

1

3,755,558  
**POLYLACTIDE-DRUG MIXTURES FOR  
TOPICAL APPLICATION**

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No Drawing. Filed Feb. 23, 1971, Ser. No. 118,081  
Int. Cl. A61k 7/00

U.S. Cl. 424-47 10 Claims

**ABSTRACT OF THE DISCLOSURE**

Formulations of polylactide and drug for topical application to the body as films provide a slow sustained release of the drug to the site. The polylactide is biodegradable to normal or essentially normal metabolic products.

**BACKGROUND OF THE INVENTION**

Field of the invention

This invention relates to novel polymer-drug formulations and to their use in bringing about desired biological effects when applied topically to living organisms, particularly human beings and warm-blooded animals such as domestic animals and pets.

Description of the prior art

U.S. Pat. 3,297,033 discloses polyhydroxyacetic acid made into absorbable surgical devices such as sutures and filaments having controlled strength characteristics. It does not have the concept of a topical polylactide-drug composition for releasing drug to a desired external site at a controlled rate where the polymer is derived predominantly from lactide.

**DESCRIPTION OF THE INVENTION**

The invention is a non-irritating pharmaceutical composition for topical administration designed to release effective amounts of a drug over a predetermined period of time comprising at least one drug in intimate association with a polylactide polymer, the proportions of drug and polylactide ranging from 0.01% by weight of drug and 99.99% by weight of polylactide to 90% by weight of drug and 10% by weight of polylactide. The compositions can contain a suitable solvent, diluent or dispersing agent and optionally a propellant. When applied to living tissue by means of spraying and following removal of volatile diluent or solvent by evaporation, the resulting intimate mixture of polylactide and drug forms an adherent, pharmaceutically useful, medicated film. In such a film the polylactide may be considered as a carrier of matrix for the drug, and is designed to release effective amounts of the drug over a predetermined period of time.

The medicated films have the valuable characteristic of undergoing gradual hydrolysis to release the drug and form physiologically normal substances. They do not, for example, have to be removed from burns, blisters, or open wounds but rather are absorbed slowly. If desired, such films can also be removed by washing with warm water, or they can simply be allowed to sluff off as their polymer components are decomposed by the hydrolytic action of tissue fluids and moisture. Like conventional medicated dressings, these polylactide-drug medicated films also serve to seal and protect lesions as well as to hold a drug in intimate contact with the area to be treated. However, they are more convenient, more comfortable, and cosmetically more acceptable than conventional dressings. Compositions of the invention that contain a propellant and are applied

2

by spraying constitute a preferred embodiment. Further preferred are sprayable compositions containing an antibiotic agent, an anti-inflammatory agent, or mixtures of both.

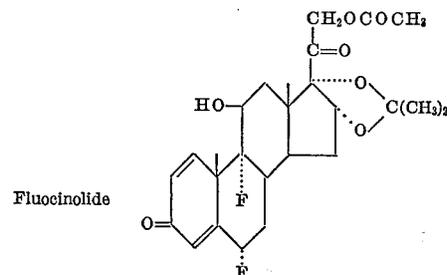
The drug

The term "drug" is intended in its broadest sense as defined in the Federal Food, Drug and Cosmetic Act, Section 201(2)g:

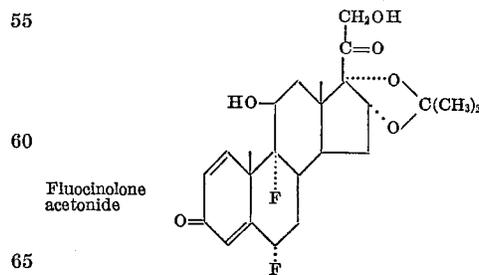
- (1) articles recognized in the official United States Pharmacopoeia, official Homeopathic Pharmacopoeia of the United States, or official National Formulary, or any supplement of any of them; and
- (2) articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease in man or other animals;
- (3) articles (other than food) intended to affect the structure or any function of the body of man or other animals; and
- (4) articles intended for use as a component of any article specified in clause 1, 2 or 3; but does not include devices or their components, parts, or accessories.

Classes of drugs that may be specifically mentioned include antibacterials, such as benzalkonium chloride and benzyl benzoate; antibiotics, such as bacitracin and neomycin; antifungals, such as tolnaftate, selenium sulfide and zinc undecylenate; antihistamines, such as diphenhydramine hydrochloride; antiinflammatories, such as hydrocortisone; antiparasitics, such as chlorphenanthane; antiperspirants, such as aluminum chloride hexahydrate; antipruritics, such as methanol and camphor; contraceptives; deodorants; drugs which promote healing, such as balsams and steroid anabolic agents; enzymes, such as fibrinolysin and desoxyribonuclease; hormones, such as estradiol 17β-enanthate; local anesthetics, such as xylocaine and benzocaine; rubefacients, such as methyl salicylate.

Examples of commercial fluorocorticoid anti-inflammatories which can be used in the practice of the invention are the following:



6α,9α-difluoro-11β,16α,17α,21-tetrahydroxypregna-1,4-diene-3,20-dione 21-acetate 16,17-acetonide



6α,9α-difluoro-11β,16α,17α,21-tetrahydroxypregna-1,4-diene-3,20-dione 16,17-acetonide