

## Chapter 2

# Doping Products and Their Demand

**Abstract** In this second chapter we provide context for the analysis of the supply of doping products, by considering the products available in Italy and by assessing, at least roughly, the demand. Despite the lack of specific historical or cross-country studies, we draw from the assumption that the use of doping substances and methods in Italy has followed the same broad lines of development known from studies in other countries. On the basis of NAS seizure data and anti-doping investigations we show that the entire palette of doping substances and methods is currently available on the Italian market. Exploiting the available data, we then estimate the size of the two main groups of users of doping products, athletes and body-builders, and demonstrate that a significant minority of the nearly 14 million Italians, aged 15 and older, who regularly engage in sports has consumed doping products at least occasionally, generating a market that is comparable to that of heroin.

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## 2.1 Doping Substances and Methods Available in Italy

The substances seized by NAS between 1999 and 2009, as reported in the NAS Investigations Database, demonstrate that the Italian market encompasses the full range of doping substances and methods.

The NAS seizures data constitute the best available source of information concerning the doping substances that are available on the Italian market, but their analysis requires preliminary methodological attention. From NAS, we received a detailed list of all the substances seized, including, for about 90 % of the cases, the number of pills, vials, or ampoules contained in each package. To aggregate the seizures correctly and meaningfully, we have relied on the internal guidelines established by the NAS Headquarters in close cooperation with Donati (NAS 2011) and used the “dose” as our unit of measure.

### 2.1.1 *Doping Doses*

The US Drug and Enforcement Administration (DEA) was the first agency to introduce the concept of a dose to this arena, but—to our knowledge—the agency applies the concept without drawing distinctions between pills, ampoules, and other packages of anabolic steroids,<sup>1</sup> regardless of the fact that, for example, ampoules of steroids and some corticosteroids usually contain four to ten times more of the active ingredient than a pill of the same product.<sup>2</sup> The same problem also applies to stimulants and testosterone, which are available both in pills and ampoules. To properly account for these considerable differences, the NAS Headquarters and Donati defined the key term of “dose” as the quantity of active ingredients contained in a single administration, even if more than one dose is taken daily and then undertook a three-part effort to establish the dose of each of the different products, in which they:

1. Recorded the active ingredients of each product seized, regardless of the differences in packages (e.g., pills, ampoules, spray). Only by considering the active ingredient can drugs seized in different packages be meaningfully aggregated and different packages of the same substance compared.
2. Retrieved information on recommended doses from the pharmaceutical companies’ instructions and/or specialized Web sites and from the Web sites of the

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<sup>1</sup>This procedure was described by DEA officials to Donati during a symposium organized by WADA in 2007 to enhance cooperation in the fight against doping in sport. See <http://www.wada-ama.org/en/News-Center/Articles/Symposium-calls-for-increased-co-operation-in-fight-against-doping-in-sport/>.

<sup>2</sup>For example, a Web site offered both steroids in pills for 10–25 mg and ampoules for 100–250 mg. See <http://www.steroid4u.eu/compra-iniettare-steroidi/winstrol-depot?language=It>. Accessed March 13, 2012.

**Table 2.1** Doping doses for the main types of doping substances seized by NAS

Doping substances	1 dose
Anabolic agents	10 mg
Peptide hormones, growth factors and related substances, of which	
EPO and other similar peptide hormones	200 IU or 1 mcg
GH and other similar peptide hormones	1 IU or 0.333 mg
Chorionic gonadotrophin	1,000 IU
Gonadorelin	1.2 mg
Adrenocorticotrophic hormone (ACTH) and other corticotrophins	0.25 mg
Insulin	10 IU
Beta-2 agonists	2 mcg
Hormones and metabolic modulators	10 mg
Diuretics and other masking agents	25 mg
Stimulants	25 mg
Narcotics	50 mg
Glucocorticosteroids	25 mg
Beta-blockers	5 mg

Source: NAS Headquarters (2012)

Agenzia Italiana del Farmaco<sup>3</sup> and Pagine Sanitarie.<sup>4</sup> The latter Web site provides detailed information about the different drugs available on the Italian market to pharmacists, physicians, and the public.

3. Compared the official doses, e.g., those of the pharmaceutical companies, with the dosages revealed by different athletes or their suppliers in wiretapped conversations, seized documents, or in official questionings or known to Donati through his previous experience as coach of several national Italian teams in track and field and other sports (fencing, rowing, Alpine and Nordic skiing, volleyball, basketball, water polo, and equestrian sports) and CONI official.

Table 2.1 below summarizes the quantities of active ingredients that constitute a doping dose for the doping substances seized by NAS and listed in the NAS Investigations Database. The classification of doping substances corresponds to that made by WADA (2012b) in its Prohibited List. However, we exclude cannabinoids, a separate category in the WADA Prohibited List, and cocaine, which is included in the category of stimulants, for both substantive and practical reasons. Whereas we will explain the substantive reasons in the following pages, the practical reasons are striking: no seizure of cannabis or cocaine is reported in the NAS Investigations Database.<sup>5</sup>

<sup>3</sup>See <http://farmaco.agenziafarmaco.it/index.php>.

<sup>4</sup>See <http://www.paginesanitarie.com>.

<sup>5</sup>In the case of both “narcotics” and “hormones and metabolic modulators,” we have adopted WADA designations, but we only refer to the subsets of substances that have been seized by NAS. The category “narcotics” thus exclusively consists of local anesthetics. As already mentioned, athletes hardly ever use systemic narcotics, such as heroin or morphine, and no seizure of such drugs is reported in the NAS Investigations Database. Within the second category of “hormones and metabolic modulators,” we refer exclusively to antiestrogens, the main products included into that category and the only product of that category for which positive tests were recorded in Italy. “Local anesthetics” and “antiestrogens” were also the two labels used by CVD until 2008 (see Ministero del Lavoro, della Salute e delle Politiche Sociali 2009).

Given the purposes of the exercise, criminal justice sources and Donati's direct experience were given priority vis-à-vis the pharmaceutical indications. As a result, the doping doses established by the NAS Headquarters and Donati sometimes differ significantly from the doses advised by pharmaceutical companies (see also Parkinson and Evans 2006; Swedish National Institute of Public Health 2010: 44). In the case of steroids, testosterone, or stimulants, in fact, doping athletes often exceed the official doses indicated by pharmaceutical companies and government bodies. The reverse is true in the case of EPO. The mean dose in renal failure patients on dialysis in Italy or Germany is 8,000 IU per patient and week.<sup>6</sup> As a matter of fact, the doping dose that the NAS Headquarters and Donati suggest for EPO is also considerably lower than the usual doping doses of, say, elite riders reported in the literature (up to 700–1,000 IU two or three times a week; see Lundby et al. 2011). The NAS Headquarters and Donati have specified the lower dose because Italian investigations (e.g., NAS Brescia 2011) confirm the trends to “micro-dosing” highlighted by WADA (2010d) and the scholarly literature (Ashenden et al. 2011; Lundby et al. 2012). Namely, doping athletes and particularly elite riders increasingly tend to fragment the dosage to avoid unnecessary shocks to their bodies and now often take 200 IU several times a day. Smaller EPO doses also have the advantage to look more natural and to be even more difficult to detect with anti-doping tests (Int-NAS-15 and 16).

