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Opinion

Overcoming Resistance to Antibiotics

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Fluoroquinolones are an important part of our antibacterial armamentarium due to broad efficacy explained by their impact on bacterial enzymes, but recently it was evidenced by Stringham., *et al.* [1] in laboratory evaluation decreased susceptibility of coagulase-negative Staphylococcus to fluoroquinolones. The discussed issue represents a hot topic in general medicine and specifically in ophthalmology, taken into account a raising resistance to antibiotics, particularly to fluoroquinolones [2], and doctors need to be aware on the matter to provide proper prophylaxis and/or treatment of infections, specifically ocular infections.

A few aspects of these results deserve consideration, beginning with the fact that the study design was in vitro case series overestimating therapeutic index due to absence of the natural anatomo-physiological barriers existing in the eye. In addition, only one pathogen (coagulase-negative Staphylococcus) as the most common cause of postoperative endophthalmitis in cataract surgery, was included in this study. Despite these limitations, available findings could be extrapolated to general ophthalmic antibacterial pharmacotherapy, and underscore the importance of addressing new avenues when formulating strategies to prevent a pharmacologic failure. One of the avenues of intervention could be use of prodrugs intended to increase a therapeutic potential of fluoroquinolones [3,4]. The other approach could be a creation of multitarget, synergistic antibiotic combinations, two of which were successfully tested in the randomized control trial of three hundred patients with open globe injury to prevent post-traumatic endophthalmitis [5]. The results indicate that intravenous cefazolin in combination with oral ciprofloxacin, and other combination of oral cefuroxime with oral ciprofloxacin are equally effective, and in addition an oral treatment would be less burdensome.

In the light of currently available findings of fluoroquinolones resistance there is an urgent need for creation of combined synergistic antibiotics topical formulations, such as aminoglycoside tobramycin and levofloxacin or moxifloxacin, intended to increase therapeutic index also by ameliorated bioavailability by the different following methods: use of lyophilisate, water-free vehicles based on semifluorinated alkane technology ,viscous vehicles and in-situ-forming hydrogels providing prolongated corneal contact time by conversion of instilled liquid form into gel on the eye surface due to some polymers responding to temperature, pH and mucoadhesive polymer (chitosan); Gelfoam- an absorbable gelatin sponge presented in the form of a matrix system; Collagen shields- cross-linked hyaluronic acid–itaconic acid films loaded with an agent; Liposomes- vesicular or colloidal drug-carrier systems; Mini-tablets with a polymer as a carrier for antibacterial drugs.

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