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Declaration of Analgesics on Doping Control Forms in German Football Leagues during Five Seasons

Angabe von Analgetika auf Dopingkontrollformularen in verschiedenen deutschen Fußball-Ligen in fünf Spielzeiten

1. NATIONAL ANTI DOPING AGENCY GERMANY (NADA), Bonn

Summary

- **Problem:** The use of analgesics in sport has been the subject of numerous studies and surveys among athletes for years. This evaluation was targeted at providing the first evaluation of analgesics declared on Doping Control Forms (DCF) from football players in the highest German leagues, the Cup, and the A and B Juniors' Bundesliga.
- **Methods:** The evaluation included a total of 8,344 DCF from doping controls performed by the National Anti Doping Agency Germany in the five football seasons from 2015/16 to 2019/20. This included both in-competition and out-of-competition doping controls in the Bundesliga, 2nd Bundesliga, 3rd League, Women's Bundesliga, A and B Juniors' Bundesliga, and the Cup.
- **Results:** On average, 33% of all DCF from the last five seasons of the adult and junior sector of the top football leagues in Germany declared use of analgesics within the seven days preceding testing. The A and B Juniors' Bundesliga has significantly lower values, at an average of 14% ibuprofen was the most commonly reported among 14 analgesic active substances, across all leagues and seasons.
- **Discussion:** Some of the analgesic active substances recorded are used for self-medication, while others are prescription drugs. They are not considered doping substances under the current rules of the World Anti-Doping Agency (WADA). However, the calculated frequency of their use suggests that further scientific surveys in competitive sport should be initiated, e.g. via the WADA Monitoring Program. Since analgesics have a general potential for abuse, continuous information of athletes, supported by the sports environment, concerning the deliberate use of such medications is required.

Zusammenfassung

- **Problemstellung:** Der Einsatz von Analgetika im Sport ist bereits seit Jahren Gegenstand zahlreicher Untersuchungen und Umfragen unter Sportlern*innen. Das Ziel der vorliegenden Auswertung bestand darin, die Angaben von Analgetika auf Dopingkontrollformularen (DKF) von Fußballspielern*innen der höchsten deutschen Ligen, dem Pokal sowie der A und B Junioren Bundesliga erstmalig zu quantifizieren.
- **Methode:** Ausgewertet wurden 8.344 DKF aus Dopingkontrollen, welche die Nationale Anti Doping Agentur Deutschland in den fünf Fußballsaisons von 2015/16 bis 2019/20 durchgeführt hat. Hierbei handelte es sich sowohl um Dopingkontrollen innerhalb als auch außerhalb von Wettkämpfen in der Bundesliga, 2. Bundesliga, 3. Liga, Frauen-Bundesliga, A und B Junioren Bundesliga sowie im Pokal.
- **Ergebnisse:** Auf durchschnittlich 33% aller Dopingkontrollformulare der letzten fünf Spielzeiten im Erwachsenen- und Juniorenbereich der höchsten Fußball-Ligen in Deutschland wurde die Anwendung von Analgetika innerhalb der letzten sieben Tage angegeben. Die Junioren-Bundesliga liegt mit einem Wert von durchschnittlich 14% deutlich darunter. Von 14 analgetischen Wirkstoffen wurde Ibuprofen in allen Ligen und Spielzeiten am häufigsten angegeben.
- **Diskussion:** Die erfassten analgetischen Wirkstoffe sind zum Teil im Rahmen der Selbstmedikation anwendbar, teilweise unterliegen sie der ärztlichen Verschreibungspflicht. Sie gelten nach dem aktuellen Regelwerk der Welt Anti-Doping Agentur (WADA) nicht als Dopingsubstanzen. Die ermittelte Häufigkeit ihrer Anwendung gibt jedoch Anlass dazu, weitere wissenschaftliche Erhebungen im Leistungssport anzustoßen, beispielsweise über das Überwachungsprogramm der WADA. Da Analgetika prinzipiell ein Missbrauchspotenzial bergen, bedarf es einer kontinuierlichen und durch das sportliche Umfeld gestützten Aufklärung von Athleten*innen über einen bedachten Umgang mit diesen Medikamenten.

