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Comparison of Enrofloxacin Concentration Residue in Milk of Healthy and Clinical Mastitic Quarters Following Intramascular Administration by HPLC

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Abstract

Pharmacokinetic studies of drugs from the body are done in healthy animals. Regarding the pathological changes in the permeability of drugs to the anatomical spaces, the knowledge about the rate of permeability of antibiotic to infected mammary glands can be effective in the selection of antibiotics. The aim of this study is to evaluate the amount of enrofloxacin in milk of healthy and clinical mastitis quarters after single dose intramasular injection in dairy cows. To do this research, from six Holstein lactating cattle with clinical grade 2 mastitis infected by E. coli, using aseptic method milk were taken and cultured in a blood Agar and McConkey environment. Finally, 6 isolates sent to the reference laboratory for approval. After confirming the cause of mastitis, Enrofloxacin 5% (hipralona) was injected intramuscularly at dose of 5 mg/kg B.W. Then, milk samples were taken at different times from healthy and clinical mastitis quarters and transferred to the laboratory to analyze. Enrofloxacin and its metabolite, Ciprofloxacin, were extracted by standard protocols. Then drug concentrations were measured using a high-performance liquid chromatographic (HPLC) method. Chromatographic conditions included a mobile phase as methanol-acetonitril solution (76:24 v/v) using an isocratic method with a flow rate of 1.0 ml/min and UV detection at 280nm. The results of our study showed that the amount of enrofloxacin in milk samples between two groups was not significantly different in hours of measurement. However, for ciprofloxacin at 12 h, it was significantly higher in milk of clinical mastitis quarters than in healthy ones. Based on the HPLC data, it can be concluded that the penetration pattern of enrofloxacin in healthy and clinical mastitis quarters had no significant difference.

Keywords: Enrofloxacin, Clinical mastitis, Coliform, HPLC

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Refrences

Ambros, L., Montoya, L., Kreil, V., Waxman, S., Albarellos, G., Rebuelto, M., . . . San Andres, M. (2007). Pharmacokinetics of erythromycin in nonlactating and lactating goats after intravenous and intramuscular administration. *Journal of veterinary pharmacology and therapeutics, 30*(1), 80-85.

Avci, T., & Elmas, M. (2014). Milk and blood pharmacokinetics of tylosin and tilmicosin following parenteral administrations to cows. *The Scientific World Journal, 2014*.

Bajwa, N., Bansal, B., Srivastava, A., & Ranjan, R. (2007). Pharmacokinetic profile of erythromycin after intramammary administration in lactating dairy cows with specific mastitis. *Veterinary research communications, 31*(5), 603-610.

Brown, S. (1996). Fluoroquinolones in animal health. *Journal of veterinary pharmacology and therapeutics, 19*(1), 1-14.

Campoli-Richards, D. M., Monk, J. P., Price, A., Benfield, P., Todd, P. A., & Ward, A. (1988). Ciprofloxacin. *Drugs, 35*(4), 373-447.

Erskine, R. J., Wagner, S., & DeGraves, F. J. (2003). Mastitis therapy and pharmacology. *The Veterinary clinics of North America. Food animal practice, 19*(1), 109-138, vi.

Fang, W., & Pyörälä, S. (1996). Mastitis-causing Escherichia coli: serum sensitivity and susceptibility to selected antibacterials in milk. *Journal of dairy science, 79*(1), 76-82.

Halasa, T., Huijps, K., Østerås, O., & Hogeveen, H. (2007). Economic effects of bovine mastitis and mastitis management: A review. *Veterinary Quarterly, 29*(1), 18-31.

Heringstad, B., Klemetsdal, G., & Ruane, J. (2000). Selection for mastitis resistance in dairy cattle: a review with focus on the situation in the Nordic countries. *Livestock Production Science, 64*(2), 95-106.

Horwitz, W. (1975). *Official methods of analysis* (Vol. 222): Association of Official Analytical Chemists Washington, DC.

Idowu, O., Peggins, J., Cullison, R., & Von Bredow, J. (2010). Comparative pharmacokinetics of enrofloxacin and ciprofloxacin in lactating dairy cows and beef steers following intravenous administration of enrofloxacin. *Research in veterinary science, 89*(2), 230-235.