### 2.1.2 *NAS Seizures*

Table 2.2 provides key data on the seizures reported in the NAS Investigations Database and presents the results of our calculations, made on the basis of the previous parameters. In the 11-year time frame covered by the database, NAS seized 7,176,780 packages of doping substances. Most of these packages belonged to 1 of 495 different packages of substances for which we had or could reconstruct precise information about the active ingredients they contained. For about 10 % of the packages, though, we did not have enough information to determine the active ingredient contained in them. To include such packages in our estimates, we have calculated the average active ingredients contained in the packages seized of the same product (or classes of product) and assumed that the packages with no additional information contained the average doses. In such a way, we estimate that the substances seized by NAS between 1999 and 2009, as reported in the database, correspond to 1,042 kg of active ingredients<sup>7</sup> and to 88 million doses. Thus, on average, each year, NAS seized

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<sup>6</sup>This figure was indicated by Prof. Wolfgang Jelkmann, an authority on EPO (personal communication, 2012 June 18).

<sup>7</sup>This sum does not include the active ingredients of peptide hormones, because they are not comparable to each other and to the other doping substances.

**Table 2.2** Substances seized by NAS between 1999 and 2009, as presented in the database on NAS Investigations

Type of substance	Pills, ampoules, and other packages seized	Active ingredients seized (mg)	No. of doping doses	% of total doses
Anabolic agents	3,531,232	745,476,230	74,547,623	83.16
Peptide hormones, growth factors and related substances, of which:	45,812	Not comparable	1,604,608	1.79
EPO and similar hormones	12,430	Not comparable	626,335	0.70
GH and other growth factors	20,482	Not comparable	928,335	1.04
Related substances <sup>a</sup>	12,900	Not comparable	49,938	0.06
Beta-2 agonists	640	9,780	4,890	0.01
Hormones and metabolic modulators	35,561	355,610	35,561	0.04
Diuretics and other masking agents	13,339	340,125	13,605	0.02
Stimulants	3,373,570	291,379,175	11,655,167	13.00
Narcotics	1	6,750	135	0.00
Glucocorticosteroids	130,802	4,549,125	181,965	0.20
Beta-blockers	11	55	11	0.00
Total	7,176,780	1,042,116,850	88,043,565	100.00

*Source:* our calculations on the basis of the NAS Investigations Database

<sup>a</sup>This category includes all other substances related to peptide hormones and growth factors, such as chorionic gonadotrophin, gonadorelin, ACTH and other corticotrophins, and insulin, which we had listed separately in Table 2.1

652,434 packages of doping substances, corresponding to 95 kg of active ingredients and to eight million doping doses.<sup>8</sup>

Given the focus of NAS investigations on body-building (see Chap. 7), these seizure data tend to overestimate the share of anabolic steroids, which are typically consumed by body-builders. With almost 75 million doses, steroids account for 85 % of the doses seized. On the other hand, NAS seizure data under-assess the relevance of peptide hormones, growth factors, and related substances,<sup>9</sup> which constitute only 1.8 % of the drugs seized because they are used by athletes of speed and endurance disciplines rather than body-building. Under this broad category, NAS seized 626,335 doses of EPO and 928,335 doses of GH, accounting respectively

<sup>8</sup>It must be taken into account, however, that NAS conducted only a handful of anti-doping investigations and seizure before the year 2000 and the adoption of a specific anti-doping law, while some of the earlier investigations, e.g., that concerning Prof. Conconi, are not inserted in the database.

<sup>9</sup>This is a complex category that, as noted in Table 2.1, includes various types of EPO, GH, and other growth factors, such as insulin-like growth factor-1 (IGF-1), chorionic gonadotrophin, gonadorelin, adrenocorticotrophic hormone (ACTH) and other corticotrophins, and insulin; see WADA (2012b).

for 38.6 and 52.3 % of the doses seized in that category. After steroids, the second largest category of substances seized involves stimulants, which account for 13 % of all the doses. All other categories of doping substances account for small fractions of the doses intercepted.

The substances reported in the NAS Investigations Database are not the only doping substances that have been seized in Italy. Other law enforcement agencies have also seized doping substances over the years and the NAS itself has carried out a few seizures during the period 1999–2009 that are not included in the database and several others afterwards. We will discuss these data in more detail in Chap. 6, when we try to assess the financial dimensions of the market. For the moment, we use seizure data merely to demonstrate the availability of all doping substances included in the WADA Prohibited List (2012b) in Italy.

As noted previously, anti-doping investigations also reveal the frequent administration of doping methods and particularly of autologous and heterologous transfusions. In addition to the criminal proceeding against Conconi and his staff, other, more recent closed and ongoing investigations indicate that transfusion remains a frequent practice among elite athletes of endurance disciplines and particularly cycling (e.g., NAS Firenze 2005; Int-Pro-4). A recent investigation coordinated by the Mantua Prosecutor's Office has, for example, identified several specialized centers in Italy and abroad that are willing to carry out transfusions on elite riders, showing that the latter visit one or another center depending on their location (NAS Brescia 2011).

### ***2.1.3 Harmful Consequences of Doping Products***

Albeit inadvertently, Italy's anti-doping investigations also persuasively indicate the harmfulness of the use of doping products. Our sources indicate that several key investigations originated from the suspicious death of a young athlete or body-builder. The large "Oil for Drug" investigation conducted by the Florence NAS Branch Office on behalf of the Rome Prosecutor's Office, for example, drew from the death of a recreational rider who was suspected of using stimulants and had a heart attack while training at the periphery of Rome (NAS Firenze 2005). The investigation, known as "Flebo," of the Padua Branch Office took off when another young rider was admitted to a nearby hospital, after he fainted during an analogous transfusion carried out by the sports director of a cycling team known in the cycling world as "the wizard" (NAS Padova 2009). The Rome Carabinieri launched another large-scale investigation after the death of a female competitive body-builder in 2004. She died in her sleep as a result of a brain aneurism, provoked by her abuse of anabolic steroids. Initially, her fiancé and manager was convicted and sentenced to a 6-year prison sentence for the abusive exercise of a profession and the administration of dangerous drugs (article 348 and 445 CP); however, the verdict was subsequently canceled by the appeals court because of the territorial incompetence of the Rome first-degree court and the whole proceeding was annulled because the statute of limitations had run out in the case (La Gazzetta di Modena 2012).

