

## **Partnering With Pharmacists For Safe and Effective Use of Transdermal Delivery Systems**

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Because veterinary patients are dependent on their human caretakers for the discovery, diagnosis and treatment of unhealthy conditions; and because medicating animals can often be a severe challenge to their human caretakers, veterinary compounding pharmacists can and do play an important role in improved drug therapy outcomes for pets. Recent advances in the collaboration between veterinarians, pet owners and pharmacists have emphasized the importance of creativity in developing dosage forms for animal medications, and the transdermal gel has been getting a great deal of attention. While this dosage form has meant a breakthrough in human and animal medication delivery, compounding pharmacists are diligent in bringing their unique training in pharmacology to the table as they discuss the possibilities for utilizing this dosage form which is receiving ever greater interest from veterinarians.

In a series of articles to be published in the International Journal of Pharmaceutical Compounding, ACVP consultant faculty member Gigi Davidson, RPh of North Carolina State University College of Veterinary Medicine discusses the obvious benefits of transdermal delivery and also the extreme care pharmacists and veterinarians must take as they explore this undocumented course of delivering traditional treatments. Veterinarians are well informed about drug disposition, pharmacokinetics and bioavailability in various species. ACVP pharmacists have the expertise to apply the principals of human and veterinary pharmacology and therapeutics to assist veterinarians in utilizing this promising delivery system which has proved to be an invaluable aid in delivering human medications. By working together, improved compliance and positive outcomes can be reached in most cases.

In addition to the patient, the human caregiver or owner of the animal patient must also be given consideration when contemplating drug therapy utilizing the transdermal delivery system. Because humans administering medication in this dosage form come in direct contact with the drug, significant care must be taken to ask the right questions regarding the health of the client and to instruct clients on proper rules of administration of transdermal medications, for example the use of gloves and/or finger cots.

The benefits of transdermal medications are plain. This dosage form removes the stress which is so often associated with administration to animals, especially cats. However, transdermals are not a panacea. The disposition kinetics of certain drugs, and the calculation of dosage amounts must be examined carefully to determine their efficacy and safety. Transdermal delivery bypasses the hepatic portal blood system and may greatly alter the systemic bioavailability of a drug. In addition, because of the vast difference between animal skin and human skin the processes of metabolism and biotransformation of drugs in very different in animal patients.

Few scientific studies exist which measure the bioavailability of transdermal dosage forms in animals. While the prospects are promising, veterinarians are only now beginning to evaluate drugs delivered transdermally. Therefore, there are many questions to be answered at each undertaking of transdermal therapy. The IPJC article suggest a three point evaluation for any drug being considered for transdermal application. This survey of the patient and the drug should be established and conducted by the team of veterinarian and pharmacist.

1. The pharmacologic characteristics of the drug should be thoroughly reviewed with respect to parenteral and oral disposition kinetics and metabolism in the target species.
2. Objective monitoring parameters for evaluating efficacy of the drug should be established.
3. Parameters for detecting drug-related toxicity should be established.

The additional risk of adverse effects in the caregiver must also be considered. Obviously, potentially toxic agents, for example cytotoxic medications, chloramphenicol and drugs known to induce anaphylaxis in humans should never be administered transdermally to an animal patient. In addition, methimazole, which is cited for its

efficacy in a transdermal vehicle, is a medication that should never be administered by a pet owner with hypothyroidism. The second article in the series stresses the hazards of human exposure to transdermal medications, and this must be given extreme attention by prescribing veterinarians as well as pharmacists filling the prescription. As in any drug therapy protocol, the pharmacist is the final line of defense in protecting both the veterinary client and the patient from drug interactions or contraindications. Prodrugs, which are activated by the hepatic system could not be completely effective if administered transdermally. First pass drugs, which are filtered by the liver, must be dosed at tempered levels to avoid toxicity. Many drugs, among them cisplatin and carboplatin, cyclophosphamide, chloramphenicol, potassium salt and digoxin cannot be logically considered for transdermal delivery on the basis of the risks they pose of producing toxicity, regardless of their candidacy on the basis of the obvious challenges posed by traditional methods of delivery. In the case of these and many other medications, the veterinarian and pharmacist should apply all of their combined scientific skill to search for solutions to problems in administration of drug therapies.

Because "veterinary therapies are constantly extrapolated from the frontiers of human medicine" and because collaborative relationships between veterinarians and pharmacists offer an ideal platform for safe examination, the trend toward transdermal delivery of medication therapy to animals is an exciting prospect. Compounding pharmacists are uniquely prepared to be cautious and rigorous in their evaluation of the benefits and dangers which will be encountered in applying this exciting technology to those medications prescribed for animal patients. By utilizing the 3-step process of evaluation, the partnership of veterinarian and pharmacist can greatly improve drug therapy outcomes by making medication regimens easier for clients and patients through the use of transdermal delivery systems.