

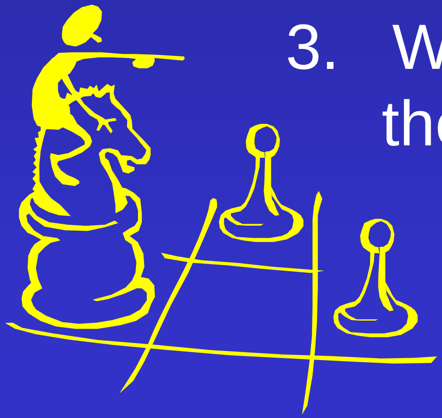
fluoroquinolones
tetracyclines
sulfamides
some β-lactams

Conclusions:
how to choose an antibiotic on the basis of its microbiological properties?

1. Antibiotic with a spectrum **as narrow as possible** (depending on the suspected pathogens)

2. **Bactericidal** antibiotic preferred to bacteriostatic ones

3. Within a family, antibiotic with the **lowest MIC** of the most probable pathogens



But how shall we adapt the dosis to the MIC ?