Several interview partners at NAS also reports smaller investigations concerning the suspicious deaths of body-builders. Since 1997, at least five body-builders are known to have died of sudden heart failure solely in the regions of Emilia Romagna and Tuscany (Int-NAS-2, 3, 5, 6, 8, and 23). At least two other cases of body-builders' suspicious deaths were reported by Cagliari and Rome Branch Offices. The NAS officers, however, also report that many doping-related deaths go undetected. According to our interviewees, most emergency room admissions or sudden deaths that could be associated with abuse of steroids are not reported by the hospitals to NAS or other law enforcement agencies (Int-NAS-16 and 24).

Several other cases of sudden cardiac death of Italian body-builders (Camoni et al. 1997; Fineschi et al. 2007) are also reported in the scientific literature and, albeit with less degree of certainty, in the Italian media as a consequence of steroid use.<sup>10</sup>

Risks are obviously not related only to steroids. In the following, a professional rider, who decided to become a witness after the 2001 raids at the Giro d'Italia, describes the spread of very dangerous doping habits in the world of professional cycling:

The first time I tried to make myself an injection on my bottom, I pricked myself eight times. Then it became a habit, a fantastic habit. All of a sudden, the bike starts going by itself, you no longer feel fatigue. I took EPO, GH, Sinacten,<sup>11</sup> Depo (i.e., Depo-Medrol, a powerful corticosteroid). Whatever came into my hands ... We did not ask ourselves questions. The important thing was to go faster and faster. There is a well-known drug called Igf3 (insulin-like growth factor 3). On the instructions it is written: "not for human use." We thought: "Wau, if it is good for horses, you can imagine what its effect on us will be." We read newspapers to remain updated about new drugs; when we read that a big champion had been caught with Actovegin,<sup>12</sup> we ran to buy it as well, in Chiasso [Switzerland], there was not even an ampule left. ... [To avoid controls] we slept with Emagel on the bedside table, it lowers the [blood] levels, or we shoot half a liter of physiological solution to dilute our blood. At the end of a competition we immediately took Andriol [testosterone undecanoate], which tests positive for 7 days, but the following Sunday we were already clean ... A day I risked dying for an injection that did not function well, I was even admitted to the hospital in Milan ... (Fazzo and Mensurati 2002b).

<sup>10</sup> See <http://radiomosaici.blogspot.com/2010/03/palermo-culturista-muore-in-palestra.html>; <http://www.ivg.it/2010/01/morte-culturista-dopo-incidente-si-attende-referto-su-autopsia/>; [http://nl-nl.facebook.com/note.php?note\\_id=374070606228](http://nl-nl.facebook.com/note.php?note_id=374070606228); <http://qn.quotidiano.net/1999/08/11/149085-Morto-un-culturista-anabolizzanti-sul-tavolo-.shtml>; <http://qn.quotidiano.net/1999/08/11/149085-Morto-un-culturista-anabolizzanti-sul-tavolo-.shtml>; [http://archiviostorico.corriere.it/2004/dicembre/23/Doping\\_bltz\\_nelle\\_palestre\\_ucciso\\_co\\_9\\_041223052.shtml](http://archiviostorico.corriere.it/2004/dicembre/23/Doping_bltz_nelle_palestre_ucciso_co_9_041223052.shtml); <http://www.bodyweb.com/forums/threads/139057-culturista-24enne-morto-nel-bergamasco>; <http://www.chimica-oggi.it/archives/0002902.html>; [http://www.vivisicilia.com/index.php?option=com\\_content&view=article&id=1421%3Apalermo-culturista-muore-dopo-gli-allenamenti&catid=1%3Aultime&Itemid=2](http://www.vivisicilia.com/index.php?option=com_content&view=article&id=1421%3Apalermo-culturista-muore-dopo-gli-allenamenti&catid=1%3Aultime&Itemid=2).

<sup>11</sup> Synacthen®, the brand name of tetracosactide is a synthetic analogue of the naturally occurring ACTH. Whereas Synacthen should be used for diagnostic purposes only, some professional cyclists also take it for prohibited performance-enhancing purposes.

<sup>12</sup> Actovegin® is a highly filtered extract obtained from calf blood that enhances aerobic oxidation in mammals. This improves absorption of glucose and oxygen uptake in tissue, which may enhance physical performance and stamina (see Pacifici and Donati 2011: 54 and 55 and Maillo 2008).



Body-builders and athletes may suffer harm not only as a direct consequence of the use of doping substances but also because of the misuse of illegal and additional drugs that may accompany doping (often cocaine and alcohol, as in the case of the Belgian 2005 world champion of cycling, Tom Boonen, who tested positive twice for cocaine; see BBC 2009), hazardous injection techniques (e.g., Baker et al. 2006) and, in the case of elite athletes, the depressions that follow the abrupt, doping-related end of their sports careers. Exemplary of the latter problems is the life history of Marco Pantani, who won both the Tour de France and the Giro d'Italia in 1998 and was considered one of the best climbers in road bicycle racing. Despite the fact that Pantani never tested positive, his career was beset by doping allegations. In the 1999 Giro d'Italia, he was expelled due to his irregular blood values. Although he was disqualified for "health reasons," it was implied that Pantani's high hematocrit was the product of EPO use. Following later accusations and more frequent doping tests of Pantani, this went into a depression from which he never fully recovered. He died of acute cocaine poisoning in 2004 (Jones and Maloney 2004).

Altering the users' mood, steroids may not only cause harm to the users but also to others. In 2009, for example, a former competitive body-builder, who suffered from depression (a frequent consequence of steroids use) stabbed his wife to death. When he later turned himself in to the police, he admitted that he could not remember what he had done (Il Corriere della Sera 2009).<sup>13</sup>

## 2.2 Italy's Sportsmen and Sportswomen and the Groups at Risk of Doping

According to a 2006 Istat population survey, in Italy there are over 13,780,000 "adults," defined for our purposes as individuals aged 15 or older, who participate regularly or occasionally in one or more sports, corresponding to 27 % of Italy's population of the same age (Istat 2007: 3). Of the nearly 14 million adult sportspeople in Italy, about 3,090,000 take part in official competitions and about 1,600,000 in unofficial competitions, for a total of almost 4,690,000 adult sportspeople (ibid.: 14). Although we do not include them in our market assessment, the Istat data indicate that 3,460,000 Italian youths, ages 3–14, also participate in sports regularly or occasionally, of which 1,590,000 engage competitively, suggesting that the total number of competitive sportsmen, sportswomen, and young people might amount to almost 6,280,000 (ibid.: 3 and 14).<sup>14</sup>

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<sup>13</sup> In a WADA Foundation Board meeting, Mathieu Holz, an Interpol officer specialized in anti-doping investigations reported data of the Swedish police, according to which, in 25 % of cases of domestic violence, the husband was on steroids (World Anti-Doping Agency 2010d).

