

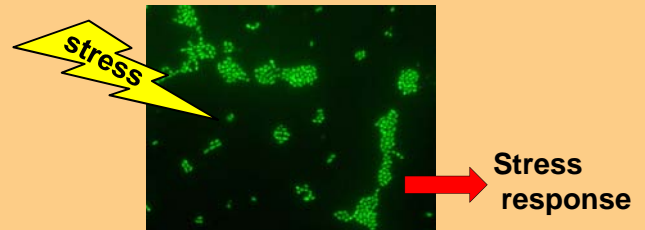
# Different stress responses in *Enterococcus faecalis* and *Enterococcus faecium*

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## Background

Bacteria encounter changing environments, where they have to cope with limited nutrients, temperature shifts and other stresses. Thus, bacterial survival and fitness is dependent on an adequate stress response.

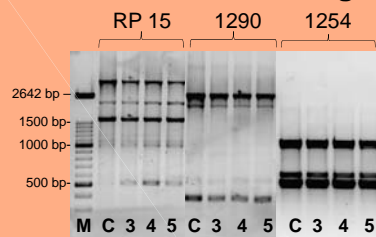
Two different opportunistic enterococci *Enterococcus faecium* B7641 and *Enterococcus faecalis* DSM 2570 were investigated in terms of their stress response.



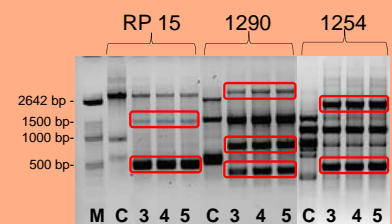
## Osmotic stress

To investigate general osmotic stress induced genome alterations via genomic fingerprinting, RAPD (randomly amplified polymorphic DNA)- PCR was applied.

### 0.5 M NaCl applied to enterococci during early stationary growth phase



*Enterococcus faecium*  
(M: marker, C: control, 3: 3 day, 4: 4 day, 5: 5 day stress application)



*Enterococcus faecalis*  
(M: marker, C: control, 3: 3 day, 4: 4 day, 5: 5 day stress application)

## Results

Osmotic stress did not change the genomic fingerprint of *Enterococcus faecium*, whereas RAPD-PCR of *Enterococcus faecalis* showed variations on the genome level.

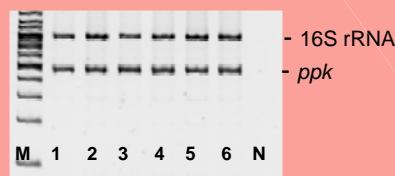
→ Robustness

→ Osmosensitivity

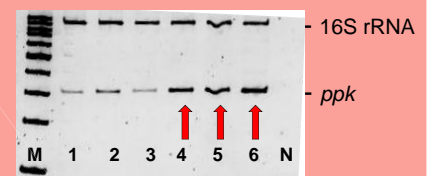
## Growth phase vs stationary phase

Gene expression of the stress responsive target, polyphosphate kinase (PPK) in comparison to a housekeeping gene was investigated.

### Expression of the *ppk* gene during bacterial growth



*Enterococcus faecium*  
(M: marker, 1-5: increasing cell densities during exponential phase, 6: stationary phase, N: negative control)



*Enterococcus faecalis*  
(M: marker, 1-5: increasing cell densities during exponential phase, 6: stationary phase, N: negative control)

## Results

Both enterococci showed a constant expression of the 16S rRNA housekeeping gene. In *E. faecium* *ppk* gene was constantly expressed on a distinct level, whereas *ppk* expression in *E. faecalis* increased during growth.

→ Constitutive expression

→ Induction

## Conclusion

Using the RAPD-PCR approach to determine general stress response, the robustness of *E. faecium* was proven in contrast to the osmosensitive *E. faecalis*. These differences in stress response were strengthened by the *ppk* gene expression results.

Despite their close taxonomical kindship, the two enterococcal species show different stress responses. In consequence, the occurrence of pathogens and their physiological behavior in natural and technical systems is difficult to predict.