KEY WORDS:

National Anti Doping Agency, Painkillers, Non-Steroidal Anti-Inflammatory Drugs, Bundesliga

SCHLÜSSELWÖRTER:

Nationale Anti Doping Agentur, Schmerzmittel, Nichtsteroidale Antirheumatika, Bundesliga

Introduction

Use of analgesics, also simply called painkillers, by athletes in various sports has been the subject of scientific and social studies and debate on national and international levels for many years (2, 10). This applies in particular to active substances or drugs from the group of non-steroidal anti-inflammatory

drugs (NSAIDs), which are not on the World Anti-Doping Agency's (WADA) Prohibited List (18). NSAIDs are characterised by their analgesic, antiphlogistic, and antipyretic effects. The extent of these effects varies among the individual active substances. The main indications for NSAIDs are acute and chronic



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pain (such as headache, menstrual pain, and toothache), pain due to injuries and surgery, painful swelling and inflammation, degenerative diseases (e.g. rheumatoid arthritis and osteoarthritis), and fever. Some NSAIDs are available over the counter, and therefore assigned to the area of self-medication (12). Previous studies have shown that NSAIDs are also used by athletes in sports. 327 of the 1250 athletes competing at the 2008 Brazil Ironman Triathlon were included in a survey study to determine the prevalence for the consumption of NSAIDs. 60% of these athletes used NSAIDs in the previous 3 months before the Brazil Ironman, 49% of them without medical prescription (6). 40% out of the 3,913 participants of the Bonn (half) marathon 2010 surveyed stated that they had taken NSAIDs and other analgesics before the competition (7).

While this mainly reflects a situation in amateur sports, other studies examine the area of competitive sports (13). Dietz et al. investigated the use of analgesics in competitive triathletes during three triathlon-competitions in Germany by means of a questionnaire to assess variables that predict the use of analgesics in competitive triathletes. In this study, 9% of the participants who provided a valid questionnaire answered that they currently take analgesics (4). Corrigan and Kazlauskas as well as Tsitsimpikou et al. conducted studies to examine the prevalence of NSAIDs in Olympic athletes. The Doping Control Forms (DCF) of athletes subject to doping controls during the Sydney 2000 Olympic Games and the Athens 2004 Olympic Games were assessed for declarations of analgesics (3, 16). 26% of the athletes tested in Sydney declared that they had taken NSAIDs in the seven days preceding the doping control (3). In Athens, 11% of the athletes tested made such declarations (16). Following the International Standard for Testing and Investigations, WADA requires that every athlete has to fill out a DCF during a doping control (17). In addition to personal and organisational information, the use of all medications (names of active ingredients or preparations) and supplements (names of ingredients or products) within the last seven days as declared by the athlete is recorded on the DCF (17). This applies accordingly in Germany based on the Standard für Dopingkontrollen und Ermittlungen (9). This enables the responsible testing authority to evaluate DCF for declared medications and active substances.

International sports federations such as the Fédération Internationale de Football Association (FIFA) or World Athletics also systematically record the medication taken by their athletes, though independently of doping tests. In the sport of football, FIFA required a report from team physicians on medication administered to players in the 72 hours before a match at FIFA competitions. Based on this data Tscholl et al. observed that about one third of the players took NSAIDs before a match during the men's FIFA World Cup from 2002 to 2014 (15). At