<sup>14</sup> As addressed in Chap. 1, we do not include youths in our calculations for reasons of data consistency and because we do not believe them to be as heavily involved in doping as their adult counterparts; however, we acknowledge that some may be doping already or at high risk of future doping (see DuRant et al. 1994 and the findings of literature review carried out by Backhouse et al. 2007: 47). Note that preadolescent and adolescent Italians, ages 11–14, constitute about 1,480,000 and 780,000 of the total and competitive youth figures, respectively, and would be more likely to engage in doping than children ages 3–10 (Istat 2007: 3 and 14).



In scoping the market for doping products, we regard the 4,690,000 adults who compete in sports as Italy's "athletes." Among them, as noted previously, we distinguish between "elite" athletes, on the one hand, and "recreational" athletes, on the other, even though we are aware of the fact that there is continuity and even two-way flow between the two groups. Consistent with the scientific and nonscientific literature, we regard elite athletes to be at a higher risk of doping than recreational athletes, because elite athletes devote greater time, energy, and personal commitment to sports and typically experience more competitive pressures than do recreational athletes. Within the category of noncompetitive sportsmen and sportswomen—again on the basis of the literature—we single out gym visitors, and specifically body-builders, as groups that are also at high risk of doping.

### ***2.2.1 Members of Sports Federations, Associated Disciplines, and Enti di Promozione Sportiva***

As of 2008, 4,186,752 people of all ages, here the data do not allow an age-based distinction, were enrolled in at least one of the 45 National Sports Federations (4,002,040) or in one of the 16 Associated Disciplines (184,712) recognized by CONI (2008: 6 and 9). Three team sports—football (27 %), basketball, and volleyball (8 % each)—account for 43 % of this group (*ibid.*: 10).

In Italy, membership in a sports federation, associated discipline or one of the 15 Enti di Promozione Sportiva (see below) is regarded as the discriminating criterion to distinguish the pool of athletes who (are supposed to) take part in competitions from the mere casual and noncompetitive sportspeople. The Enti are associations intended to promote sports in different social contexts, for example, among university students; some of them were originally linked to a political party or union, although they have now become largely autonomous.<sup>15</sup> The members of these three sets of sporting organizations are also targeted by CONI and CVD for the anti-doping tests. While we have exact data on the athletes enrolled in sports federation and associated disciplines, there are only partial data on the Enti membership—and therefore it is impossible to estimate the entire pool of athletes on the basis of this criterion. In fact, only 8 of the 13 Enti publish the number of their associated athletes or members (see Table 2.3).

Moreover, not all Enti are equally involved in competitions; some speak of members rather than athletes and report only approximate numbers, suggesting that only a minority of their members take part in competitions; the athletes of some associations at least partially overlap with those enrolled in a sports federation

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<sup>15</sup>For example, Centro Sportivo Italiano (CSI) was once linked to the Christian Democracy Party and the Italian Bishop Conference (CEI), the Unione Italiana Sport per Tutti (UISP) was originally linked to the Italian Communist Party, and the Unione Sportiva ACLI (US ACLI) was originally linked to the Catholic unions.

**Table 2.3** Sportspeople enrolled in the 15 Enti di Promozione Sportiva

	Number of members
Associazione di Cultura, Sport e Tempo Libero (ACSI)	n.a.
Alleanza Sportiva Italiana (ASI)	150,000
Attività Sportive Confederale (ASC)	n.a.
Centro Nazionale Sportivo Libertas (CNS Libertas)	861,567
Centro Sportivo Educativo Nazionale (CSEN)	820,000
Centro Universitario Sportivo Italiano (CUSI)	n.a.
Movimento Sportivo Popolare Italia (MSP Italia)	503,896
Unione Sportiva ACLI (US ACLI)	600,000
Associazione Italiana Cultura Sport (AICS)	n.a.
Centri Sportivi Aziendali Industriali (CSAIN)	n.a.
Centro Sportivo Italiano (CSI)	953,789
Ente Nazionale Democratico di Azione Sociale (ENDAS)	300,000
Polisportive Giovanili Salesiane (PGS)	n.a.
Organizzazione Per l'Educazione allo Sport (OPES)	n.a.
Unione Italiana Sport Per tutti (UISP)	1,250,000
Total	5,439,252

*Source:* our calculations on the basis of the data retrieved from the Enti Web sites

The data were collected from the following Web sites

Associazione di Cultura Sport e Tempo Libero (ACSI) at <http://www.acsi.it/>

ASI at <http://www.alleanzasportiva.it/web/asi/i-numeri>

Attività Sportive Confederale (ASC) at <http://www.ascsport.org/>

Centro Nazionale Sportivo Libertas (CNS Libertas) at <http://www.cnsi-libertas.it/>

Centro Sportivo Educativo Nazionale (CSEN) at <http://www.csen.it/>

Centro Universitario Sportivo Italiano (CUSI) at <http://www.cusi.it/home.aspx/>

Movimento Sportivo Popolare Italia (MSP Italia) at <http://www.mspitalia.it/>

US ACLI at <http://www.usaccli.org/chi-siamo>

AICS at <http://www.aics.info/>

Centri Sportivi Aziendali Industriali (CSAIN) at <http://www.csain.it/>

CSI at <http://www.csi-net.it/numeri?PHPSESSID=7ca6a107b53b36977d83c26e38d82cc0>

Ente Nazionale Democratico di Azione Sociale (ENDAS) at <http://www.endas.it/htm/ita/home.html/>

Polisportive Giovanili Salesiane (PGS) at <http://www.pgsitalia.org/index.asp>

Organizzazione Per l'Educazione allo Sport (OPES) at <http://www.opesitalia.it/>

UISP at <http://www.uisp.it/nazionale/index.php?idArea=163&contentId=453>

or an associated discipline, and, even in the cases of Enti publishing good data, only an undetermined fraction of their “athletes” really takes part in races. Given all these caveats, knowing as we do that 5,439,252 people are enrolled in Enti is not particularly helpful. We note, however, that if we assumed that only half of the known Enti members (i.e., 2,709,626 people) take part in competitions without being also enrolled in a sports federation or associated discipline and add them to the over four million who are enrolled in a sports federation or associated discipline, we would reach the figure of 6,906,378—a figure rather close to the 6,280,000

competitive sportsmen, sportswomen, and youths found in the Istat data.<sup>16</sup> Rather than trying to estimate the overall number of athletes through the membership in a sports federation, associated discipline or Ente, we work with the more robust Istat data.

