

# Reversible Anagen Effluvium Induced by Azathioprine: A Rare Adverse Effect Case Report

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**Abstract:** *Anagen effluvium is a sudden, non-scarring hair loss predominantly associated with chemotherapeutic agents, but it can also occur as an idiosyncratic reaction to immunosuppressive medications. We report a rare case of azathioprine-induced anagen effluvium in a 42-year-old female being treated for disseminated dermatitis. The patient presented with acute onset diffuse hair loss and pancytopenia within 5 days of initiating azathioprine therapy. Prompt discontinuation of the drug and supportive treatment led to complete recovery, including normalization of hematological parameters and full hair regrowth within 2.5 months. This case highlights the importance of early recognition of adverse drug reactions and appropriate management.*

**Keywords:** Anagen effluvium, Azathioprine, Drug-induced alopecia, Pancytopenia, Adverse drug reaction, Immunosuppressants, Dermatology, Toxicity

## 1. Introduction

Anagen effluvium is a non-scarring alopecia characterized by abrupt shedding of hair in the active growth (anagen) phase due to impaired mitotic activity of hair matrix cells. While it is most frequently observed in patients undergoing chemotherapy or radiation therapy, other causative agents include heavy metals, autoimmune disorders, malnutrition, and a spectrum of medications like cyclosporine, colchicine, and rarely, azathioprine.<sup>1</sup>

The average anagen phase duration is approximately 1000 days on the scalp, and damage to follicular matrix cells during this time results in diffuse hair loss. Azathioprine is a widely used purine analog that interferes with DNA synthesis and is used in the management of autoimmune skin diseases including atopic dermatitis, pemphigus vulgaris, and systemic lupus erythematosus.<sup>2</sup>

Although commonly associated with gastrointestinal and hematological toxicities, reports of alopecia as a side effect are sparse.<sup>3</sup>

A 2020 review by Tosti et al. emphasized that medication-induced anagen effluvium, although reversible, can have profound psychological effects on patients, necessitating greater awareness among physicians. Given the increasing use of immunosuppressants in dermatological practice, vigilance for such rare side effects is crucial for optimal patient care.<sup>2</sup>

## 2. Case Report

A 42-year-old female presented to the dermatology outpatient department with complaints of acute onset diffuse hair loss over the scalp for the past 5 days. Her history revealed recent diagnosis of disseminated dermatitis, for which she was prescribed azathioprine 50 mg twice daily and prednisolone 20 mg once daily. Within a week of initiating therapy, she also developed oral ulcers, fatigue, and excessive salivation.

### Cutaneous Examination:

Scalp: Diffuse, non-scarring alopecia more prominent over frontal and vertex areas. No erythema, scaling, or atrophy noted.

- Hair Pull Test: Positive; multiple hair strands pulled out easily.
- Skin: Multiple palpable purpuric lesions ranging from 1.5 mm to 1.4 cm.
- Oral Mucosa: Multiple well-demarcated ulcers over the lateral and ventral tongue.

### Systemic Examination:

- Vitals: Stable
- No lymphadenopathy or organomegaly



Figure 1



Figure 2



Figure 3



Figure 4

#### Laboratory Investigations

Parameter	Result	Normal Range
Hemoglobin	6.6 g/dL	12-16 g/dL
Total WBC count	$1.4 \times 10^3/\mu\text{L}$	$4.0-10.0 \times 10^3/\mu\text{L}$
RBC count	2.1 million/ $\mu\text{L}$	4.2-5.4 million/ $\mu\text{L}$
Platelet count	76,000/ $\mu\text{L}$	150,000-450,000/ $\mu\text{L}$
Liver function test	Within normal limits	-
Renal function test	Within normal limits	-
Peripheral Smear	Microcytic hypochromic RBCs, anisocytosis	
ANA	Negative	-

#### Management and Outcome:

- Azathioprine was immediately discontinued.
- Supportive care initiated: topical 2% minoxidil nightly, oral multivitamins (B-complex, biotin, zinc).
- Hematological recovery observed within 7 days.
- Complete hair regrowth noted at 2.5 months follow-up.

#### Naranjo Adverse Drug Reaction Probability Score:

Criteria	Score
Temporal association with drug intake	+2
Improvement upon drug withdrawal	+1
Absence of alternative causes	+2
Previous conclusive reports	+1
Total Score	6 (Probable ADR)

#### Differential Diagnosis Considered

Condition	Reason for Exclusion
Telogen Effluvium	Delayed onset; not consistent with 5-day history
Alopecia Areata	No exclamation mark hairs, no patchy loss
Nutritional Deficiency	No signs of chronic malnutrition
Lupus-related alopecia	ANA negative; absence of systemic signs

### 3. Discussion

Azathioprine is a purine analogue that inhibits DNA synthesis and is widely used in dermatological conditions such as atopic dermatitis, pemphigus vulgaris, and other autoimmune disorders. Common side effects include gastrointestinal disturbances, bone marrow suppression, hepatotoxicity, and hypersensitivity reactions. However, anagen effluvium is a rarely reported adverse event.<sup>2</sup>

The rapid onset of hair shedding within days of initiating therapy suggests direct cytotoxicity on rapidly proliferating hair matrix cells. Hair loss is often reversible, with regrowth commencing within weeks to months after discontinuation of the offending drug. A histopathological examination, although not performed in this case, may demonstrate abrupt cessation of mitosis in matrix keratinocytes, indicative of anagen effluvium.<sup>1</sup>

Several reports support this association. For example, Rasi et al. (2014) described azathioprine-induced alopecia in a patient with autoimmune hepatitis. Another study by Hanafiah et al. (2019) highlighted azathioprine-related alopecia in pediatric patients with inflammatory bowel disease.<sup>2</sup>

In this case, the patient developed pancytopenia alongside hair loss, likely representing a systemic toxic response to azathioprine. The normalization of blood counts and subsequent hair regrowth within 10 weeks of drug cessation further supports a causal relationship. The positive Naranjo score further supports this association.<sup>4</sup>

Clinicians must maintain high suspicion when encountering acute diffuse alopecia in patients recently started on immunosuppressive therapy. Detailed history, timely investigations, and immediate withdrawal of the suspected agent are crucial in preventing permanent damage.<sup>3</sup>

#### 4. Conclusion

This case underscores the need for heightened awareness regarding rare adverse effects of azathioprine, particularly anagen effluvium and pancytopenia. Early diagnosis and drug withdrawal resulted in complete clinical and hematological recovery in our patient. We recommend close monitoring of patients on azathioprine and reporting such uncommon adverse events to strengthen clinical understanding and pharmacovigilance.

#### References

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