

Article

Higenamine, Anti-Doping, and Plant-Based Cuisine: A Legal Analysis of Higenamine in Sport Anti-Doping Systems

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Abstract: Current anti-doping policy seeks to protect honest athletes from biochemically overeducated colleagues. However, there is a question of whether the present policy has gone too far. This article illustrates the ambiguity of the anti-doping policy in the context of a particular plant-based substance (i.e., higenamine) by providing certain case studies. In such cases, the process of proof requires the continuous checking of suppositions since an athlete must establish how the prohibited substance could have entered his or her body. This obligation implies that an athlete and the defending team must have legal, medical, dietary, and biochemical knowledge. However, even with all precautions, it is still possible to fail an anti-doping test and be severely punished because it is almost impossible to trace all the sources that caused the prohibited substance to enter the athlete's body.

Keywords: doping; higenamine; source of a prohibited substance; no significant fault or negligence; proportionality of sanctions



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1. Introduction

Current anti-doping policy is built on the doctrine of strict liability.¹ The doctrine's application here assumes responsibility without the athlete's fault or negligence. If a prohibited substance is found in the athlete's body, it is presumed that the athlete is at fault and, accordingly, the burden of proof is shifted onto the athlete. There is a two-step process set forth in the World Anti-Doping Code (further—also the WADC² or the Code), i.e., first, a violation is established that relies on the principle of strict liability; second, the anti-doping organization has the burden to prove that the violation was intentional whereas the athlete holds the burden to prove no significant fault or negligence (also NSFN). As a rule, the athlete must then demonstrate how a particular substance has entered his or her body.³ Accordingly, a more lenient sanction or full acquittal can be expected if the athlete proves that the substance has entered his or her body accidentally without attempting to improve his or her athletic performance. Understandably, every detail is essential, and there is a whole chain of nuances involved in the process of proving and sentencing: it is critical to establish whether there was no (significant) fault or negligence in the athlete's conduct, whether the prohibited substance came from contaminated products, whether it was an ingredient of food supplements, or whether the athlete was secretly harmed by a

¹ Strict Liability is the rule which provides that it is not necessary that intent, Fault, Negligence, or knowing Use on the Athlete's part be demonstrated by the Anti-Doping Organization in order to establish an anti-doping rule violation.

² When using "WADC" further in this article, I refer to the World-Anti Doping Code 2015 with 2019 amendments, if not stated otherwise. Regarding higenamine, no changes have been made to the pertinent sections of 2021 WADC (WADA 2015, 2021).

³ The comment on 2021 WADC, Art. 10.2.1.1, expressly states that "while it is theoretically possible for an Athlete or other Person to establish that the anti-doping rule violation was not intentional without showing how the Prohibited Substance entered one's system, it is highly unlikely that in a doping case under Article 2.1 an Athlete will be successful in proving that the Athlete acted unintentionally without establishing the source of the Prohibited Substance". In an earlier edition of the WADC (i.e., WADC 2015 with 2019 amendments), there was no such a comment.

competitor or a coach, etc. (a non-exhaustive list of relevant provisions includes Articles 2.1, 10.2.1, 10.2.2, 10.4 and 10.5.5.1 of the WADC).

This text reveals the proving and sanctioning process related to a specified prohibited substance, higenamine. Being both a sports attorney (inter alia in the further described case of Adomavičiūtė) and a sports scientist, the author of the article seeks to identify questionable areas in the anti-doping system by showing that the standard of proof for an athlete might be too demanding. So far, there has been one case⁴ in Lithuania concerning the substance under consideration. In the article, this case will be the “main leitmotif.” In addition, other disciplinary cases that have taken place in Brazil, France, and Italy will also be examined. Recognizing that the double-status of the author might be an advantage and a drawback in writing this article, it should be admitted that the text inevitably entails a certain level of intersubjectivity and, perhaps, at times reminds a kind of documentary movie rather than a formal academic text.

The Lithuanian case⁵ originates from a doping control carried out by the Anti-Doping Agency of Lithuania (further—also the NADO) out of competition on 19 August 2020, for which rowing athlete Ieva Adomavičiūtė was selected. Adomavičiūtė was the world champion in the women’s double scull, winning her title in 2018. After analyzing urine sample 4509316, the NADO obtained an adverse analytical finding (further—also AAF). On 15 September 2020, the NADO informed the athlete about the substance found in the sample and a suspected anti-doping rule violation. According to the WADA’s 2020 Prohibited List ([Prohibited List 2020](#)), the substance found in Adomavičiūtė’s sample, higenamine (S3), is a specified substance prohibited both in and out of competition. On 30 November 2020, the NADO submitted a letter substantiating the suspicion against athlete Ieva Adomavičiūtė.⁶ It was not until 8 December 2020 that the athlete learned the precise concentration of the higenamine. With this in mind, the article’s main claim is as follows: the right to know precisely what an athlete is suspected of should mean the right to know the exact concentration of the substance in the athlete’s sample. In other words, there should be no question that in cases involving higenamine, the anti-doping authority must inform the athlete of the AAF and the exact concentration.⁷ This does not imply that knowing this information would always save the case, but at the very least it would spare the athletes’ time, which is vital in these kinds of disciplinary proceedings.