Kinsella, B., Lehotay, S. J., Mastovska, K., Lightfield, A. R., Furey, A., & Danaher, M. (2009). New method for the analysis of flukicide and other anthelmintic residues in bovine milk and liver using liquid chromatography–tandem mass spectrometry. *Analytica chimica acta, 637*(1), 196-207.

Marin, P., Escudero, E., FERNÁNDEZ-VARÓN, E., & Carceles, C. (2007). Pharmacokinetics and milk penetration of difloxacin after intravenous, subcutaneous and intramuscular administration to lactating goats. *Journal of veterinary pharmacology and therapeutics, 30*(1), 74-79.

Movassagh, M. (2012). Identification of antibiotic residues in raw cow's milk collected from Ilkhchei region (south west of Tabriz) in spring of 1388. *Journal of Food Technology and Nutrition, 9*(3), 89-94.

Neu, H. C. (1988). Quinolones: a new class of antimicrobial agents with wide potential uses. *The Medical clinics of North America, 72*(3), 623-636.

Pober, J. S., & Sessa, W. C. (2007). Evolving functions of endothelial cells in inflammation. *Nature Reviews Immunology, 7*(10), 803.

Rantala, M., Kaartinen, L., Välimäki, E., Stryrman, M., Hiekkaranta, M., Niemi, A., . . . Pyörälä, S. (2002). Efficacy and pharmacokinetics of enrofloxacin and flunixin meglumine for treatment of cows with experimentally induced Escherichia coli mastitis. *Journal of Veterinary Pharmacology and therapeutics, 25*(4), 251-258.

Rasooli, A., Amani, Z., Bahonar, A., Shams, G., & Abdolmaki, Z. (2014). A trace analysis of oxytetracycline and tetracycline residues in pasteurized milk supplied in Tehran: a one-year study (April 2011-March 2012). *Iranian Journal of Veterinary Medicine, 8*(2), 119-123.

Rassouli, A., Abdolmaleki, Z., Bokaee, S., Kamkar, A., & Shams, G. (2010). A cross-sectional study on Oxytetracycline and Tetracycline residues in pasteurized milk supplied in Tehran by an HPLC method. *International Journal of Veterinary Research, 4*(1), 1-68.

Riviere, J. E., & Papich, M. G. (2018). *Veterinary Pharmacology and Therapeutics*: John Wiley & Sons.

Ruegg, P. L. (2012). New perspectives in udder health management. *Veterinary Clinics: Food Animal Practice, 28*(2), 149-163.

Sawant, A., Sordillo, L., & Jayarao, B. (2005). A survey on antibiotic usage in dairy herds in Pennsylvania. *Journal of Dairy Science, 88*(8), 2991-2999.

Schenck, F. J., & Callery, P. S. (1998). Chromatographic methods of analysis of antibiotics in milk. *Journal of Chromatography A, 812*(1), 99-109.

Suojala, L., Kaartinen, L., & Pyörälä, S. (2013). Treatment for bovine E scherichia coli mastitis–an evidence-based approach. *Journal of veterinary pharmacology and therapeutics, 36*(6), 521-531.

Tedgui, A. (1996). Endothelial permeability under physiological and pathological conditions. *Prostaglandins, leukotrienes and essential fatty acids, 54*(1), 27-29.

Tyczkowska, K. L., Voyksner, R. D., Anderson, K. L., & Papich, M. G. (1994). Simultaneous determination of enrofloxacin and its primary metabolite ciprofloxacin in bovine milk and plasma by ion-pairing liquid chromatography. *Journal of Chromatography B: Biomedical Sciences and Applications, 658*(2), 341-348.

Varma, R., Ahmad, A., Sharma, L., Aggarwal, P., & Ahuja, V. (2003). Pharmacokinetics of enrofloxacin and its active metabolite ciprofloxacin in cows following single dose intravenous administration. *Journal of veterinary pharmacology and therapeutics, 26*(4), 303-305.

Waxman, S., Rodriguez, C., González, F., De Vicente, M., San Andrés, M., & San Andrés, M. (2001). Pharmacokinetic behavior of marbofloxacin after intravenous and intramuscular administrations in adult goats. *Journal of Veterinary Pharmacology and Therapeutics, 24*(6), 375-378.