### 2.2.2 *Elite Athletes*

There are no official data on the number of the elite athletes in Italy and it is difficult to develop an estimate because elite athletes merely represent an upper tier of a much wider pool of would-be or former elite athletes who would like to participate in national or international competitions. The borders between the elite, would-be elite, and former elite are fluid and blurred. Athletes rise or fall in the official ranks and therefore can be included in, or excluded from, national and international competitions; some retire, while others emerge; they may or may not be allowed by their federations to take part in some competitions or may be supplemented by foreign athletes who play for Italian clubs. In the wider pool of elite athletes, we can more easily identify the uppermost or “super” elite, that is, those who participate or have very good chances of participating in international competitions and are therefore most likely to be targeted by CONI’s anti-doping tests. While a secretary of the CONI’s Scientific Commission, a member of our project team (Donati) was responsible for identifying the—de facto “super”—elite athletes to be targeted by the CONI’s anti-doping tests. Relying on the same criteria that were then (and are still) used by CONI (Int-Oth-2), we estimate that the total number of super elite athletes in Italy participating or likely to participate in international competitions is about 10,000 people, most but certainly not all of whom are likely to be “adults” as defined above (see Table 2.4).

Even if the super elite athletes represent only a minute share of the 6.2 million athletes, they are those most under pressure to use doping products. Moreover, they play a crucial role in the market for doping products for at least three other reasons.

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<sup>16</sup> A different estimation procedure has been suggested by Alfredo Cucciniello, who was for many years the coordinator of all the Enti. According to him, the real number of Enti members is approximately 6,100,000 units, of which 4,100,000 of them effectively engage in sports. About 40 % (i.e., 1,640,000) of the actively engaged group is also associated with a sports federation or associated discipline and therefore need to be excluded from the calculation because otherwise we would count them twice. The remaining 60 % (i.e., 2,460,000 athletes) is only associated with an Ente. According to Cucciniello, about 10 % of the sports federation members rarely takes part in competitions or stops taking part in them during a given year. Therefore, only 3,750,000 out of the 4,186,752 sportspeople officially enrolled in a sports federation or associated discipline effectively take part in competition. By adding the former figure to the 2,460,000 Enti athletes, we reach an estimate of 6,210,000 athletes, which is very close to the 6,280,000 athletes aged 3 and older estimated by Istat.

**Table 2.4** Estimate of the “super” elite athletes active in Italy: 2011–2012

Members of the male football teams playing in the first and second leagues (Serie A and B) and the members of the female football teams playing in the first league	1,800
Members of the first- and second-league male and female volleyball teams	1,600
Members of the first- and second-league male basketball teams and members of the first-league female basketball teams	1,400
Members of the first-league male and female water polo teams	600
Members of the first-league male and female hockey teams	600
Members of the first-league rugby male teams	400
10–15 best male and female athletes playing individual sports and specifically:	0
Cycling (including professionals and under 23 athletes)	600
Swimming	500
Track and field	500
Winter sports	400
Rowing	200
Canoe/kayak	200
Ice skating	100
Weightlifting	100
Combat sports	
Other sports	1,000
<b>Total</b>	<b>10,200</b>

*Source:* our own estimates based on Donati’s personal experience (the estimate of super elite athletes corresponds to the number of athletes considered eligible by CONI for its anti-doping tests. It is an approximate estimate, as CONI controls are sometimes extended to minor leagues or to teams and athletes ranked after the first 15)

1. With their illegal behavior, even if it is only suspected or if it is not consistently sanctioned by either sports law bodies or criminal justice agencies, they constitute negative role models for the millions of other elite, would-be elite, and recreational athletes and occasional sportspeople. Almost paradoxically, the doping super elite athletes who are left unscathed may be particularly harmful, because their experience suggests that great sports successes can be achieved by cheating and with impunity.
2. Super elite athletes significantly contribute to the economic “success” of some suppliers of doping products, in particular, a few prominent physicians and pharmacists. As some NAS investigations show, these suppliers build up a “reputation” by treating famous super elite athletes and then “monetize” this reputation, by selling their services or drugs to a larger number of lower-level sportsmen and sportswomen (NAS Firenze 2005; Int-Pro-4). An ongoing investigation focuses on a famous sports physician, who has been linked since the late 1990s to several champions of different sports disciplines and who more recently also “treated” a wide clientele of recreational athletes (Int-Pro-6).
3. Several super elite athletes have gone on to become coaches or officials of sporting organizations and, therefore, if they were able to enhance their performances

with doping products and avoid harm or detection, they are likely to socialize future generations of promising athletes to such illegal practices, thus perpetuating a vicious circle.<sup>17</sup>

Our sources provide a number of examples of known super elite athletes who failed drug tests or were involved in anti-doping criminal investigations during their active sports careers and later became coaches or sports body officials. Manuela Di Centa, a cross-country skier who won several Olympic medals, for example, was 1 of the 33 professional athletes explicitly mentioned in the 2005 verdict of the Tribunale di Ferrara and indicated to have been treated with EPO by Conconi and his staff (see also Capodacqua 2003). Like the other 32 athletes, Di Centa was not charged with doping because the facts addressed in the Conconi proceeding antedated the adoption of Italy's anti-doping law. Despite proof of what would have been illegal doping practices under current standards, Di Centa became CONI Vice President and a member of the IOC (Moresco 2005a, b). The case of the football player and manager, Josep Guardiola, is even more recent. In 2001, Guardiola tested positively twice to nandrolone, while he was playing for Brescia football team (Capodacqua 2002a). Consequently, he was suspended by the Italian Football Federation (FIGC) and convicted by a first-degree court in Brescia. After retiring as a player, Guardiola became the team manager of Barcelona FC, leading the team to win the Spanish League, Spanish Cup, and Champion League in his first season and numerous other prestigious trophies afterwards.<sup>18</sup> Seven years after the positive tests, in 2009 Guardiola was able to question the procedure used by the Rome Anti-Doping Laboratory in analyzing his samples and to obtain the reversal of the verdicts issued by the FIGC and the Brescia first-degree court (Int-NAS-9). In early 2012 Guardiola received the FIFA World Coach of the Year for Men's Football award.

Last but not least, many super elite athletes—with the exception of 2 or 3,000 professional athletes in football, basketball, volleyball, and cycling—are dependent on government funding for their sports careers. Therefore, the athletes themselves, their coaches, and the officials of sports federations are under a particular obligation to make sure that taxpayers' money is not spent on doping practices that violate the laws of the funding government.

The super elite athletes represent only the very topmost segment of a much wider pool of elite athletes who take part in national competitions. These include, for

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<sup>17</sup>In 2011 the UCI Management Committee approved the introduction of a new article in the regulations aiming to prevent anyone found guilty of an anti-doping violation during his cycling career from obtaining a license authorizing him to take on a role in cycling as a member of a team's staff. However, the measure is not applied retroactively. Therefore, the new rule does not affect numerous current managers, such as Bjarne Riis, who admitted to doping during his active sporting career, including 1996 Tour de France victory, and now runs an elite cycling team (The Telegraph 2011 and Velonews.com 2011).