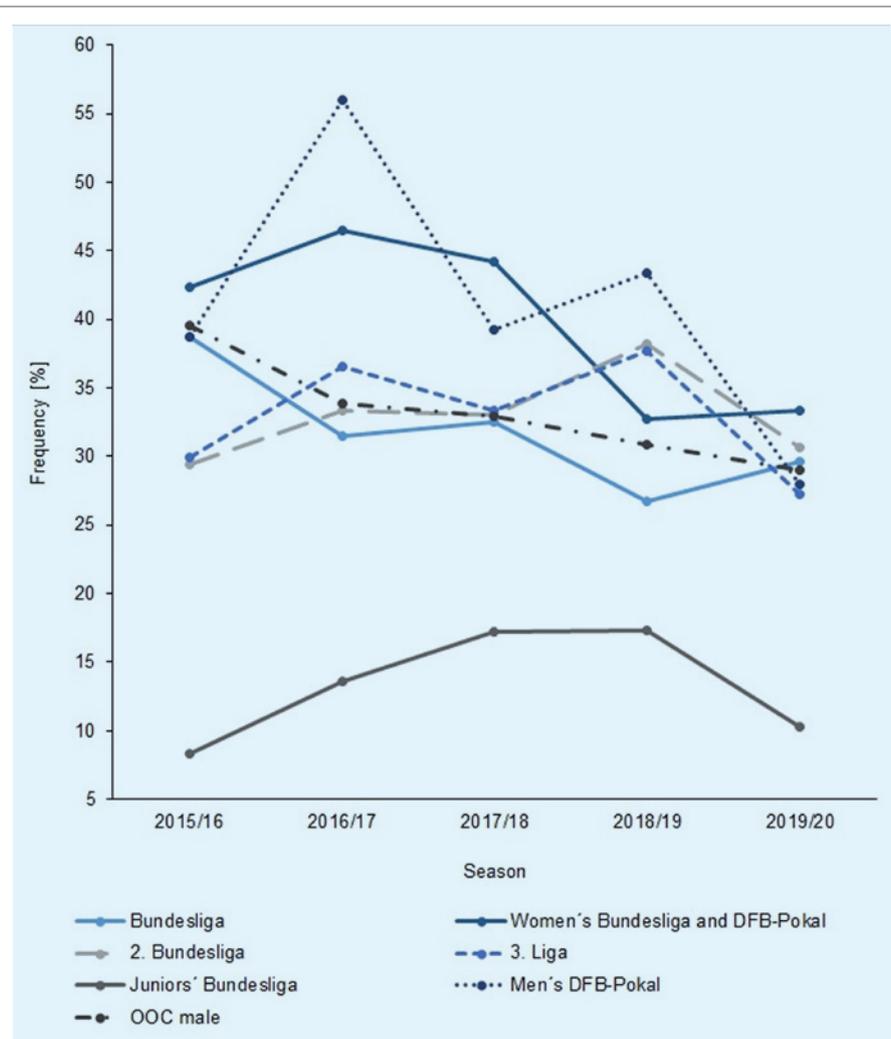


Figure 1

Relative frequency of declared analgesics on Doping Control Forms (DCF) from in-competition (IC) and out-of-competition testing (OOC) by individual German football league and season.

the 2018 FIFA World Cup Russia, about 24% of the players took NSAIDs before a match (11), and around 86% of the players in the Italian national Lega Serie A and B took NSAIDs, either purchased on their own or prescribed by a physician, when examined in the 2003/04 season (14). The exact reasons for the use of NSAIDs are not explored in these studies. It can be assumed that NSAIDs are often applied due to the high occurrence of musculoskeletal injuries as a result of the physical demands of different sports.

In Germany, the use of painkillers in amateur and professional football has recently come to public attention after a television report by the ARD-Dopingredaktion in cooperation with the CORRECTIV research centre aired under the title of "Geheimsache Doping - Hau rein die Pille!" (5).

This evaluation is to provide the first quantification of the declaration of selected analgesics on DCF by football players in top leagues (men, women, juniors) in Germany.

Methods

The National Anti Doping Agency Germany (NADA) has been responsible for conducting all doping controls on behalf of the German football association (Deutscher Fußball-Bund e. V.; DFB) since the 2015/16 season. The in-competition testing (IC) initiated by the NADA currently takes place in

Table 1

Number of Doping Control Forms (DCF) from In-Competition (IC) and Out-of-Competition testing (OOC) in German football leagues with declared analgesics during season 2015/16-2017/18. *= with declaration of analgesics; #= with single/multiple declaration of analgesics.

In-Competition Testing	SEASON 2015/16				SEASON 2016/17				SEASON 2017/18			
	DCF total	DCF *		DCF #	DCF total	DCF *		DCF #	DCF total	DCF *		DCF #
		N	n			(%)	n/n			N	n	
Bundesliga ¹	408	158	39%	123/35	476	150	32%	123/27	436	142	33%	126/16
2. Bundesliga ²	316	93	29%	68/25	384	128	33%	105/23	336	111	33%	94/17
3. Liga ³	224	67	30%	62/5	276	101	37%	82/19	228	76	34%	63/13
Women's Bundesliga and DFB-Pokal ⁴	52	22	42%	22/0	56	26	46%	22/4	52	23	44%	20/3
Juniors' Bundesliga ⁵	48	4	8%	3/1	44	6	14%	6/0	64	11	17%	9/2
Men's DFB-Pokal ⁶	80	31	39%	25/6	50	28	56%	19/9	84	33	39%	27/6
Out-of-Competition Testing (male) ^{1,2,3,5}	394	156	40%	122/34	522	177	34%	128/49	431	142	33%	117/25
Total (IC and OOC) ^{1,2,3,4,5,6}	1522	531	35%	425/106	1808	616	34%	485/131	1631	538	33%	456/82

