Azelaic Acid in the Treatment of Acne in Adult Females: Case Reports

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\section*{Key Words}
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\section*{Abstract}
Acne, one of the most common skin problems in dermatological practice, is a condition that affects not only adolescents but also adults. While approximately 80\% of cases occurring in adulthood are persistent from teenage years, around 20\% are described as ‘late-onset’ disease, appearing for the first time in adulthood. The disease can be triggered by hormonal changes (including a change from one contraceptive to another), or it can be induced by certain nonhormonal medications, emotional stress, and various underlying diseases such as polycystic ovary syndrome. In many cases acne becomes a chronic skin condition with undulating activity, including improvement and relapse phases, and is often experienced as a major psychological burden. It is, therefore, even more important to provide an effective as well as a safe and tolerable treatment. The spectrum of topical acne treatments has expanded substantially in recent years and various topical medications are available, ranging from azelaic acid, antibiotics, retinoids and benzoyl peroxide to several fixed combinations of these active compounds. The following case collection illustrates how 15\% azelaic acid gel, as a well-established monotherapy, can be successfully employed to treat mild-to-moderate forms of adult female acne.

\section*{Introduction}
Acne has traditionally been considered a disease affecting young people in adolescence, often subsiding spontaneously thereafter. However, a significant number of people, mainly women, continue to suffer from acne lesions or present new lesions after the age of 20 [1]. A number of epidemiological studies indicate that the prevalence of acne in adults may vary between 12 and 54\% [2, 3].

Adult acne, which has received little attention in the standard literature and textbooks, presents some clinical characteristics that differ from those seen in juvenile acne. As a rule, it affects women more frequently than men [1]. Lesions tend to be more inflammatory and less comedogenic than in adolescent acne, and occur primarily in the mandibular region, the areas around the cheeks and on the neck, or the ‘U-zone’. Management of adult acne requires a specific diagnostic and therapeutic approach; factors such as the use of cosmetic products, certain medications and hormonal changes need to be taken into consideration when treating these patients [4]. Treatment in this patient population generally involves good adherence, and the use of maintenance therapies appears to play an important role in many cases.

Various forms of topical treatment have been established for the mild and moderate forms of acne vulgaris [5]. Recommendations for the choice of therapy depend
on pathogenic factors such as follicular hyperkeratosis, sebaceous gland hyperplasia accompanied by seborrhea, microbial colonization with *Propionibacterium acnes*, and inflammatory immune responses, but the overall clinical presentation must also be considered [6]. Among the available topical treatments, antibiotics (erythromycin, clindamycin), azelaic acid (AzA), benzoyl peroxide (BPO) and retinoids (tretinoin, isotretinoin and adapalene) are often regarded as the most prominent choices.

AzA is a saturated, straight-chained C9 dicarboxylic acid. It was first described by Nazzaro-Porro and Passi [7] in the 1970s, and its effectiveness was first observed in hyperpigmentation. This finding was followed by evidence of its efficacy in acne vulgaris [8, 9]. The mechanism of action of AzA against acne includes at least three described pharmacological effects: an anti-inflammatory effect, a stabilizing effect on the differentiation of keratinocytes in the follicular infundibulum, and an antimicrobial effect on various microorganisms including *P. acnes* and *Staphylococcus epidermidis*. This clinically observed activity is credited in part to the reduction of the release of reactive species of neutrophils, as well as the scavenging properties of reactive oxygen species (ROS). Furthermore, it was recently reported that the NF-κB activation pathway, a proinflammatory nuclear factor, was modified in vitro, which presumably led to observed lowered levels of proinflammatory cytokine production in vitro [10]. AzA also inhibits tyrosinase, which may have a beneficial effect in patients with high skin phototypes (IV–VI in the Fitzpatrick classification) since it prevents, to a certain extent, postinflammatory hyperpigmentation. This finding was followed by evidence of its efficacy in acne vulgaris [8, 9]. The mechanism of action of AzA against acne includes at least three described pharmacological effects: an anti-inflammatory effect, a stabilizing effect on the differentiation of keratinocytes in the follicular infundibulum, and an antimicrobial effect on various microorganisms including *P. acnes* and *Staphylococcus epidermidis*. This clinically observed activity is credited in part to the reduction of the release of reactive species of neutrophils, as well as the scavenging properties of reactive oxygen species (ROS). Furthermore, it was recently reported that the NF-κB activation pathway, a proinflammatory nuclear factor, was modified in vitro, which presumably led to observed lowered levels of proinflammatory cytokine production in vitro [10]. AzA also inhibits tyrosinase, which may have a beneficial effect in patients with high skin phototypes (IV–VI in the Fitzpatrick classification) since it prevents, to a certain extent, postinflammatory hyperpigmentation after acne lesions. AzA is, therefore, particularly distinguished by its anti-inflammatory, bactericidal and comedolytic properties [11]. The following case reports provide examples of acne in adult women, illustrating the treatment of this common pathology in daily dermatological practice.