<sup>18</sup>For details, see <http://www.fcbarcelona.com/football/first-team/staff/coaches/guardiola/biography>.

example, in football, the players of Serie C (Italy's third league) and the first and second category and in other sports such as track and field or swimming, elite athletes of different age groups who take part in national competitions but are excluded for different reasons from the international ones. Among them, there are the best athletes of the younger age groups who still take place in lower-level (national) competitions than the adult elite athletes but are considered promising as well as older athletes who have passed their best performing age or started late their sporting activities but still want to, and can, compete at a national level.<sup>19</sup> The ratio between super elite and other elite athletes may be 1:30 or 1:50, but, having no means of precisely estimating the overall number of elite athletes, we cannot precisely establish the ratio between them.

It is important to stress, though, that many non-super elite athletes as well as the even broader range of would-be elite athletes train all day, every day, and devote a considerable amount of energy and personal commitment to sports. Thus, they should also be considered at high risk of doping.

### 2.2.3 *Recreational Athletes*

Even if we have no means to precisely estimate the number of elite athletes, there is no doubt that recreational athletes constitute the bulk of the almost 6,280,000 athletes of all ages and the 4,690,000 adult athletes that we identified earlier (Istat 2007: 3, 14). With the exception of the would-be elite athletes among them, most recreational athletes are less committed to sports than elite athletes and are therefore less at risk of doping. However, given their sheer numbers, they are likely to constitute a very large share of the demand for doping products.

Despite the lack of reliable longitudinal data, we hypothesize, on the basis of the scientific literature (see Chap. 1) and a few NAS investigations, most notably "Oil for Drug" (NAS Firenze 2005), that the recreational athletes' demand for doping products has grown steadily from very low levels since the 1970s as a consequence of the broader range of drugs and changes in sports and society. In turn, this growth has led to a significant expansion of the market for doping products and, therefore, also an increase in the recreational athletes' market share. Probably until 2000, the demand for doping products largely consisted of two separate segments: elite and would-be elite athletes, on the one hand, and body-builders, on the other. The sports successes of elite athletes suspected of or proven to be using prohibited performance-enhancing products and even the scandals and police investigations involving some of them, such as Pantani, have fostered the demand for and consumption of doping products

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<sup>19</sup>For example, the Italian Athletics Federation (FIDAL), which includes the track and field disciplines, recognizes the following categories of competitive athletes and organizes national competitions for each of them: ragazzi (age group 12–13); cadetti (age group 14–15); allievi (age group 16–17), juniores (age group 18–19), promesse (age group 20–22), seniors (23 and older), amatori (age group 23–34), and masters (35 and older; see FIDAL 2012).

also among the masses of recreational athletes. As we will describe in more detail in Chap. 3, the investigation “Oil for Drug” (NAS Firenze 2005) and the investigations concerning Dr. Michele Ferrari (Tribunale di Bologna 2004; Int-Pro-4; MacMichael 2011a, b; U.S. Anti-Doping Agency 2012c) document that several physicians have built up a “doping” reputation by treating a few super elite and elite athletes but then gone on to make the bulk of their earnings by selling their services to a much larger number of unknown recreational athletes.

### **2.2.4 Body-Builders**

In addition to elite athletes, the other group of sportsmen and sportswomen most at risk of doping practices are body-builders, as is well known from the literature (see Chap. 1). In Italy, there are no official figures concerning this group of sportspeople who usually attend gyms and, with few exceptions, do not belong to an official sports federation recognized by CONI or take part in competitions. In order to estimate its dimensions, we can rely on the results of a survey of the gyms of the regions Apulia, Emilia Romagna, Latium, Trentino Alto Adige, and Veneto, which was conducted in 2007 by the Ministries of Sports and Social Solidarity. The two ministries collected data from the Camera di Commercio (Chamber of Commerce), Confartigianato, and three main Enti di Promozione Sportiva (CSI, ACLI, e UISP). (Many gyms are enrolled in an Ente in order to obtain a more favorable tax regime.) The study identified about 1,350 gyms with at least one room fully devoted to body-building equipment or machines and estimated the number of sportsmen and sportswomen attending these gyms as approximately 423,000 people (Ministero dello Sport and Ministero della Solidarietà Sociale 2008). As the five above-mentioned regions account for about 33 % of the Italian population,<sup>20</sup> we can estimate that there are 4,050 gyms with at least one room for body-building machines in the whole of Italy serving almost 1,270,000 potential body-builders. We refer to them as “potential” body-builders, because some or even many individuals may frequent gyms with rooms dedicated to body-building machines or equipment without being, themselves, body-builders. In this subset of gym patrons, there are also a considerable number of athletes especially those, such as weightlifters, discus and hammer throwers, and rugby players who visit gyms to increase their muscle mass and strengths. In other words, despite the formal separateness between athletes and body-builders, gyms often become a meeting point for different groups at high risk of doping who exchange advice on training methods, diets and, last but not least, doping products. They are also a venue where athletes and body-builders meet other sportspeople

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<sup>20</sup> In total, 20,226,933 out of 60,626,442 residents in Italy. See <http://www.comuni-italiani.it/regioni.html>.



and the former two groups may become a model or a source of advice on doping and other matters for the latter.

## 2.3 The Results of Anti-doping Tests

Italy's Anti-Doping Commission (CVD) and the Italian National Olympic Committee (CONI) are jointly responsible for conducting anti-doping tests in Italy, with CONI effectively sharing its competence with the Italian sports federations and, at least in principle, with the WADA and the international sports federations.<sup>21</sup> An agreement signed in October 2007 by the then Minister of Health, the Minister of Youth Policies and Sports, and the CONI President formalized an official division of labor that had taken shape since CVD's establishment in 2000. In the cited agreement, the three parties "agreed ... to regard the national and international competitive sports activities as the prevalent object of CONI's anti-doping activities." At the same time, the agreement restricted CVD's competencies to recreational athletes. The parties to the agreement also "agree[d] to consider the non-competitive activities and the competitive activities having no national relevance as the prevalent object of the anti-doping activities of the Commission" (Ministero della Salute 2007). According to some observers, including Bellotti (2009) the former head of the CONI Scientific Commission and a former member of the CVD, the 2007 agreement overrules the Italian anti-doping law, Act 376/2000 (see Chap. 7). Neither authority routinely tests youths, although, given cause, one or the other may do so in a specific case (Int-Oth-2).

### 2.3.1 CONI's Tests of Elite Athletes

As formalized in the 2007 agreement, CONI and the national sports federations target only elite athletes with their anti-doping tests. CONI oversees the data collection on all such tests carried out in Italy but has not published the data for 2006 and since 2008 (see Comitato Olimpico Nazionale Italiano 2012).<sup>22</sup> As shown in Table 2.5, CONI and the national sports federations carried out an average of about 9,400 anti-doping tests over the past 5 years for which data are available (2002–2005

<sup>21</sup> Due to funding constraints, WADA tests, on average, only seven or eight athletes per day all over the world and therefore the chance that an Italian elite athlete is targeted by a WADA control is very small. As a rule, international sports federations carry out most testing during the most important sports competitions, such as World Championships (Int-Oth-2).