Table 2

Number of Doping Control Forms (DCF) from In-Competition (IC) and Out-of-Competition testing (OOC) in German football leagues with declared analgesics during season 2018/19-2019/20. *= with declaration of analgesics; #= with single/multiple declaration of analgesics.

In-Competition Testing	SEASON 2018/19				SEASON 2019/20				SEASON 2015/16-2019/20
	DCF total	DCF *		DCF #	DCF total	DCF *		DCF #	DCF #
		N	n			(%)	n/n		
Bundesliga ¹	490	131	27%	111/20	482	143	30%	116/27	32±4%
2. Bundesliga ²	356	136	38%	117/19	378	116	31%	91/25	33±3%
3. Liga ³	236	89	38%	76/13	220	60	27%	51/9	33±4%
Women's Bundesliga and DFB-Pokal ⁴	52	17	33%	17/0	60	20	33%	18/2	40±6%
Juniors' Bundesliga ⁵	52	9	17%	9/0	39	4	10%	4/0	14±4%
Men's DFB-Pokal ⁶	60	26	43%	18/8	68	19	28%	16/3	40±10%
Out-of-Competition Testing (male) ^{1,2,3,5}	479	148	31%	116/32	411	119	29%	93/26	33±4%
Total (IC and OOC) ^{1,2,3,4,5,6}	1725	556	32%	464/92	1658	481	29%	389/92	33±2%

the Bundesliga, 2nd Bundesliga, 3rd League, the Women's Bundesliga, the associated relegation matches, the A and B Juniors' Bundesliga (U19 and U17), and the DFB Cup (men, women). Out-of-competition testing (OOC) covers the Bundesliga and 2nd Bundesliga, the national team, and the women's national team. At present there are no doping controls in the amateur sector. In the regional leagues (Regionalliga), doping controls were conducted only during the seasons 2015/16 and 2016/17.

The DCF of the athletes tested in the 2015/16 to 2019/20 seasons of the above competitions and leagues form the data basis for this evaluation. First, the population of all DCF (N=8,344) on which at least one analgesic was explicitly declared was counted and documented, sorted by league and season. Ambiguous medication data was not considered any further. Subsequently, the number of DCF declaring only one analgesic and the number of those declaring more than one were assessed. The names of the individual active substances were recorded, and the frequencies of their declarations

determined. The subsequent assessment is therefore based on the NSAIDs of aceclofenac, acetylsalicylic acid, celecoxib, diclofenac, etoricoxib, ibuprofen, indometacin, meloxicam, naproxen, parecoxib, piroxicam, as well as the active substances metamizole, paracetamol, and tilidine as analgesics. Drugs with the active substances of aceclofenac, celecoxib, etoricoxib, indometacin, meloxicam, metamizole, parecoxib, piroxicam, and tilidine are prescription drugs in Germany. The active substances acetylsalicylic acid, diclofenac, ibuprofen, naproxen, and paracetamol are available as prescription and over-the-counter drugs alike in Germany, depending on dosage, strength of the active ingredient, dosage form, and package size.

Descriptive statistics were used to present group based distributions. Group differences were determined by means of the Chi-square test. The significance level was set to $\alpha=0.05$. The IBM® (Armonk, New York, USA) SPSS® Statistics program, Built 1.0.0.1508, was used for the provided data analysis.