It should be added that in the Lithuanian case the athlete, together with various biochemists, tried not only to find out the exact concentration of higenamine in her urine for approximately three months but also to restore where and what she ate and what body care products she used. Higenamine is such a deceptive substance that can occur virtually anywhere. Therefore, the process of proof required the continuous checking of speculations and intertwined versions. What initially seemed entirely innocent to the athlete, later (in consultation with the author of this article) emerged as suspicious. On the initiative of the athlete, seven samples of food products and dietary supplements were tested in World Anti-Doping Agency (further—also the WADA) accredited laboratories in Warsaw and Cologne. The latest answers from the Cologne laboratory arrived in January 2021: higenamine was not found in any of the samples. Higenamine was included in the Prohibited List under S3 as a beta-2 agonist on 1 January 2017. Both the initial and the final position of the NADO was that the athlete should be subject to a two-year period of ineligibility. This approach follows from Article 10.2.2 of the WADC as the NADO could

⁴ More Lithuanian cases are connected to higenamine, but this case is selected to show the most doubtful places in the whole anti-doping system. Moreover, this is a resonant and much-analyzed case in the Lithuanian media since the world champion is involved and rowing is a popular Olympic sport in Lithuania.

⁵ The final decision of this case was announced on 8 February 2021 by the Lithuanian commission for the examination of cases of anti-doping rules violation.

⁶ NADO’s letter No. S20-181 of 30 November 2020 substantiating the suspicion against athlete Ieva Adomavičiūtė.

⁷ It is important to note that laboratories are not required to quantify or report the concentration for an analyte of non-threshold Prohibited Substances detected in the urine sample. In the article, it is argued that this approach does not work with higenamine.

not prove that violation of anti-doping rules was intentional (if intentional, the potential sanction would be even higher—a four-year period of ineligibility, as per Article 10.2.1.2 of the WADC). It is significant to highlight that recent scientific studies specifically cite higenamine as a source of unintentional doping. In light of this, recent recommendations call for including all plants that contain higenamine in athletic education programs. The use of any higenamine-containing products by athletes is therefore advised to be avoided, regardless of dosage (Rangelov Kozhuharov et al. 2022).

It is also worth mentioning that WADA policy tends to change. For example, WADA is significantly mitigating penal policies related to sanctions for substances of abuse (MacInnes 2020b). Under the 2021 World-Anti Doping Code, if an athlete is tested positive for the substances in question but can prove that they were used out of competition and were unrelated to sporting performance, the previous two- or even four-year ineligibility sanction may be reduced to three months. Researchers have long criticized WADA's overly strict policy on automated sanctioning for drug use (Duval 2014); nevertheless, substantial improvements were not expected until 2021.

My opinion is that the anti-doping policy should be thoroughly reevaluated in the case of higenamine, which, according to practice, is not less problematic than the case of substances of abuse. To illustrate the aforesaid, it is crucial to note that higenamine is a substance that is quite “popular”. In a 2020 report from WADA, anti-doping testing figures show that higenamine use is increasing and that higenamine ranked second as a beta-2 agonist. Higenamine had adverse analytical findings in 26 cases. The United States Anti-Doping Agency reported different sanctions ranging from 10 to 20 months for athletes that violated anti-doping rules by testing positive for higenamine. Investigations linked positive samples to the use of dietary supplements (Rangelov Kozhuharov et al. 2022; U.S. Anti-Doping Agency 2020a, 2020b, 2020c). In other words, different sanctions were imposed in the USA on athletes whose cases were relatively simple: they were able to demonstrate that the usage of nutritional supplements was to blame for their positive test results.

2. Origins of Higenamine

In response to the NADO's letter of 30 November 2020 and seeking to reduce the potential two-year period of ineligibility, the athlete noted that the primary origin of higenamine (or norcoclaurine) comes from different plants: the substance is widespread in plants and in some nutrients and medicines, especially in traditional Chinese medicine and food (Stajić et al. 2017). The plants and flowers in which this substance is found include *Nandina Domestica*, or heavenly bamboo, from East Asia, *Aconitum carmichaelii*, a flowering shrub native to eastern China and Russia, *Galium divaricatum*, a plant native to the Mediterranean Basin (coffee family, known by the common name *Lamarck's bedstraw*), *Annona squamosa* or sweet apple, a fruit tree native to tropical America and East Asia, and *Nelumbo nucifera* or sacred lotus. Most of the listed plants are sold in Lithuania. Therefore, higenamine might be hidden under various names, including lotus root⁸ or wild ginger, widely used in Asian cuisine. For instance, sour vegetable curry paste⁹ contains wild ginger,

⁸ Considering that higenamine is present in lotus seeds and used in the production of food and dietary supplements in China and other Asian countries, researchers sought to assess the risk of the AAF. Fourteen volunteers took plumula nelumbinis capsules orally and another eleven volunteers took higenamine tablets. Urine samples were collected after 14 days and were subject to quantitative dilute-and-shoot analysis using liquid chromatography–tandem mass spectrometry. The analytical results showed that urinary higenamine concentrations exceeded the WADA reporting limit of 10 ng/mL. The maximum higenamine concentration (500 ng/mL) was observed in the group which took capsules. The research revealed that higenamine concentration in urine could exceed the WADA reporting limit with a high probability after taking plumula nelumbinis tablets. The oral administration of the capsules, as mentioned above, showed a high risk of an AAF due to higenamine. More information: Yan et al. (2019).