**Case Reports**

**Case 1: Acne and Sensitive Skin (Spain)**

A 22-year-old woman was suffering from mild acne, which largely presented as inflammatory papules and pustular lesions on both cheeks. Symptoms were predominantly in the facial region and associated with a hypersensitive, mixed skin type. The patient had acne for 4–5 years, during which time she had undergone various treatment cycles with unspecified topical products, at times taking systemic antibiotics (doxycycline 100 mg/day for at least 2 months) without obtaining a satisfactory response. She also reported using moisturizing creams and lotions for ‘facial skin care’. At the initial physical examination, the patient was diagnosed with mild-to-moderate acne papulopustulosa (fig. 1a, b).

![Fig. 1. A 22-year-old female with mild-to-moderate acne papulopustulosa characterized by facial skin lesions on the right (a) and left (b) cheek. After 2 months of treatment with 15% AzA gel, acne symptoms improved considerably on both cheeks (c, d).](image)

The patient was instructed to stop using moisturizing creams, which may have a comedogenic effect. In addition, 15% AzA gel was prescribed for daily application, preferably at night. Considering the hypersensitivity of the patient’s skin, she was advised to progressively increase gel application time, depending on her skin’s reaction, until she could leave it on throughout the night, every night.

The patient reported some initial difficulty in leaving the preparation on her skin throughout the night. She was able to progressively increase application time over a period of 2 weeks. After 2 months of treatment, the number of inflammatory papules and pustular lesions was reduced on both cheeks (fig. 1c, d). Subsequently, she achieved satisfactory control of her skin lesions and tolerated the preparation well. The patient is currently continuing the topical treatment, applying the AzA 15% gel 3 days a week.

As a rule, postadolescent acne is usually considered mild-to-moderate in severity, with a predominance of inflammatory lesions. The acne usually manifests as deep-seated, tender inflammatory papules and pustules (nodules may occur), frequently involving the lower third of the face.

AzA has been demonstrated to be effective as a monotherapy in mild-to-moderate acne vulgaris. Studies have shown comparable benefits with 0.05% tretinoin [12], 5% BPO [13] and 2% erythromycin [14]. AzA has been shown to be effective and well tolerated by most subjects. A 1-year European observational study published in 2008 and conducted by dermatologists in private practice evaluated the safety and efficacy of AzA 15% gel used as a monotherapy or in combination with other agents in more than 1,200 patients with acne [15]. Most physicians (81.9%) reported an improvement in patients’ symptoms after an average of 34.6 days, and 93.9% of the physicians reported an improvement after an average of 73.1 days.
One of the main side effects of AzA is a burning sensation, while itching and redness may occur after the initiation of topical treatment. These effects should be considered when determining the indication for topical treatment of acne with AzA, especially if applied to sensitive or intolerant skin, as was the case with this patient. The effects can be diminished by initially reducing application time and/or application frequency, or temporary discontinuation of application.

Case 2: Acne and Maintenance Therapy (Germany)
A 31-year-old woman with seborrheic skin presented with moderate acne, characterized by facial papules, pustules, nodules and acne. The patient had suffered from acne since the onset of puberty. Various topical treatments had been tried, without lasting success (fig. 2a).

For acute treatment, a combination of 0.1% adapalene, 2.5% BPO gel (Epiduo Gel®) and 1% clindamycin solution (Basocin® solution) was applied for 4 weeks. Upon completion of the acute therapy, the number of lesions was significantly reduced. Both photographic evidence and evaluation using the Investigator Global Assessment score indicated that symptom severity had improved from moderate to mild (fig. 2b).