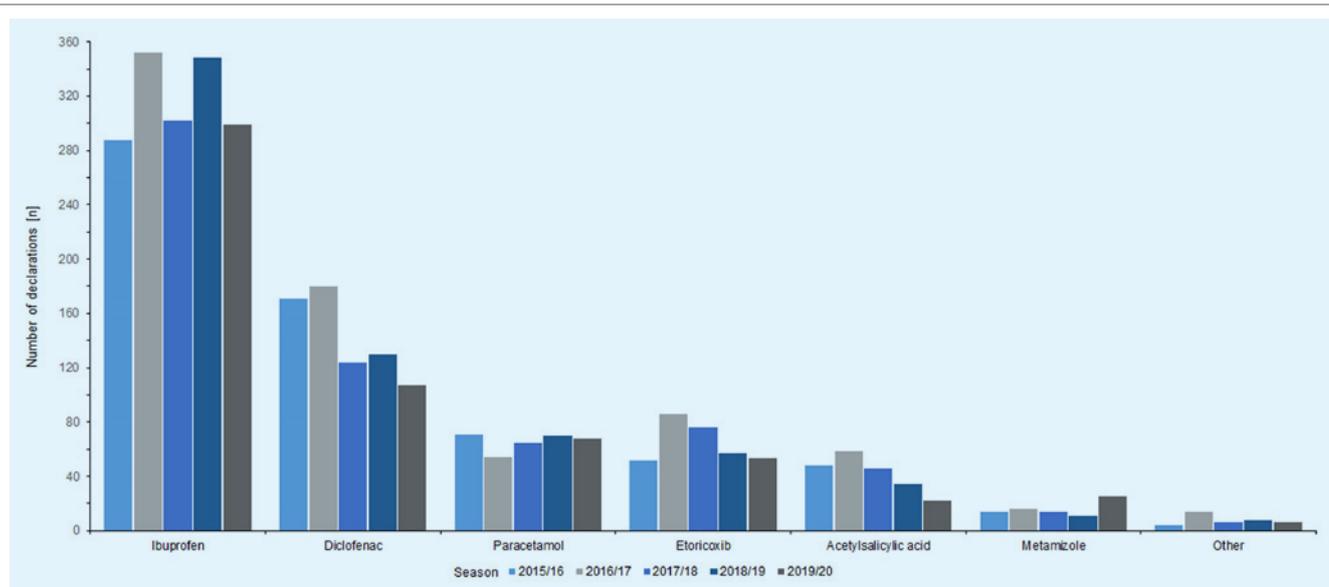


Figure 2

Frequency of analgesics declared on Doping Control Forms (DCF) from in-competition (IC) and out-of-competition testing (OOC) in German football leagues during five seasons ("Other": aceclofenac, celecoxib, indometacin, meloxicam, naproxen, parecoxib, piroxicam, and tilidine).

Results

The evaluation was based on a total of 8,344 DCF. 2,722 of all DCF (33%) declared at least one analgesic and were included in further evaluations. 5,622 DCF (67%) declared no analgesics. These DCF were not considered any further.

742 DCF (33%) from OOC doping controls (n=2,237) and 1,980 DCF (32%) from IC doping controls (n=6,107) declared that analgesics were used. The number of DCF declaring one analgesic was much higher than the number of DCF declaring more than one analgesics through all leagues and all seasons. Table 1 and 2 provide an overview of the DCF across all leagues evaluated through the five seasons from 2015/16 to 2017/18 (Table 1), and 2018/19 to 2019/20 (Table 2).

Frequency of Declared Analgesics by League and Season

In the A and B Juniors' Bundesliga, the percentage of DCF declaring an analgesic IC reached an average of 14% across the last five seasons. In relation to each individual season, with the exception of the Bundesliga, Women's Bundesliga and DFB Cup (women) in 2018/19, the frequency of declared analgesics is significantly ($p < 0.05$) lower compared to any other league and season.

In the Bundesliga, an average of 32% of the evaluated DCF from IC testing declared analgesics. Most analgesics (39%) were declared in the 2015/16 Bundesliga season. An average of 33% each was calculated of the DCF declared analgesics from IC testing from the 2015/16 to 2019/20 seasons of the 2nd Bundesliga and 3rd League. The highest rates of DCF declaring analgesics are found in the DFB Cup (men) and in the Women's Bundesliga and Cup (both IC). They average 40% each. There is a particularly high rate in the DFB Cup (men) of 56% in the 2016/17 season.

IC and OOC DCF declaring analgesics average 33% across both sexes, all leagues and all periods evaluated. No long-term trends in the frequency of analgesics declarations are evident within the individual leagues during the observed period (Figure 1).