⁹ See the ingredients of Sour Vegetable Curry Paste. Available online: <https://www.thaihouse.lt/en/product/sour-vegetable-curry-paste-50g/> (accessed on 12 March 2022). It should be acknowledged that I. Adomavičiūtė could have used such a paste, although it most likely occurred far before the doping test.

also known as *Asarum heterotropoides*. This plant contains higenamine (Cannon 2018). The table below is provided for clarification (see Table 1).

Table 1. Plants containing higenamine (Ibid.).

Plant	Also Known As:
<i>Nelumbo nucifera</i> (lotus seeds)	Indian lotus, sacred lotus
<i>Nandina domestica</i> (fruit)	Heavenly bamboo/sacred bamboo
<i>Aconitum carmichaelii</i> (root)	Chinese aconite/Chinese wolfsbane
<i>Asarum heterotropoides</i>	Snakeroot and wild ginger
<i>Galium divaricatum</i> (stem and vine)	Lamarck’s bedstraw
<i>Annona squamosa</i>	Sweetsops

Thus, from the athlete’s point of view, eating Asian food allowed her to consume higenamine without any significant fault or negligence. To understand that higenamine is masked under an ingredient, it may be necessary to read Latin or another language. It is of note that the Court of Arbitration for Sport (hereinafter—CAS) has stated that language barriers are considered in determining the level of athlete’s subjective fault (yet, of course, “considering” per se does not necessarily lead to “taking into account”).¹⁰ It is also worth mentioning that the athlete did not hide that she had been on holiday in Thailand; she liked buying various Asian semi-finished products and making Thai soup according to various recipes (the two witnesses confirmed these circumstances in the disciplinary hearing held on 15 January 2021), including wild ginger as one of the ingredients. Addressing the series of events, the athlete had dinner in the pub “Viking’s China” on the evening of 14 August (the men’s rowing camp took place there). She could have consumed Thai paste on Monday or Tuesday because she was in Trakai,¹¹ and was tested for doping on Wednesday morning. Accordingly, there is a probability that the substance may have entered her body due to the food eaten. Understandably, after a positive doping test, the athlete gave up on her favorite Asian cuisine.

Furthermore, higenamine may be present in food supplements without indication of this specified substance on the label. Supporting scientific research was carried out, and 24 products were examined in one of them. Most supplements were sold as weight loss supplements (11/24; 46%) or sports/energy supplements (11/24; 46%). Two brands did not present a product specification. Higenamine levels ($\pm 95\%$ PI) ranged from traces to 62 ± 6.0 mg per serving. Consumers might be exposed up to 110 ± 11 mg of higenamine per day following the recommended serving sizes indicated on the label. Five products (5/24; 21%) indicated higenamine levels, but none were accurately labeled; the content of these supplements ranged from $<0.01\%$ to 200% of the amount labeled (Cohen et al. 2019).

The ambiguity of the substance in question is evidenced by the fact that several intriguing sports disputes have already occurred, as shown below: the cases of Mamadou Sakho, Anzor Boltukaev, and Daniel Guedes da Silva. Let it be noted that, in terms of anti-doping strategy, the case of Brazilian footballer Daniel Guedes da Silva is the most interesting, followed by ongoing research on higenamine.

¹⁰ CAS 2013/A/3327, Marin Cilic v. International Tennis Federation (ITF), para. 76, 88. CAS 2017/A/5015, International Ski Federation (FIS) v. Therese Johaug & Norwegian Olympic and Paralympic Committee and Confederation of Sports (NIF), para 165.

¹¹ Rowing sports camps took place in Trakai (Lithuania). During these camps, the athlete cooked for herself and had some paste from Thailand.

3. The Case of Mamadou Sakho

In principle, this case¹² has more historical than legal significance—since at that time higenamine *de lege lata* was not prohibited. However, even historical aspects may be necessary for realizing that the substance in question and its use have been treated ambiguously over time. What is once recognized as normal conduct may imply a serious violation after several years.

In April 2016, French footballer Mamadou Sakho was informed that his doping test was positive because the athlete's urine sample contained a substance called higenamine, which the World Anti-Doping Agency has allegedly prohibited since 2004. However, at that time, higenamine was not yet on the WADA List of Prohibited Substances as a specified substance. Additionally, not all WADA-accredited laboratories tested for higenamine which was included in the List as a specified substance only in 2017. At a London court, Sakho sought GBP 16.7 million in damages for defamation. The WADA apologized to the athlete and acknowledged that Sakho did not breach the UEFA Anti-Doping Regulations, did not cheat, did not intend to gain an unjustified advantage, and acted in good faith (MacInnes 2020a).

In a broader sense, this case illustrates the application of the principle of legal certainty in sports law: the breach of that principle led to Mamadou Sakho not having committed an anti-doping rule violation. Antonio Rigozzi has spoken about this at one of the summits, citing the example of higenamine as a substance which falls into the “gray zone”, and which had no clear consensus as to its classification during the period of 2016–2017 (Beloff et al. 2017, p. 146).

4. The Case of Daniel Guedes

On 27 May 2019, Daniel Guedes tested positive for higenamine during the Brazilian Football Championship. The footballer's doctor and nutritionist Eduardo Rauhen checked various ways of how this substance could have got into the athlete's body. Eventually, they concluded that the athlete drank sweetsop juice at a hotel restaurant few hours before his doping test, which could lead to the AAF (Rauhen 2020). The footballer's lawyer, sports law professional Dr. Bichara Abidão Neto, contacted a chemist who selected 12 volunteers and gave them sweetsop juice to drink. After a certain period, he collected their urine samples which tested positive for higenamine, thus suggesting the causal relationship between testing positive and drinking the juice in question.