<sup>22</sup> The Rome Anti-Doping Laboratory, which carries out the tests on behalf of both CONI and CVD, does submit the results of its tests to WADA, which then publishes them in an annual report (e.g., World Anti-Doping Agency 2011a). However, these data are not helpful to determine the number of positive results in CONI's tests because WADA merely reports "analytical adverse findings" and, as WADA itself notes (2011a: 1), these "may not be identical to sanctioned cases, as the figures ... may contain findings that underwent the Therapeutic Use Exemption (TUE) approval process."

**Table 2.5** Anti-doping tests carried out in Italy by CONI and the National Sports Federations: years 2002–2005 and 2007

	2002 <sup>a</sup>	2003	2004	2005	2007	Average
Total tests	7,823	9,431	9,950	8,791	11,154	9,430
Positive results	48	62	65	52	69	59
Percent of positive results on total tests	0.61	0.66	0.65	0.59	0.62	0.63

Source: our calculations on CONI (2012) (for further details, see [http://www.coni.it/index.php?dati\\_statistici](http://www.coni.it/index.php?dati_statistici))

<sup>a</sup>Tests analyzed, not carried out

and 2006), thus potentially reaching many or most of the elite athletes in Italy at least once each year.<sup>23</sup> However, the rate of positive test results is only about 0.63 % on average with very little variation after 2002. On average, about 59 elite athletes fail a drug test each year.

Among the elite athletes that have tested positive, some are well known in Italian sports. To give just an example, ten professional football players in addition to Guardiola—including Edgar Davids, who was then a Juventus midfielder; Fernando Couto, then a Lazio stopper; Francois Gillet, gatekeeper at Bari; and several other less known players—tested positive to nandrolone in 2001, the year in which the official anti-doping laboratory in Rome started to operate again after the 3-month suspension resulting from the scandal mentioned in the introduction (La Repubblica 2002). These players were suspended by the Italian football authorities (The Telegraph 2001). At least Davids, Couto, and Gillet were also convicted by a regular court for the offense of doping foreseen by article 9 of Act. 376/2000 (La Repubblica 2005).

Judging by CONI's positive tests, one might conclude that the problem of doping hardly exists in Italy. CONI's data can be complemented with results of the anti-doping criminal investigations carried out by NAS and other police forces. With few exceptions, the elite athletes involved in these investigations did not test positive for doping products. At least 100 different riders, for example, have been involved collectively over the years in some of the largest anti-doping investigations, such as the proceeding against Prof. Conconi (20 or more riders; see Tribunale di Ferrara 2003), the “Campioni senza valore” proceeding run by the Bologna Prosecutor's Office (another 20 or more riders; Tribunale di Bologna 2000), the so-called “Oil for drug” case coordinated by the Rome Prosecutor's Office (another 30 or more riders; NAS Firenze 2005), and the recent investigation in Mantua concerning a local pharmacist (another 40 or more riders; see NAS Brescia 2011 and Pacifici and Donati 2011), with several others implicated in smaller cases (e.g., NAS Firenze 2002). At least 50 other elite athletes of different disciplines have also been suspected of illegal doping practices in the investigations conducted by NAS.

The abuse of legitimate drugs and the extensive use of doping substances were also documented by the charges pressed by Dr. Guariniello from the Turin Prosecutor's Office against Antonio Giraudo and Dr. Riccardo Agricola, respectively the manager and the chief sports physician of the Juventus football club. According

<sup>23</sup> See [http://www.coni.it/index.php?dati\\_statistici](http://www.coni.it/index.php?dati_statistici).

to Guariniello, “the drugs seized from the Juventus’ inventory would have been sufficient to supply an entire town” (Hartmann 2003). The prosecutor’s charges were confirmed by a 2007 verdict of the Corte Suprema di Cassazione (2007; see also Travaglio, 2007 and chapter 3). No negative consequences were drawn from this verdict by the Italian sports authorities. However, if the Juventus team manager and chief physician were found guilty by the Court of Cassation of sporting fraud for purchasing and administering illegal performance-enhancing substances, such as corticosteroids, the logical implication of the Corte di Cassazione’s verdict is that some if not all the Juventus players were administered illegal performance-enhancing substances. Moreover, the Corte di Cassazione (2007) concluded that the two defendants committed the same offense of sporting fraud when they administered legal drugs not included in the list of banned performance-enhancing substances, if these are used off-label, i.e., for purposes different than those officially foreseen. These practices seem to be widespread in the elite football world, as reported by the judge who wrote the first-degree verdict in the Juventus case: “up to the end of the trial the defense lawyer repeatedly argued that Agricola’s behaviors were enormously widespread in the sports world and that in practice all physicians of professional football teams behaved in the same way” (Tribunale di Torino, 2004: 46).

Rather than reflecting the above-average “cleanness” of Italian elite athletes, the low percentage of positive samples in CONI’s anti-doping tests might testify to the difficulty of detecting doping substances and methods in urine samples, the testing method used almost exclusively. CONI’s rate of positive tests or “detection” is further hampered by fact that CONI conducts few out-of-competition, hence, genuinely surprise, tests (Int-Oth-1). Already in 2002, the Council of Europe team that evaluated Italian anti-doping policies came to the conclusion that “the proportion of out-of-competition controls provided for by the [1989 Council of Europe] Convention ... as being the most effective appears rather low. Moreover, advance warning of these controls seems in actual fact to be quite lengthy (at least 24 h), which means that they cannot be regarded as unannounced controls within the meaning of the Convention” (Evaluation Team 2002: 34). Judging on the basis of the data available and the opinion of some respondents with detailed knowledge of these issues (Int-Oth-2 and Int-NAS-26), we conclude that the problems noted by the Council of Europe evaluation team in 2002 do not yet seem to have been solved.

### ***2.3.2 CVD’s Tests of Recreational Athletes***

Although the recreational athletes overseen by CVD might be expected to have less interest in taking performance-enhancing drugs than the elite athletes targeted by CONI, CVD has been considerably more effective than CONI with its doping tests.