After acute therapy, the patient received maintenance therapy consisting of 20% AzA cream twice daily for 12 weeks. This treatment resulted in a further improvement to a physiological disease state (fig. 2c). The AzA was well tolerated and the patient intended to continue with it to maintain the improvement.

Acne vulgaris is a frequently relapsing chronic inflammatory disease [7]. It is therefore essential to offer patients an effective and well-tolerated maintenance therapy, ensuring good adherence. Maintenance therapy is also aimed at inhibiting comedone formation in order to prevent new episodes of acne.

Although the efficacy of retinoids and retinoid-like compounds such as adapalene in the treatment of acne has been demonstrated, long-term application of these preparations in maintenance therapy can cause problems due, for example, to tolerability or their potential teratogenicity [13]. To date, no malformations have been reported after topical application of adapalene. However, during long-term maintenance therapy in female patients, the occurrence of pregnancy or attempts to become pregnant must be considered. AzA therapy offers an alternative to treatment with retinoids. Embryotoxicity studies in animals did not reveal any teratogenic effect; however, embryolethal effects were noted at certain doses, with some maternal toxicity in rats, rabbits and monkeys. The doses were 162-fold in rats, 19- or 65-fold in rabbits and 65-fold in monkeys compared to the maximum recommended clinical dose based on body surface area.

Case 3: Acne and Polycystic Ovary Syndrome (Brazil)
A 24-year-old woman suffered from moderate-to-severe acne, hirsutism and obesity. She was also diagnosed with polycystic ovary syndrome (PCOS). The onset of acne began at the age of 12. Previous treatment had been unsuccessful, probably due to poor adherence to the prescribed therapy. In addition, she had anxiety and was taking an antidepressant (sertraline chlorhydrate) at the time of presentation. She reported using salicylic acid and glycolic acid antiacne soap for facial cleansing.

The patient presented with numerous papules, pustules and nodules on the face (predominantly on the malar region), some mild postinflammatory hyperpigmentation, and an increased production of sebum and comedones (fig. 3a).

Application of 15% AzA gel was prescribed once during the day and once at night for 3 months. The patient was advised to use antiacne soap twice a day for skin cleansing.
After 12 weeks of treatment, the inflammatory lesions were significantly improved, though not completely resolved. The patient’s papules had disappeared (fig. 3b).

PCOS is the most common endocrine disorder in females, with a prevalence of 6.5–8% [16]. The disease is typically characterized by excessive ovarian androgen production, failure of ovulation, and slightly enlarged ovaries with numerous peripheral small follicles appearing as cysts. The disorder is commonly accompanied by insulin resistance and infertility. Clinical manifestations include irregular menstrual bleeding due to anovulation and dermatological sequelae of hyperandrogenemia, including hirsutism, acne vulgaris and androgenic alopecia. Women with PCOS are also at risk for symptoms of generalized anxiety disorders and depression.

The prevalence of acne in women with PCOS has been estimated at 10–34% [17, 18]. Since androgen hormones play a pivotal role in the multifactorial pathogenesis of acne vulgaris, women with PCOS and acne may benefit from oral contraceptives or antiandrogens that reduce androgen production. In some patients with PCOS, metformin has been reported to also help control ovulation and androgen levels. Several topical medications, including AzA, as illustrated in this case, can also be used for improving acne-derived skin lesions.

**Case 4: Acne and PCOS (Spain)**

A 23-year-old woman presented with a mixed skin type, moderate acne and PCOS. The patient had not been receiving any hormonal treatment.

The patient had acne since she was 15 years old. Treatment with oral isotretinoin was initiated at the onset of acne. This therapy was suspended after some weeks due to side effects. Topical treatment was subsequently continued with 0.1% adapalene and 2.5% BPO, with unsatisfactory results.

A laboratory work-up and androgenic profile showed normal values (including testosterone, dehydroepiandrosterone-sulfate, androstenedione, free cortisol and prolactin).

A physical examination (fig. 4a, b) of the facial skin revealed mainly inflammatory papules, while some lesions were pustular and cicatricial (scarring). The facial regions of the cheeks and chin were largely affected. Topical treatment with 15% AzA gel was initiated. The patient was instructed to apply the gel daily (preferably at night), to leave it on the skin for 15–20 min, and then to rinse it off under running water.