In the first instance, the disciplinary tribunal did not trust this defensive version and imposed a sanction of 10 months of ineligibility on the footballer. One of the arbitrators stated that he also drank sweetsop juice, and thus, the causal link between the juice and the AAF did not convince him. The second proceeding, which took place remotely due to the COVID-19 pandemic, resulted in eight months of ineligibility. The second instance award was pronounced by the Brazilian Anti-Doping Tribunal (Port. *Tribunal de Justiça Desportiva Antidopagem*, TJD-AD) on 16 July 2020 (Giufreda et al. 2020).

In the third instance, however, the same tribunal acquitted the athlete by three votes against two in the plenary session held on 12 August 2020. The WADA appealed this decision at the CAS. The proceedings have been suspended due to an ongoing study of high economic value funded by the WADA to reconsider the hazards of higenamine.¹³ The insights of the footballer's doctor (“Daniel Guedes' story where there is no doping”; Port. *A história do atleta Daniel Guedes, que foi pego no doping por causa de um suco de graviola*) were published in the magazine *Veja* on 22 October 2020 (Rauhen 2020). For the sake of objectivity, it should be noted that the concentration of higenamine in the Daniel Guedes' sample was only 11 ng/mL (Otempo 2020); thus, his acquittal should come as no big surprise. However, in any case, it appears that the specific concentration of the prohibited substance in the urine is relevant as is the fact that the substance is of plant origin and that various (rather

¹² Sakho & Anor v. World Anti-Doping Agency. England and Wales High Court (Queen's Bench Division). 11 February 2020.

¹³ Brazilian Anti-doping Tribunal, Judgment TJD-AD n° 35/2020. Number of disciplinary proceedings: 71000.035569/2019-52.

than automated) assessments of athlete’s conduct are possible. As for various assessments, three hypotheses were examined by the Panel in this case. The summarized scheme of the examination of three hypotheses is provided below (see Table 2).

Table 2. The examination of three hypotheses in Guedes’ case.

Three Hypotheses	Credibility of Hypothesis
1. The athlete used a supplement, and it was not declared.	Hypothesis is not very convincing. The use of this type of supplement in football is not medically recommended, since it increases heart beats and blood pressure, which are also increased during the game, and thus can cause an overload of the player’s circulatory system. It is observed that Goiás is a football club with a good structure in terms of athlete nutrition. Athletes are instructed on what to eat before and after a training session. As for concentrations, menus are established for every day with a very small margin being left for accidental deviations.
2. The athlete’s adverse analytical result comes from using sweetsop juice.	Hypothesis is being verified using scientific measures. The WADA Scientific Department proposed collaborative work between the Rio de Janeiro and Cologne Laboratories to define once and for all the real possibilities of sweetsop juice to generate AAF.
3. Other possibilities	The third hypothesis involves exclusion of the first two or a possible complementation of the second, which would be a metabolic alteration that would justify the adverse analytical result. The rapporteur considered this to be the weakest hypothesis.

According to the Rapporteur of the Panel—E. H. de Rose—the analysis of the hypotheses raised shows that all of them present much more doubts than certainties. In his words, “what should be tried is to serve justice without unduly harming an athlete, who has already served another eight months in provisional suspension, without being able to exercise his professional activity in this period. Furthermore, I feel a certain discomfort in sanctioning for a longer time an athlete who presented a relatively low concentration of higenamine, and I understand that I cannot fail to consider the study related to the sweetsop juice presented by the defense, especially when WADA decides to study this possibility, building and financing a research project (. . .). So, I think that when in doubt, due to a fundamental principle in law,¹⁴ I should favor the defendant, and I accompany the auditor of the losing vote in the first instance, without sanctioning the athlete, as he considers the level of higenamine found to be debatable, and that there is a study of the WADA in progress on the topic.”¹⁵

5. The Case of Anzor Boltukaev

On 8 October 2018, the Court of Arbitration for Sport considered WADA’s appeal against United World Wrestling (further—also the UWW) and wrestler Anzor Boltukaev. The athlete was a participant in the Olympic Games of Rio in 2016 and a medal winner of the world and European championships. Anzor Boltukaev was tested at the European Championships on 3 May 2017, when the prohibited substance, higenamine, was found in his urine sample.¹⁶ The athlete said he was unaware of how the banned substance was detected in his urine and that he had never used products that enhance his athletic advantage. In the doping control

¹⁴ In dubio pro reo is had in mind.

¹⁵ See note 13 above.

¹⁶ CAS 2018/A/5619, World Anti-Doping Agency (WADA) v. United World Wrestling (UWW) & Anzor Boltukaev, para. 6, 7.

form, the athlete declared only the dietary supplement “Riboxine, Polyvitamins,” stating that he had taken this supplement for seven days before testing.

On 2 February 2018, the UWW Anti-doping Panel (further—also the ADP) imposed 10 months of ineligibility on the basis of NSFN in compliance with Article 10.5.1 of the WADC.¹⁷ The Anti-doping Panel found that the athlete had been sufficiently careful when consulting his team doctor about his supplements. He could not reasonably suspect that he had used the specified substance higenamine through coffee or nutritional supplements. Therefore, the Panel was sure that a reduction of the suspension period might be applied, based on NSFN. The WADA appealed against this decision to the Court of Arbitration for Sport.

