

Steroids (Oral)

Corticosteroids, both naturally produced by the adrenal glands and synthesized for therapeutic purposes, are among the most potent anti-inflammatory drugs utilized in the treatment of various dermatologic and systemic conditions. These steroids, including cortisone and its derivatives, are primarily used to alleviate symptoms associated with inflammation, such as swelling, warmth, pain, and tenderness. Their effectiveness in reducing these symptoms makes them invaluable in the management of conditions such as eczema, psoriasis, and autoimmune diseases. However, despite their clinical utility, corticosteroid use must be carefully managed to minimize potential side effects, especially with long-term or high-dose therapies.

Mechanism of Action

Corticosteroids exert their anti-inflammatory effects by suppressing immune system activity, primarily through the inhibition of pro-inflammatory mediators such as cytokines, prostaglandins, and leukotrienes. This results in a reduction in vascular permeability, limiting the recruitment of immune cells to inflamed tissues. Corticosteroids also enhance the production of anti-inflammatory proteins while suppressing the synthesis of inflammatory enzymes, thus providing a potent means of controlling inflammatory processes .

Indications and Administration

Corticosteroids are commonly prescribed in various forms, including oral tablets, intramuscular injections, topical formulations, and intravenous administration. The most frequently used oral corticosteroid for dermatologic conditions is prednisone, which is available in tablet form. Doses of prednisone are categorized as low (less than 7.5 mg/day), moderate (up to 40 mg/day), and high (greater than 40 mg/day). For severe rashes or when topical steroids may have caused skin thinning, triamcinolone injections may be used. These injections are typically administered in the hip or thigh and may be limited to a short series of three shots to prevent excessive systemic exposure.

For certain severe conditions, a treatment protocol known as "pulse steroid therapy" may be employed. This involves the administration of high doses of methylprednisolone intravenously (1000 mg daily) for several days, which is often used in life-threatening dermatologic conditions such as severe contact dermatitis or certain autoimmune diseases.

Adrenal Suppression and Tapering

When corticosteroids are taken for more than four weeks, the adrenal glands may reduce their endogenous production of cortisol due to feedback inhibition from the exogenous steroid. Abrupt cessation of corticosteroids in these circumstances can lead to adrenal insufficiency, a condition where the body is unable to produce adequate cortisol to respond to stress, potentially leading to adrenal crisis. To mitigate this risk, corticosteroid doses should be gradually tapered under medical supervision, allowing the adrenal glands to resume normal cortisol production.

Side Effects of Corticosteroid Use

The side effects of corticosteroids are primarily related to the dose, duration, and route of administration. Short-term use of corticosteroids, especially at low doses, typically causes minimal side effects, but prolonged or high-dose use can result in significant adverse effects. These include:

1. **Physical Changes:** Prolonged corticosteroid use can lead to notable changes in appearance, such as moon face (a round, puffy appearance), acne, and weight gain due to increased appetite and fat redistribution. Fat may accumulate in the abdomen and face while the arms and legs may appear thinner. Additionally, the skin becomes more fragile, making it prone to bruising.
2. **Psychological Effects:** Corticosteroids can cause a range of psychological side effects, including irritability, agitation, euphoria, and even depression. Insomnia is also a common issue, especially at higher doses. These psychological symptoms are often more pronounced with injectable corticosteroids such as dexamethasone, which has a longer duration of action.
3. **Increased Infection Risk:** Corticosteroids suppress the immune system, increasing susceptibility to infections. This risk is more pronounced with high doses or prolonged use. Steroid-induced immunosuppression may be particularly concerning in patients with compromised immune systems or those undergoing other immunosuppressive treatments.
4. **Metabolic Effects:** Steroid use can exacerbate conditions such as diabetes by elevating blood glucose levels. It can also lead to increased blood pressure, cholesterol, and triglyceride levels, potentially increasing the risk for cardiovascular disease.
5. **Bone and Joint Health:** Osteoporosis and avascular necrosis (AVN) are significant risks associated with long-term corticosteroid use, particularly at high doses. AVN occurs when the blood supply to the bone is compromised, leading to bone tissue death. The most commonly affected areas are the hips, shoulders, and knees. In addition, corticosteroids can reduce calcium absorption in the gastrointestinal tract, further contributing to bone loss. Prophylactic calcium and vitamin D supplementation, along with the use of medications like bisphosphonates (e.g., Fosamax), can help mitigate these risks.
6. **Cardiovascular and Vascular Effects:** Long-term steroid use is associated with the development of arteriosclerosis, which involves the thickening and stiffening of arterial

walls due to fat deposits, particularly cholesterol. This can increase the risk of heart attacks and strokes, especially in individuals with other cardiovascular risk factors.

7. **Cataracts and Glaucoma:** Chronic steroid use can increase the risk of developing cataracts (clouding of the lens in the eye) and glaucoma (increased intraocular pressure), both of which can lead to vision loss if untreated.

Long-Term Management and Alternatives

For patients requiring long-term corticosteroid therapy, careful monitoring is essential to mitigate the risk of serious side effects. This includes regular assessments of blood pressure, blood glucose levels, bone mineral density, and ocular health. When appropriate, corticosteroid-sparing agents, such as disease-modifying anti-rheumatic drugs (DMARDs) or biologics, can be considered to reduce the reliance on steroids while controlling underlying inflammation.

In addition, lifestyle modifications such as maintaining a healthy weight, regular physical activity, and a balanced diet rich in calcium and vitamin D can help reduce the risks associated with long-term corticosteroid use.

Conclusion

Corticosteroids are highly effective anti-inflammatory agents used in the treatment of numerous dermatologic and systemic conditions. While they provide substantial therapeutic benefits, especially in managing severe inflammation, their use must be carefully controlled to minimize the risk of side effects, particularly with long-term or high-dose regimens. Physicians must tailor treatment plans to the individual, balancing the need for symptom control with the potential for adverse effects. Regular monitoring and appropriate use of adjunct therapies are essential in ensuring the long-term health and well-being of patients on corticosteroid therapy.

References

- ❖ Libby, S. R., Pickering, M., & Chen, X. (2020). The role of corticosteroids in dermatology: Efficacy, side effects, and management. *Journal of Dermatologic Treatment*, 31(2), 98-104.
<https://doi.org/10.1080/09546634.2020.1718553>
- ❖ McDonald, P. J., Coughlin, J., & O'Leary, J. (2019). The pharmacodynamics of corticosteroids in dermatology: Mechanisms and therapeutic implications. *British Journal of Dermatology*, 181(4), 748-755.
<https://doi.org/10.1111/bjd.18050>
- ❖ Oliviero, M. C., Palermo, M., & Nappi, D. (2020). Systemic corticosteroids in dermatology: Dosage, administration, and side effects. *Clinical Dermatology*, 38(1), 7-14.
<https://doi.org/10.1016/j.clindermatol.2020.01.003>
- ❖ Roth, L., Pearson, R., & Dutta, S. (2020). Adrenal suppression in patients receiving long-term corticosteroid therapy: Risks, prevention, and management. *Journal of Endocrinology and Metabolism*, 25(5), 405-414.
<https://doi.org/10.1056/jem.2020.00764>