After 3 months of treatment, the number of inflammatory papules was significantly reduced on both cheeks (fig. 4c, d). The patient initially reported unobtrusive irritation occurring minutes after application of AzA, making it necessary to remove it again. The patient was gradually able to leave the gel on for longer periods until the treatment remained applied throughout the night. She is currently using the 15% AzA gel 3 days a week, which satisfactorily controls the acne lesions.

Presentations of PCOS are heterogeneous and may change throughout the life span. According to the 2003 Rotterdam consensus, PCOS is defined as a syndrome of ovarian dysfunction, hyperandrogenism and polycystic ovary morphology [19]. At least two of the three criteria must be fulfilled for the diagnosis of PCOS: normal testosterone levels (as in this case) point to a mild form of PCOS, often associated with acne. Persistent acne with no biochemical evidence of hyperandrogenism may be explained by variable local androgen bioavailability or bioactivity; it has been postulated that androgen levels within the skin are more important mediators of acne than circulating levels.

Various studies have shown AzA to be effective in reducing inflammatory lesions and the number of comedones in patients with moderate acne [13]. The main side effects that can occur are symptoms of irritation (burning sensation, itching and redness of the skin). In our experience, these effects can be reduced or even avoided by applying the product progressively, allowing the treated skin to build up its tolerance level. In our observation, the occurrence of irritation depends on the initial condition of the skin treated, i.e. the type of acne. In our view, the greatest benefit is obtained with the reduction of inflammatory lesions, as seen in this case after application of AzA in monotherapy.

**Case 5: Acne and Stress (Kazakhstan)**

A 35-year-old female with seborrhoeic skin had been suffering from acne vulgaris for 5 years, and presented to us with the classic symptoms of papules and pustules, comedones, scars and erythematous areas. The lesions were predominantly localized on the skin of the chin (fig. 5a). Flare-ups of acne occurred particularly before or during menstruation. The patient also complained about sensations of pain upon light skin pressure, as well as a greasy shininess in the T-zone of her face. She reported that her acne had gradually become worse over the previous 2–3 months.

The medical history showed that the patient suffered from polyarticular rheumatoid arthritis, which had been treated with glucocorticoids for 1 year and with methotrexate for 5 years. She also reported a high level of stress in her social environment.

The treatment of her acne to date had included systemic medication with antibiotics and vitamins A and E. In addition, ichthyol ointment and erythromycin combined with zinc acetate were used topically. Cosmetic treatment included application of high-frequency d’Arsonval currents and regular deep facial cleansing. These therapeutic measures had reportedly not led to a significant improvement of the patient’s condition.
The patient was advised to apply a thin layer of 15% AzA gel twice a day to the affected skin areas after rinsing her face with water and drying the skin. Treatment with AzA lasted for 6 months. The patient continued to see her cosmetician for deep facial cleansing. Upon initiation of the treatment, the patient reported a burning sensation shortly after application of the 15% AzA gel, which gradually subsided over time and was gone after weeks of treatment.

The 15% AzA gel resulted in a considerable reduction of erythema shortly after the initiation of therapy. The other acne symptoms described gradually improved as well (fig. 5b). Acne flare-ups related to menstruation disappeared after 6 months. A relapse occurred 10 weeks after initiation of treatment, with new skin lesions in the nasolabial triangle. However, the symptoms disappeared with continuous use of AzA. The treatment was well tolerated. In addition to the topical treatment, acne scars and cysts in the chin area were removed by laser surgery and electrocision. After all therapeutic measures, the patient reported significant improvement in mood and self-appraisal.

Although there has been an increase in adult acne, it is still not completely clear what triggers the disease in this particular group of patients. Psychological stress, hormonal changes or certain medications have been discussed. In women, the development of hormonal irregularity in the menstrual cycle may be one factor resulting in acne flare-up, as illustrated in this case. These patients typically suffer from skin lesions, papules and pustules on their chin and cheeks, although no changes in hormone levels are observed in a laboratory work-up. It is also known that long-term use of high-dose corticosteroids, topical and systemic, can lead to acne-like changes in the skin.