In the Court of Arbitration for Sport, Anzor Boltukaev referred to scientific articles and studies, arguing that higenamine is found in various plants and is generally not listed as an ingredient in products. He stated that the substance could have appeared in his urine due to contaminated products or coffee. The athlete indicated that he used to consume four to five cups of strong coffee a day. Thus, the coffee could be the reason for the presence of higenamine. It is understandable that athletes cannot know everything, including that even everyday products such as coffee may contain prohibited substances. However, the WADA (namely, Dr. Mazzoni) argued that the concentration of higenamine was high, 250 ng/mL, and therefore it could not result from coffee or contaminated supplements.¹⁸ In general, the WADA disputed the conclusion of the ADP and requested the Panel to rule that the athlete had failed to establish the origin of the prohibited substance on the balance of probabilities and, therefore, to impose a standard sanction of two years. The CAS Panel agreed with WADA’s arguments and the athlete was subject to the two-year period of ineligibility. The CAS stated that an athlete may not merely speculate as to the possible existence of a number of conceivable explanations for the source of AAF and then further speculate as to which appears the most likely of those possibilities to conclude that such possibility excludes intent (*Ibid.*, pp. 67, 75).

While linking this case to that of Adomavičiūtė, it can be said that, although Boltukaev lost, this case could be considered favorable for the Lithuanian athlete, because the degree of I. Adomavičiūtė’s fault in violating anti-doping rules is lower in both biochemical and legal terms than that of the Chechen wrestler. The latter insight stems from the fact that the Lithuanian athlete had a much lower concentration of the prohibited substance and was tested out of competition.

6. The NADO’s Position and further Process of Proving and Sanctioning

The Anti-Doping Agency of Lithuania took a zero-tolerance policy: its notification of 30 November 2020 stated that “the amount of the substance is irrelevant in this case as higenamine is prohibited both in competition and out of competition, and if the athlete has used less of a prohibited substance, it does not mean that she is less guilty; a positive test result was received and the amount of the substance in the sample has no significance for fault or punishment”. In other words, the exact concentration of the higenamine was still not known to the athlete on 30 November 2020. However, this position of the NADO possibly violates the athlete’s rights and follows the almost undeniable presumption of guilt of the athlete. In this case, it is essential to emphasize the athletes’ right to know what they have been charged with; this right was entrenched in Article 5.1.1 of the Results Management, Hearings and Decisions Guidelines, 2014 (*WADA’s Results Management, Hearings and Decisions Guidelines 2014*). To put it simply, it takes several hours for the NADO (in consultation with the laboratory) to determine the exact concentration, whereas this takes several months for the athlete. As a result, the athlete should not be loaded with

¹⁷ See the first-instance ADP decision. United World Wrestling (UWW) v. Mr Anzor Boltukaev: https://unitedworldwrestling.org/sites/default/files/2018-03/180202_panel_decision_case_anzor_boltukaev.pdf, para. 33, 34. Accessed on 12 March 2022.

¹⁸ CAS 2018/A/5619, World Anti-Doping Agency (WADA) v. United World Wrestling (UWW) & Anzor Boltukaev, para. 67, 75, 76, 78, 80.

such an unnecessary burden. This time could have been used much more effectively: for instance, the Athlete could have talked with numerous biochemists; perhaps even some experiments (akin to those undertaken in the case of Guedes) could have been conducted.

The concentration of higenamine (discovered only on 8 December 2020, when the Lithuanian NADO, at the tenacious request of the athlete, sent the request to the Polish laboratory) in Ieva Adomavičiūtė (23.03 ng/mL) was almost 11 times lower than that of Anzor Boltukaev. Additionally, as previously stated, Adomavičiūtė, unlike Boltukaev, was tested out of competition, which implicitly suggests that the acquisition of a sports advantage was not a decisive factor. Furthermore, the biochemical specificity of higenamine is that this substance leaves the body in 7–10 days without any residual effect. That makes it different, for instance, from anabolic steroids which have a long-lasting impact even after elimination from the body. Therefore, there is no compelling reason for using a stimulant such as higenamine out of competition. Let the record emphasize that WADA technical document No. TD2019MRPL provides that higenamine should not be reported at levels below 10 ng/mL (i.e., 50% of the minimum required performance levels for beta-2 agonists) (WADA Laboratory Expert Group 2019). Since Adomavičiūtė's higenamine concentration was slightly above the permissible level, it might imply that her conduct included no significant fault or negligence (Article 10.5.1 of the WADC) and that there is at least 51% probability¹⁹ that the prohibited substance may have been contained in her urine due to certain food products or (less probable, but also possible) food supplements where higenamine was not indicated as an ingredient. In other words, there are three scenarios, according to which Adomavičiūtė's conduct can be assessed: (1) It is presumed that Adomavičiūtė's conduct included significant fault or negligence due to violation of anti-doping rules; (2) the prohibited substance may have appeared in her body due to certain foods; or (3) the prohibited substance may have appeared in her body due to contaminated food supplements. The standard of proof of balance of probabilities implies that an athlete eliminates the first scenario upon providing realistic explanations. It does not matter whether there is a second or third scenario; the essential fact is that a doping substance in the athlete's body appeared accidentally (See more: Wisnosky 2017, p. 90; Nuriev 2019).

