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Review Article

Topical calcipotriol in dermatology

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Abstract Calcipotriol is a vitamin D analogue, which has antiproliferative and anti-inflammatory effects and stimulates terminal differentiation of keratinocytes by acting through immunologic mechanism and regulating intracellular calcium concentration. It is currently being used in many dermatoses e.g. psoriasis, vitiligo, morphoea, pityriasis rubra pilaris, ichthyoses and palmoplantar keratodermas. The present article reviews the therapeutic potential of topical calcipotriol in various dermatological disorders.

Key words
Calcipotriol, dermatological disorders.

Introduction

Calcipotriol is a synthetic analogue of 1,25-dihydroxyvitamin D3.[1] It has antiproliferative and anti-inflammatory effects and stimulates terminal differentiation of keratinocytes.[2] It also has immunomodulatory properties.[3]

Various therapeutic modalities have been found to be useful in disorders like psoriasis, vitiligo, morphoea, pityriasis rubra pilaris, ichthyoses and palmoplantar keratodermas but all of them have their potential hazards and limitations. Topical calcipotriol is being used in above mentioned dermatoses for the last one decade and found effective with minimal side effects.[4]

Mechanism of action

Calcipotriol is a synthetic vitamin D3 analogue, which has a high binding affinity to the vitamin D receptor (VDR) for the biologically active form of vitamin D3 (1,25-dihydroxy vitamin D3). Vitamin D receptors have been demonstrated in epidermal keratinocytes, melanocytes, dermal fibroblasts and many other cell types.[2,5]

Topical calcipotriol improves disorders characterized by hyperkeratosis, acanthosis, parakeratosis and epidermal hyperproliferation (psoriasis, ichthyoses, pityriasis rubra pilaris, acanthosis nigricans and palmoplantar keratodermas) by modifying terminal differentiation of epidermal keratinocytes without changing their keratin gene expression.[2,5] It is effective in the treatment of vitiligo by increasing intracellular calcium leading to low intracellular concentration of reduced thioredoxin which stimulates tyrosinase activity, resulting in increased synthesis of tyrosine and melanin.[6,7,8,9] It has also been found to be useful in the treatment of morphoea, lichen sclerosus et atrophicus and vitiligo by acting immunologically and decreasing the antigenic potential of antibodies directed against melanocytes and Langerhan's cells.[3, 10]

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Indications

Topical calcipotriol is indicated in various skin conditions like psoriasis,[11] vitiligo,[12] ichthyosis,[13] morphoea,[14] erythema annulare centrifugum,[15] extragenital lichen sclerosus,[16] prurigo nodularis,[17] seborrheic dermatitis,[18] lichen amyloidosis,[19] pityriasis rubra pilaris,[20] epidermolytic palmoplantar keratoderma of Vorner,[21] bullous ichthyosiform erythroderma,[22] Netherton's syndrome,[23] Sjogren-Larsson syndrome,[24] disseminated superficial actinic porokeratosis,[25] Darier's disease,[26] epidermal naevus,[27] Flegel's disease,[28] acanthosis nigricans,[29] Grover's disease,[30] confluent and reticulate papillomatosis,[31] peeling skin syndrome,[32] viral warts,[33] cutaneous lichen planus,[34] actinic keratosis,[35] oral leukoplakia,[36] cutaneous metastatic breast cancer.[37]

Dosage and administration

Calcipotriol (Daivonex®) 50µg/g cream or ointment is applied once or twice daily to the maximum of 100g weekly. Calcipotriol scalp solution 50µg/ml is applied once or twice daily. The dose is slightly less with scalp solution.[38]

Contraindications

Calcipotriol is contraindicated in hypercalcemia, hypercalciuria, urolithiasis, parathyroid disease, disorders of calcium metabolism, photosensitivity, pregnancy, lactation and concomitant use of vitamin D or calcium or any other drug that can affect calcium homeostasis.[39]

Side effects

The side effects of topical calcipotriol include mild to moderate erythema, xerosis, itching, local irritation, contact dermatitis, perioral dermatitis, photosensitivity and hypercalcemia.[40,41,42]

Combination of calcipotriol with psoralen-UVA

The combination therapy has been studied in vitiligo and it is found to be more effective than PUVA alone.[9] It is advised to apply calcipotriol after UVA exposure because there is a significant decrease in the calcipotriol concentration ranging from 2% to 75% with a mean reduction of 28% if applied before hand.[43]

Conclusion

The calcipotriol therapy has been found effective in dermatoses characterized by hyperproliferation and impaired terminal cell differentiation by involving immunologic mechanism and regulation of intracellular calcium concentration. There is a need for a better clinical evidence base within this area. The review of the existing literature strongly suggests that regular, randomized, double-blind, placebo-controlled studies may be worthwhile to clarify which diseases can be treated using calcipotriol.

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