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7 days of doxycycline. Tetracycline class was derived from soil bacteria ‘actinomycetes’. Tetracycline represents an early example of a broad-spectrum & a semi-synthetic antibiotic. Modification to oxytetracycline to ↑ potency, oral absorption & increased t½ led to doxycycline, approved FDA 1967.

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Day 2: [#doxycycline](https://twitter.com/search?q=%23doxycycline) is active against multiple infections, gram positive & negative organisms, anaerobes, mycoplasmas, intra-cell chlamydiae, rickettsiae, as well as protozoan parasites. Can be used (where suitable) as oral single agent for MRSA.



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Day 2 (cont): [#doxycycline](https://twitter.com/search?q=%23doxycycline) used for large range of infections but typical dose adult & child>12 is 100mg/day (can be doubled if severe infection), & tradition for 200mg on 1st day for acute infections (not for all). Evidence base for 200mg stat not found; some papers state 200mg dose achieves bioavailability in lower range of the i.v dose. Early studies (1980s) refer to this as a ‘loading dose’ to attain rapid steady state, but studies comparing dosing regimens were not found

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Day 3: MOA. Bacteria have transport systems which admit tetracyclines (TCs), but human cells mostly do not uptake. [#doxycycline](https://twitter.com/search?q=%23doxycycline) binds to bacterial ribosome, prevents tRNA binding mRNA; inhibits protein synthesis, cell functions & replication. Predominantly bacteriostatic

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Day 3(cont) TCs have anti-inflammatory/anti-oxidant properties which may be helpful for inflammatory conditions e.g rosacea & periodontitis (low dose). Mechanism possibly reduced cytokine production e.g TNF-⍺, IL-6, 8 & ↓ matrix metalloproteinases so ↓ tissue remodel/destruction. Also imparied enzyme production e.g phospholipase so ↓ prostaglandin synthesis

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Day 4: Widespread use for over 60yrs & low level use livestock/crop protection has caused high levels of tetracycline resistance; semi-synthetic modifications e.g [#doxycycline](https://twitter.com/search?q=%23doxycycline) and newer tetracyclines e.g tigecycline have helped to overcome resistance issues . Some bacteria can sense a repressor gene prod by TCs prompting up-regulation of an efflux pump which pushes the antibiotic out of the cell. Some bacteria have ribosomal protection tools, which dislodge the TC. Enzyme inactivation p/way also discovered, predominantly in vitro

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Day 5: kinetics [#doxycycline](https://twitter.com/search?q=%23doxycycline); well- absorbed from GI tract unless Ca, Mg, Al, Fe present as can form insoluble complexes with tetracyclines. Interaction with calcium can lead to teeth staining & reduced bone growth in children/newborns, or if taken after 4th month pregnancy.

SPC states OK to take with milk (despite Ca levels), as doxycycline has low Ca binding, hence no label 7 (no milk 2hrs before/after taking). NHS sites state avoid dairy without clarification re milk, which could cause confusion

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Day 5 (cont); [#doxycycline](https://twitter.com/search?q=%23doxycycline) has high bioavailability, high Vd & good tissue penetration (↓ in CSF) + high intra-cellular penetration. Low hepatic/GI metabolism (CYP p/ways unknown) with excretion mainly unchanged (despite lipophilic drug?) in urine & faeces, t½ 16-22hrs

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Day 6: [#doxycycline](https://twitter.com/search?q=%23doxycycline) common ADRs include; rash, headache dyspnoea, tachycardia, peripheral oedema, photosensitivity; Rare/serious, antibiotic associated colitis, raised intra-cranial pressure, severe cutaneous adverse reactions (SCARs), DRESS, SJS

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Day 6 (cont); DDIs; severe include lithium (increase risk toxicity) & systemic/topical retinoic acid derivatives; multiple ‘moderate’ drug interactions e.g ↑ effect of warfarin (monitor) & in combination e.g [#doxycycline](https://twitter.com/search?q=%23doxycycline) & rosuvastatin both increase risk hepatotoxicity (not exhaustive)

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Day 7 [#doxycycline](https://twitter.com/search?q=%23doxycycline) [#coronavirus](https://twitter.com/search?q=%23coronavirus) possible roles 1. Some anti-viral action e.g lower cytokines when used for dengue virus 2. Treatment of CV19 associated pneumonia (NOT 1st line unless penicillin allergy) 3. Possibly helps reduce lung injury in ARDS 4. May remove ‘aged/damaged’ cells vulnerable to [#COVID19](https://twitter.com/search?q=%23COVID19) attack. NOTE above based on mostly animal/*in vitro* research

CPD: in addition to the tweets, read the BNF section on Tetracyclines and the monograph on doxycycline. Another useful source is the Summary of Product Characteristics for doxycycline

<https://www.medicines.org.uk/emc/product/4050/smpc#UNDESIRABLE_EFFECTS>

CPD questions (most but not all answers will be in the tweets). There is only one correct answer per question

1.Doxycycline is a narrow spectrum antibiotic

TRUE or FALSE

2. Doxycycline is mostly bacteriocidal

TRUE or FALSE

3. Doxycycline is not linked with high levels of bacterial resistance

TRUE or FALSE

1. Which statement is TRUE?
2. There is minimal resistance to the tetracycline drug class
3. Doxycycline can be used for malarial prophylaxis
4. Doxycycline has less effect on human cells because it is negatively charged
5. Doxycycline can be taken safely throughout pregnancy

B is TRUE

1. Some essential minerals e.g iron can combine with tetracyclines/doxycycline if consumed at the same time and prevent complete drug absorption

TRUE or FALSE

1. Skin reactions including photosensitivity are common side-effects

TRUE or FALSE

1. Which of the following is FALSE?
2. Doxycycline believed to have some anti-inflammatory properties
3. Rarely doxycycline causes antibiotic associated colitis
4. The once daily dosing is because doxycycline has a long half-life
5. There are no severe drug-drug interactions with doxycycline
6. All tetracycline drugs work in the same way by inhibiting normal protein chain assembly in the bacterial ribosome

TRUE or FALSE

1. It is recommended that doxycycline be taken while sitting or standing and well before bedtime to help avoid oesophageal irritation

 TRUE or FALSE

1. Which of the following is TRUE?
2. Doxycycline may have an anti-platelet effect
3. Doxycycline is used first-line to manage coronavirus related pneumonia
4. Doxycycline has a serious drug-drug interaction with lithium
5. Doxycycline is licensed for use as an anti-viral agent