One of the precedents in the CAS practice where similar scenarios were “weighted” is the Ademi case.²⁰ Here, the UEFA stated that the Player bears the burden of proof regarding the source of the prohibited substance in order to enjoy a reduced sanction. According to the UEFA, Ademi failed to meet this burden (Ibid., p. 62). However, the CAS sided with the Player and stated that irrespective of any inability to identify the source of stanozolol,²¹ the Panel finds that the Player established, on a balance of probability, that he did not engage in conduct that he knew constituted or might constitute or result in an anti-doping rule violation (ADRV). That is to say, he did not knowingly ingest stanozolol or intended to cheat otherwise. The Panel confirmed that the Player's scenario with the pills was more plausible than the UEFA's version, a plan masterminded by the Player under which he knowingly and intentionally used stanozolol and then manipulated the pills (Ibid., pp. 75–77). The CAS considered that the Player, who has the burden of proof, was able to discharge that burden and establish that he had no intention to use stanozolol and was, therefore, not a cheater. Consequently, he should be suspended for two years in lieu of a four-year term (Ibid., p. 79).

It must be said that factual circumstances of Ademi's case do not fully coincide with the Lithuanian case, mainly because stanozolol and higenamine fall under different categories in the Prohibited List. However, what is of relevance here is the fact that the CAS was ready to accept the flexible explanation of how the substance might have entered the athlete's

¹⁹ CAS 2009/A/1930, World Anti-Doping Agency (WADA) v. ITF & Richard Gasquet, para. 5.9.

²⁰ CAS 2016/A/4676, Arijan Ademi v. Union of European Football Associations.

²¹ Stanozolol is a substance prohibited at all times, both in and out of competition, and is not a specified substance. The suspension period is four years if anti-doping rule violation does not involve a specified substance (unless a player or other person can establish that it was unintentional). Ibid., pp. 6, 47.

body. In the light of legal theory, it can be said that the CAS in that case rested on the requirement of the “proximate cause” rather than the “cause-in-fact”.²²

Ademi’s case above shows that a two-year suspension may be imposed even if one of the most popular anabolic steroids is used and even if the defendant does not present a mathematically precise explanation of how the substance has entered the athlete’s body. Therefore, under similar factual circumstances, in the case of a much more subtle substance—higenamine—the standard sanction of two years seems disproportionate. Thus, the author of this article is of the opinion that more flexible explanations on how the source entered the body should be accepted in certain cases and, accordingly, there could be a lower standard sanction for that kind of specified substance. Concerning the arguments mentioned above, I think that only a mild degree of fault might be applied in respect of Adomavičiūtė, with a sanction of no more than eight months.²³ Moreover, should the concentration of higenamine found in Adomavičiūtė’s sample have been 11 ng/mL instead of 23.03 ng/mL, a complete acquittal may have been considered similar to the Brazilian footballer’s case (who, like Boltukaev, was tested in competition, unlike the Lithuanian athlete).

It is worth remembering that the issue of proportionality of sanctions has been emphasized by the European Court of Justice in the resonant Meca-Medina’s case.²⁴

In this regard, disciplinary proceedings No. 246/20 against Alex Di Giorgio are relevant.²⁵ Athlete Di Giorgio was referred before the Italian Anti-Doping Court for violation of Art. 2.1 of the WADC as a result of the doping control carried out on 13 September 2020 and testing positive for the substance Enobosarm (Ostarine) that was included on the WADA 2020 List in S1 Anabolic agents as an unspecified substance prohibited both in and out of competition.²⁶

Di Giorgio’s test was conducted on September 13 in Livigno, Italy, during a training camp. He was given a temporary suspension by the Italian Anti-Doping Tribunal and faced up to a four-year ban for the first offense.

In this case, the defense stated that the quantity of ostarine found in the athlete’s biological sample was very low. As attested by the Deputy Director of the Anti-Doping Laboratory, a quantity approximately equal to 1 ng/mL was found. A concentration of that size is unable to affect the athlete’s body. The defense stated that it is perfectly compatible with indeterminate and indeterminable situations, like scenarios such as the uncontrollable contamination of any legal supplement ranging from mineral salts to multivitamins. According to the defense, the ostarine substance could also be found in small quantities in food or even in products used in private relationships. The Public Prosecutor disputed the

²² The conventional wisdom about the causation requirement is that in reality it consists of two very different requirements for liability. The first requirement is that of “cause-in-fact”. Such conventional wisdom holds that the “cause-in-fact” requirement is the only truly *causal* component of the law’s two requirements, because this doctrine is the only one that corresponds to any scientific or even factual notion of causation. Whether cigarette smoking causes cancer or whether the presence of hydrogen or helium causes explosion are factual questions to be resolved by the best science the courts can muster, and these are classed as “cause-in-fact” questions. By contrast, it is contested whether the second requirement, that of “proximate” or “legal” cause, is an evaluative issue to be resolved by arguments of policy, or whether it is also a matter of causal fact. See Moore (2019).

²³ More on a light degree of fault: CAS 2013/A/3327, Marin Cilic v. International Tennis Federation (ITF), para. 1.

²⁴ ECJ C-519/04, Meca-Medina et Majcen v. Commission, the judgment of 18 July 2006, paragraph 47. “It must be acknowledged that the penal nature of the anti-doping rules at issue and the magnitude of the penalties applicable if they are breached are capable of producing adverse effects on competition because they could, if penalties were ultimately to prove unjustified, result in an athlete’s unwarranted exclusion from sporting events, and thus in impairment of the conditions under which the activity at issue is engaged in. It follows that, in order not to be covered by the prohibition laid down in Article 81(1) EC, the restrictions thus imposed by those rules must be limited to what is necessary to ensure the proper conduct of competitive sport.”