Distribution of Active Substances

With a percentage of 48% (n=1,589) of all the active substances mentioned (n=3,291), ibuprofen is the most frequently named active substance across all observed seasons. Nearly half of all DCF that declared analgesics named ibuprofen. Diclofenac follows at 22% (n=712), and paracetamol and etoricoxib at 10% each (n=328 and n=332). Acetylsalicylic acid (6%, n=209) and metamizole (2%, n=80) are reported less frequently. Less than 1% of the declarations name the active substances aceclofenac, celecoxib, indometacin, meloxicam, naproxen, parecoxib, piroxicam, and tilidine. They are combined as "Others" in figure 2.

The frequencies of acetylsalicylic acid, diclofenac, and etoricoxib show a decrease from the 2016/17 to the 2019/20 season. In contrast, the analgesic metamizole, was declared notably more often on DCF in the 2019/20 season than it was in previous seasons.

Discussion

For the first time, the DCF of all doping controls in the highest German football leagues for men and women as well as in the junior sector that were performed by NADA in Germany in the last five years were subjected to a systematic evaluation concerning the declaration of analgesics. 33% of the players declared that they had used one or more analgesic(s) in the seven days prior to testing in these IC and OOC doping controls. This result is comparable to data collected in football on international level, although the studies of Tscholl and Oester only refer to medication taken during the last three, rather than seven, days (11, 15). The sport of football is characterised by lots of physical contact between the individual players, combined with an increased risk of injury, short regeneration times, and short competition intervals. For female players, it should be considered that analgesics are used to treat menstrual problems and thus, may be taken on a regular basis. While this may explain the use of analgesics identified here, NADA considers the use of analgesics by about one third of the players in professional football to be alarming, in particular >

since the side effects of these substances may cause irreversible health damage such as renal insufficiency and/or liver damage in the long-term use (1). Use of painkillers in the area of junior players, at an average of 14%, also requires urgent further consideration. Efforts in behavioural and structural prevention should urgently be improved here. NADA has been working with players in the junior performance centres and junior teams of clubs in German football for several years. Experts specifically inform about the well-considered use of medicines and nutritional supplements. NADA's prevention programme "Gemeinsam gegen Doping" involves the athletes' immediate environments, such as parents, coaches, and support staff, in its measures along with the young athletes. Although NADA's education and prevention offerings are also available to the professional sector, this offer is only rarely used there to date.

Further investigations should be conducted to determine in how far the use of painkillers by football players in the highest German performance categories differs from that of other team sports such as basketball, ice hockey, and handball. Similarly, a comparative evaluation of the use of painkillers between team and individual sports may provide further insights into use of analgesics among top athletes in Germany. Such a study could be supplemented by re-analyses of long-term stored doping control samples for selected analgesic substances under the rules of strict anonymity.

Since the analgesics described here do not meet the definition of doping according to the WADA Prohibited List, their use cannot be sanctioned under sports law (18). However, it should be considered to include the analgesics most commonly used in sports in WADA's Monitoring Program (19). NADA submitted this proposal to WADA during the consultation phase for the draft of the Prohibited List 2021 already. The Monitoring Program serves the purpose of globally monitoring substances that are not currently on the WADA Prohibited List for their potential of misuse in sport. WADA specifies the substances for the Monitoring Program in consultation with its various stakeholders.

Last but not least, the results presented here might give team physicians an incentive to raise awareness for well-considered use of analgesics among the players they supervise and to critically review their own prescription behaviour concerning the corresponding medications.

Limitations

Since the period of time for which an athlete declares use of drugs during a doping control is seven days, conclusions as to the specific time and frequency of use before or during a football match or training session cannot be drawn. An ongoing medication or therapy might occur on more than one DCF of an individual athlete in case the athlete is tested more than one time. Furthermore, information on dosage, strength, route of application, and duration of use of the analgesics, if provided on the DCF, are not included in this evaluation. Considering the fact that for some active ingredients it depends on their strength whether the medication is a prescription drug or not, it cannot be assessed on the available data if the drugs were prescribed by a physician, took the form of self-medication, or were self-medication with the potential of drug abuse. ■

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Conflict of Interest

The authors have no conflict of interest.

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