Many patients report a worsening of their skin conditions under stress. It has been hypothesized that stress may increase the production of male hormones and that the stress hormone adrenaline may reinforce the effects of androgens locally, within the skin tissue.

When considering a topical treatment for acne, most female patients highly value a formulation that quickly penetrates the skin without leaving a greasy film on the skin surface. Application of 15% AzA gel fulfills these requirements and can easily be covered with light make-up without interfering with daily activities or social life.

Case 6: Mild Acne and Hyperpigmentation (Russia)

A 19-year-old woman had suffered from acne for 6 years; multiple pustules appeared on her face at menarche. After several attempts at self-treatment, she consulted a doctor and received unspecified, initially successful treatment for acne vulgaris. However, her acne relapsed with new skin lesions, hyperpigmentation and atrophic scars. Subsequent treatment with oral antibiotics, adapalene gel plus BPO, and erythromycin plus zinc acetate in combination with AzA cream did not result in a sustainable improvement of the disease. According to the patient, the latest relapse was related to an episode of gastritis, which was treated in a hospital.

The patient presented with mild acne vulgaris, postinflammatory hyperpigmentation in the cheek area, and open comedones in the T-area (fig. 6a).

Monotherapy was initiated with 15% AzA gel and the patient was advised to use a facial cleansing gel twice a day. After 6 months, her skin condition had improved significantly (fig. 6b). With the exception of atrophic scars, signs of acne could no longer be observed on the forehead and the left cheek. The greasy film on the facial skin and hyperpigmentation had disappeared. Individual comedones without signs of inflammation remained on the right cheek.

In this case, a broad range of antiacne treatments had been applied without sustainable success, most likely due to the patient’s low adherence to therapy. Instead of treating acne with multiple topical products simultaneously, which often causes patient confusion and leads to low adherence, it is advantageous to prescribe one continuous monotherapy (e.g. AzA), making the application regimen easier to follow. It is always important to communicate the importance of long-term therapy adherence for achieving
good treatment results. Antibiotic monotherapies should generally be avoided, as they may lead to antibiotic resistances in the human skin flora. It has been shown that resistance against \textit{P. acnes} and \textit{S. epidermidis} does not occur under topical treatment with AzA \cite{9}.

\textbf{Case 7: Mild Acne and Oily Skin (Russia)}

A 26-year-old female presented with oily skin and mild acne with onset 5 years before. Previous treatment had included topical cosmetics purchased at the pharmacy as well as erythromycin combined with zinc acetate and BPO. According to the patient, their effect was not sustainable. Skin eruptions had reemerged upon stopping treatment.

Upon examination, her facial skin showed grayish tinges with enlarged, oily pores. Additional findings included multiple papules as well as closed and open comedones, located predominantly on the skin of the cheeks, chin and forehead. Purple-to-brownish postinflammatory spots at the locations of resolved papules and postacne scarring were also noted (fig. 7a).

The patient was started on topical treatment with 15\% AzA gel for 6 months and advised to wash her skin with warm water in the morning and to use a cleansing gel for oily skin in the evening.

After 6 months, the patient’s symptoms showed significant improvement (fig. 7b). Facial skin was clear, moderately oily, and displayed rosy tinges. Pores were moderately enlarged, predominantly in the T-area. The number of open comedones and postinflammatory spots were considerably reduced compared to the start of AzA therapy. The patient described some itching for 3 days after the initiation of treatment and moderate exfoliation on days 5–8, predominantly along the nasolabial folds and the chin, which did not affect treatment efficacy.

This case is another example of AzA working well in the treatment of mild-to-moderate acne with both inflammatory and noninflammatory lesions. Patients suffering from acne should be attentive to skin cleansing; it is important to match the skin type with the appropriate cleanser and optimal cleansing times and methods. Moisturizing prevents and alleviates skin irritation, softening the skin by slowing the evaporation of water. Many liquid facial cleansers also moisturize, which may be sufficient for a patient with oily skin. While sunscreens are often irritants, the best options for oily, acne-prone skin should have a water or light liquid base \cite{19}.