²⁵ Case no. 246/20 concerning the disciplinary proceedings against Mr. Alex Di Giorgio. The decision of the Italian National Anti-Doping Court, dated 11 March 2021.

²⁶ Enobosarm is a selective androgen receptor modulator. It was developed for the treatment of medical conditions like muscle wasting and osteoporosis; it can be used by athletes to increase physical stamina and fitness, producing effects similar to anabolic steroids. The drug is intended to target the body’s androgen receptors to cause them to respond similarly to how they would to testosterone but without side effects. Keith (2021).

defensive theses stating that the athlete did not prove that he had not intentionally taken the prohibited substance. The National Anti-Doping Court, however, was convinced by the arguments of the defense, applied NSFN, and imposed a reduced sanction of ineligibility of eight months, starting from 8 October 2020 and expiring on 7 June 2021. The sanction of an eight-month ban implies that the athlete convinced the panel that he had not taken the substance intentionally and also that he had provided some plausible alternative for the substance to get into his body. The Panel believed that a positive test result might have been due to contamination, in particular bearing in mind the quantity found. Paragraph 20 of the decision stated that “the presence of 1 ng/mL of urinary ostarine, and the lack of metabolites make, in fact, strongly lean towards the conclusion that the intake of contaminated supplements was not due to the voluntary ingestions of the substance found for doping use. This also takes into account what the party technician stated in the report filed, a thesis not opposed by the Prosecutor’s Office, according to which the doping effect from ingestion of ostarine would be obtained by taking 3 mg per day of ostarine for at least 12 consecutive weeks”. It is interesting to note that later, on 27 April 2021, the sanction was further reduced to three months of ineligibility by the Italian National Anti-Doping Court of Appeal (it. *La Corte Nazionale di Appello Antidoping*). As justification for the reduced sentence, the appeals court emphasized the extremely low concentration (1 nanogram/milliliter) and the absence of metabolites to support the claim of a contaminated supplement ([Swimbiz.it](https://www.swimbiz.it) 2021).

It becomes clear from the Di Giorgio case that it might be possible to reduce a sanction even without showing a quantitatively precise way of how the substance enters the athlete’s body. Again, what comes to mind is the flexibility of the argumentation of the Italian National Anti-Doping Court. In the light of legal theory, it can be said that this type of argumentation opens the door to the nuanced interpretation of causality rather than various deterministic *sine qua non* interpretations. What is more, with such reasoning, the presence of a prohibited substance is treated as a result offence rather than a conduct offence; that is, the effect of such presence is taken into account. In the Di Giorgio case, there was actually no effect (i.e., no intention to improve performance). Below is the simplified scheme of “traditional” and “flexible” reasoning in proving NSFN (see Table 3).

Table 3. Traditional vs. flexible reasoning.

Traditional (Biochemically Oriented) Reasoning	
General principle	Explication of the general principle
The athlete must show how exactly the substance has entered his/her body.	It is the <i>sine qua non</i> or “cause-in-fact” requirement; unless established, the athlete fails to prove NSFN. Other attempts are called not evidence, but “mere speculations”, “protestations of innocence” (CAS 2018/A/5619), or—at best—“the narrowest of corridors” (CAS 2016/A/4534).
Flexible (Socio-Legally Oriented) Reasoning	
General principle	Explication of the general principle
The athlete can present several scenarios or hypotheses and, by excluding the “intent-scenario”, (s)he can expect a lower sanction to be imposed.	The circumstance is proven by the “proximate” or “legal” cause requirement. This requirement is of a probabilistic nature rather than deterministic. To a certain extent, this requirement was followed in the cases of Guedes, Di Giorgio, and Ademi (CAS 2016/A/4676).

In the opinion of the author of this article, in certain cases antidoping policy should accept the flexible approach. It is worth remembering here that Emile Durkheim already said that an offence is a social, not biological fact. Consequently, since social facts consist of representations and actions, they cannot be confused with organic phenomena, nor with psychical phenomena ([Durkheim 1982](#)). However, it seems that anti-doping policy still rests on biochemically oriented depersonalized reasoning that often has an overly dramatic

effect on individual athletes. From the procedural and etymological point of view, it can be added that the term widely known as “balance of probabilities” is not associated per se with deterministic explanations.²⁷

7. Conclusions

Despite all the substantive and procedural questions raised, the Lithuanian NADO’s position was supported and, on 8 February 2021, a two-year suspension was imposed on the rower. CAS upheld the decision and the sanction: the Sole Arbitrator recalled that higenamine is a Non-Threshold Substance and believed that the Athlete could not sustain a plea of NSFN since, in order to rely on this provision, proving the source of contamination was a strict precondition.²⁸ It is quite a sad outcome that potentially speaks about some global problems: according to Prof. Ulrich Haas, the third revision of the WADC was designed for such people as Armstrong,²⁹ but sometimes it caught overly naive and “uneducated” athletes. From a scientific point of view, it would be possible to apply game theory, according to which an anti-doping organization has a monopsonic position,³⁰ being the sole purchaser of specific information (in the context of higenamine cases—mathematically precise ways explaining how the prohibited substance has entered the body). Other information is of a minimal interest to potential sanctioners, and there hardly is another buyer. Linking this theory with the causality issues discussed in this article, one might say that for now (with very rare exceptions) the WADA sees only one way to prove NSFN by fulfilling a necessary condition test. However, this article argues that there should be more ways; instead of overly deterministic and biochemically oriented reasoning, other forms of reasoning (mostly probabilistic) should be accepted.

