

Fluoroquinolones and the SOS response

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The SOS response

- The bacterial SOS response is an inducible DNA repair system which allows bacteria to survive sudden increases in DNA damage.
- The SOS response can activate or enhance the horizontal transfer of antibiotic-resistance genes and of virulence genes.

Fluoroquinolones and SOS response

- Antibiotics (eg. the β -lactams, trimethoprim and the quinolones) can induce the SOS response in some bacteria, often at subtherapeutic doses.
- The fluoroquinolones induce the SOS response in *E-coli* O157, in *Staphylococcus aureus* and in *Vibrio cholerae* - at subtherapeutic doses for *S. aureus* and at higher doses for *E-coli* O157.

Consequences of SOS induction by the fluoroquinolones

- Genes encoding Shiga-toxin production can be transferred from *E-coli* O157 to other *E-coli*.
- A *S. aureus* ‘pathogenicity island’ can be horizontally disseminated. As a result, virulence genes are spread.
- An ‘Integrating conjugative element’ (ICE) carrying genes which code for resistance to several antibiotics other than fluoroquinolones can be transferred from *V. cholerae* and *E-coli*.

Conclusions

- SOS induction by the fluoroquinolones may help spread virulence genes. This could contribute to the emergence of new pathogens (eg. Shiga-toxin-producing *E. coli*, *Citrobacter* and *Enterobacter*).
- Exposure to fluoroquinolones can promote resistance to antibiotics to which the bacteria have not been exposed.
- The unnecessary or subtherapeutic use of fluoroquinolones should be avoided.