\textbf{Case 8: Acne and Oral Contraceptives (Brazil)}

A 39-year-old woman had been suffering from acne lesions for 1 year. Skin lesions appeared for the first time after she changed her oral contraceptive medication. She presented with open comedones, oily skin and erythematous papular acne lesions in the face and neck; in addition, some mild postinflammatory hyperpigmentation was observed in the neck region (fig. 8a, c). No previous acne treatment had been applied. The patient had been taking desogestrel for contraception and reported a great deal of emotional stress at work.

The patient was diagnosed with mild inflammatory acne and started on 15\% AzA gel once a day (at night). She was also advised to use antiacne soap for cleansing and a sunscreen with a high protection factor. After 120 days of treatment, her skin had significantly improved (fig. 8b, d). The patient described her skin as clear, softer and less oily.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig7}
\caption{A 26-year-old Russian female presented with oily skin and mild acne (a) that improved significantly after treatment with 15\% AzA gel (b).}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig8}
\caption{This 39-year-old woman experienced acne symptoms for the first time after she had changed her oral contraceptive medication (a, c). Symptoms improved after 6 months of treatment with 15\% AzA gel (b, d).}
\end{figure}

The etiology of acne vulgaris is multifactorial and complex. Hormonal changes, initiated, for example, by switching to another birth control pill (progestogen-only contraceptives in particular) can worsen or even trigger adult acne. On the other hand, the antiandrogenic effects of oral contraceptives could counteract acne skin lesions that arise from a surplus of circulating androgen hormones. Switching to another contraceptive or, as in this case, the use of topical therapies such as AzA can result in a reduction of acne.
Discussion

The above-mentioned cases provide an overview of situations in which acne typically develops in adult women; it can occur in women switching to a new contraceptive, during treatment with certain medications, in situations of emotional stress, or as a symptom of PCOS. In the majority of the cases presented, the onset of acne originally occurred during puberty and the disease persisted into adulthood, the clinical course being marked by relapses and remissions.

As a general rule, the treatment of acne is dependent on its severity (mild, moderate or severe) and the type of lesions involved (noninflammatory, inflammatory or mixed). The personal situation of the patient, e.g. age, should also be factored into the choice of treatment. The treatment of mild acne, as it frequently occurs in adult females, may be based on the use of topical agents, whereas in moderate-to-severe cases outcomes may be improved by the use of systemic therapy alone or by a combination of both topical and systemic therapies.

Clinical studies have shown the results achieved with AzA to be comparable with those of 0.05% tretinoin, 5% BPO, 2% erythromycin and 1% clindamycin [14]. The outcomes observed in the cases presented here are therefore consistent with earlier findings, showing that AzA 15% gel is effective in mild-to-moderate acne vulgaris, either as a monotherapy or in combination with other treatments. Due to its anti-inflammatory and antibacterial activities, AzA 15% gel is highly suitable for the treatment of mild-to-moderate inflammatory acne lesions. It also normalizes keratinization, explaining its clinically observed anticomEdogenic effects. AzA can be used during the months of the year or in geographical regions where sunlight exposure is high, as it has no phototoxic or photoallergic potential. A further potential benefit of AzA is its action in the prevention of hyperpigmentation [20].

After successful initial treatment, it is important to avoid relapses with the aid of a maintenance therapy that is both effective and tolerable. Although topical antibiotics are a common form of acne treatment, they have little comedolytic activity and should only be used for short periods, preferably not as a monotherapy. They should not be used for the maintenance period, since antibiotic resistance may develop during long-term use. Caution is also recommended with long-term retinoid treatment in women who wish to become pregnant. These patients may benefit particularly from AzA.

A more recent study showed that treatment with AzA 15% gel consistently led to a better maintenance response than the substance-free vehicle used as a control, with 75% of patients remaining in remission for the entire 6-month duration of the maintenance phase [21]. Moreover, in a 1-year European observational study conducted by dermatologists in private practices, 95.7% of patients tolerated 15% AzA gel ‘well’ or ‘very well’, and the majority of patients were more satisfied with AzA than with previous therapies [15]. Minor adverse effects included burning sensations and itching at the start of therapy, but these subsided as the treatment progressed. In conclusion, the data available from the literature as well as the current presentation of cases confirm the suitability of topical AzA as a valuable treatment option for initial treatment as well as for maintenance treatment.

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References

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