In light of the above, Adomavičiūtė’s case could serve as an example of several doubtful anti-doping policy elements: (1) A zero-tolerance policy³¹ seems harsh in the context of certain substances. In other words, the “standard” two-year ineligibility sanction is disproportionate with respect to the substances that may be present in everyday food. (2) There does exist a legal fiction in the context of higenamine which is not a threshold substance *de jure*, but it is *de facto*. (3) If the substance is a threshold substance *de facto*, the right to know precisely what an athlete is suspected of should mean the right to know the exact concentration of the substance in the athlete’s sample. In other words, there should be no doubt that the anti-doping authority must notify the athlete not only of the AAF but of the exact concentration as well. It should not be the athlete’s responsibility to find this out with one or more biochemists. (4) The zero-tolerance approach, whereby it is possible to reduce a sanction only by specifying how the prohibited substance entered

²⁷ On the contrary, central subjects in probability theory include discrete and continuous random variables, probability distributions, and stochastic processes, which provide mathematical abstractions of non-deterministic or uncertain processes. What matters to lawyers is the idea that linear, or so-called deterministic, equations have just one solution, whereas non-deterministic equations have multiple solutions. In the light of this article—it might be said that the author is advocating for multiple scenarios in proving NSFN rather than for one single biochemical solution.

²⁸ CAS 2021/A/7755, Ieva Adomavičiūtė v. Lithuanian Anti-Doping Agency, para 68, 78.

²⁹ “The second thing I would like to draw your attention to is that I think almost any revision of the Code was in the context of some of the big scandals. So, Festina scandal, we had the 2003 Code. We were obsessed by harmonisation. Then we had a couple of cases where we thought, <Ah, this is not justice. This is not giving justice>. So, the second revision was to be more fact specific and case specific. The third revision was absolutely in light of the Armstrong case. I’m 100% sure that we never would have a four-year ban or something like this without Armstrong”. Beloff et al. (2017), p. 153).

³⁰ Monopsonic position is closely related to the linear deterministic explanations demanded from the athlete; there is no democracy or “free market” from the perspective of the athlete. See more: Hakeem (2013).

³¹ As Viret notes, as a direct consequence of the zero tolerance rule, the standard model of a laboratory analysis is “qualitative”, i.e., limited to the identification of a Prohibited Substance. Laboratories are not required to measure the concentration of the substance present in the Sample in order to report an AAF unless they are dealing with a Threshold Substance. Traditional Doping Control thus relies on a binary decision mode: either a Prohibited Substance is identified and anti-doping rule violation was committed, or no Prohibited Substance is identified and no anti-doping rule violation was committed. Viret (2016, pp. 357, 359).

the athlete's body,³² is highly questionable. In respect of plant-based substances, such a standpoint imposes a disproportionate burden of proof, both financially and in other ways (requiring time, qualified professionals, and sometimes even biochemical experiments with volunteers). In this respect, a famous precedent in Villanueva's case should be kept in mind. Consequently, the figurative phrasing known as "the narrowest of corridors"³³ should be interpreted on a case-by-case basis. Naturally, the corridor in the cases connected to higenamine should not be as narrow as in the cases related to less nuanced substances.³⁴ As it is told in Kurosawa's famous film *Scandal* (1950), if you look at a mountain closely enough, you can see it moving and even dancing. Similarly, a closer look at the "immovable" doctrine of the strict liability and interrelated concepts in international sports law might reveal that this doctrine is not so unshakeable.

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³² A short message that wild ginger is used in preparing food in the pub "Viking's China" (later, when the Lithuanian NADO directly confronted the pub, the pub denied this fact) was presented to the hearing of the case on 15 January 2021. However, this message and the factual circumstance that Ieva Adomavičiūtė ate at this pub five days before the doping test were not enough to establish the causal link between Chinese dish consumption in the pub in question and the AAF. In other words, some evidence was submitted to demonstrate that a particular product that the athlete took could contain the substance in question. The details about the intake date, the location, and the route of intake were presented; however, these details were deemed insufficient to establish the required causal relation. In the disciplinary decision dated 8 February 2021, it was stated that "even if it were found that the Athlete could have used wild ginger as an ingredient, this would not confirm that such consumption resulted in a positive result of the Athlete's Sample, since sufficient and convincing evidence should be provided on the quantities consumed and their influence on the Sample's result".

³³ "The panel can envisage the theoretical possibility that it might be persuaded by an athlete's simple assertion of his innocence of intent when considering not only his demeanor but also his character and history (. . .). Where an athlete cannot prove source, it leaves the narrowest of corridors through which such athlete must pass to discharge the burden which lies upon him". CAS 2016/A/4534, para. 37.

³⁴ In this respect, CAS precedents requiring specific evidence to be adduced that the athlete ingested a product that contained a prohibited substance cannot be treated in an automatically constant way. These precedents might sound reasonable in the case of steroids (CAS 2016/A/4377, para. 52; CAS 2016/A/4563, para. 58, 63; CAS 2017/A/4962, para. 52, etc.), but can hardly be fully applied in the case of higenamine.

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