**Table 2.6** Anti-doping tests carried out in Italy by CVD: years 2003–2011

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Simple average, 2003–2011	Simple average, 2008–2011
Total tests	740	1,556	1,875	1,511	1,607	955	1,328	1,115	1,676	1,303	1,374
No. substances detected	n.a.	n.a.	n.a.	40	52	n.a.	52	97	80	n.a.	76.3 <sup>a</sup>
Positive results	20	42	37	37	46	39	42	53	52	40.9	46.5
Percent of positive results on total tests	2.7	2.7	2.0	2.4	2.9	4.1	3.2	4.8	3.1	3.4	3.8

*Source:* our calculations on Ministero del Lavoro, della Salute e delle Politiche Sociali (2009), Ministero della Salute (2010a, 2011b), and Ministero della Salute and Istituto Superiore di Sanità (2012: 11)

<sup>a</sup>Average 2007–2011

CVD has been considerably more effective than CONI with its doping tests.<sup>24</sup> CVD has been testing recreational athletes since 2003 and, as shown in Table 2.6, between 2003 and 2011, CVD carried out on average 1,365 tests each year, about one seventh of the tests conducted yearly by CONI. With 3.4 % positive tests on average, CVD has a five-time higher positive rate than CONI. Moreover, since 2008 the effectiveness of CVD's tests has considerably improved, with 3.8 % positive tests on average, six times higher than CONI's average rate. In 2 recent years, 2008 and 2010, the rate of positive tests exceeded 4 % (with a record 4.8 % in 2010), but the number of tests was below average (there were 26 % less tests in 2010 than in 2006).

A lack of financial means constrains CVD's, more so than CONI's, ability to conduct tests out of competition. However, given that more than four million people within CVD's jurisdiction and the seemingly countless numbers of recreational sports competitions, CVD's tests represent in most cases a surprise for the selected athletes. A crucial factor in improving the CVD's testing performance was also the fact that for the period 2009–2010 its tests were coordinated by Dr. Pasquale Bellotti, a sports physician and sports teacher and former head of the CONI Scientific Commission, who has an in-depth knowledge of different disciplines and training methods and who could therefore more effectively select the dates and events to control (see Chap. 6). Throughout the years, many more male athletes have tested positive than their female counterparts: in 2011, for example, the rates were 84.6 % versus 15.4 %, and the ratio is not significantly different in the previous years (Ministero della Salute and Istituto Superiore di Sanità 2012: 11). Older athletes tend also to dope more frequently than younger ones. As shown in Table 2.7, the age classes older than 30 consistently record

<sup>24</sup> The CVD's controls are representatives for geographic areas and sports disciplines, considering also the number of sportsmen and sportswomen practicing the different disciplines (Ministero della Salute 2011b; see also Bellotti 2009).

**Table 2.7** Percent of athletes testing positive by age on the total of tested athletes: 2008–2011

	2008 (%)	2009 (%)	2010 (%)	2011 (%)
<19	0.0	0.9	0.4	1.2
19–24	3.1	3.7	2.1	1.1
24–29	3.3	2.5	5.0	4.8
29–34	6.8	4.3	6.9	2.1
34–39	5.7	3.0	8.0	3.2
39–44	8.2	2.7	6.7	3.9
>44	13.2	5.2	7.1	7.7
Total	4.1	3.2	4.8	3.1

*Source:* Ministero della Salute and Istituto Superiore di Sanità (2012)

higher rates of positive tests than the younger age classes and, in 3 out of the 4-year period 2008–2011, the category of over 44-year-olds registered the highest positive rates (Ministero della Salute and Istituto Superiore di Sanità 2012: 13).

Excluding the sports federations, associated disciplines, and Enti, in which only a few controls were carried out, the highest rates of positive athletes were found in natural body-building (12.8 %),<sup>25</sup> followed by weightlifting (7.6 %), motorcycling (6.2 %), and ex aequo cycling and sailing (5.9 %). Other sports with above-average rates were also rugby (5.1 %), golf (5.0 %), boxing (4.9 %), and squash (4.6 %; Ministero della Salute and Istituto Superiore di Sanità 2012: 15).

The substances identified in the CVD's anti-doping tests from 2003 to 2011 are listed, in percent values, in Table 2.8. In assessing the table it needs to be taken into account that, as the tests are exclusively conducted during competitions, they tend to over-assess the use of stimulants and diuretic agents, while they provide only a limited view of the use of anabolic steroids, which are commonly used in training. Moreover, as the CVD's (and CONI's) tests only involve urine samples, they cannot detect a wide range of peptide hormones. In particular, urine tests cannot detect GH, unless this drug has been taken a few hours before the test—which obviously athletes hardly ever do.

Analyzing the time series of CVD's positive samples with these caveats in mind, we observe, nonetheless, considerable changes in the relevance of different substances. Between 2003 and 2004 and 2010–2011,<sup>26</sup> the share of samples in which stimulants have been detected has decreased 14.7 % points, from 30.5 % in the earlier period to 15.8 % in the later period. The share of samples containing traces of cannabis has also decreased considerably: whereas cannabis was found in 26.7 % of all samples in 2003–2004, it was found in only 12.4 % in 2010–2011. On the contrary, no peptides or other hormones were detected in 2003–2004, whereas they

<sup>25</sup> The Natural Body-Building Federation is a small federation of recreational body-builders, which is not recognized by CONI but is part of an Ente, the ASI (Alleanza Sportiva Italiana, ASI; see Ministero della Salute and Istituto Superiore di Sanità 2012: 30).

<sup>26</sup> As the percent of positive results by substance in anti-doping tests are partially due to several not fully predictable factors, we have considered the average value of the first 2 years and the last 2 years of the overall time span under consideration in calculating the differences.

**Table 2.8** Doping substances ascertained in CVD's anti-doping tests in percent values: years 2003–2011

Substances	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average 2003–2011	Averages		Differences (1)–(2)
											2003/2004	2010–2011	
											(1)	(2)	
Anabolic agents	20.0	10.4	6.4	7.5	5.8	25.4	7.7	37.1	20	15.6	15.2	28.6	13.4
Peptide hormones, growth factors and related substances <sup>a</sup>	0.0	0.0	2.1	5.0	5.8	25.4	7.7	10.3	3.8	6.7	0.0	7.1	7.1
Beta 2-agonists	4.0	4.2	2.1	7.5	5.8	4.0	5.8	6.2	5	5.0	4.1	5.6	1.5
Hormones and metabolic modulators	0.0	0.0	0	2.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Diuretics and other masking agents	16.0	16.7	19.1	20.0	17.3	3.4	15.4	12.4	25	16.1	16.4	18.7	–2.3
Stimulants	36.0	25.0	19.2	12.5	17.3	16.4	23.1	10.3	21.3	20.1	30.5	15.8	–14.7
Narcotics	4.0	0.0	0	0.0	0.0	0.0	3.8	2.1	0.0	1.1	2.0	1.1	–1.0
Cannabinoids	16.0	37.4	42.6	32.5	42.3	16.9	28.8	7.2	17.5	26.8	26.7	12.4	–14.4
Glucocorticosteroids	0.0	4.2	6.4	10.0	3.8	8.5	5.8	14.4	12.5	7.3	2.1	13.5	11.4
Beta-blockers	4.0	2.1	2.1	2.5	1.9	0.0	1.9	0	0.0	1.6	3.1	0.0	–3.1

*Source:* our calculations based on Ministero del Lavoro, della Salute e delle Politiche Sociali (2009), Ministero della Salute (2010a, 2011), and Ministero della Salute and Istituto Superiore di Sanità (2012: 11)

*Note:* totals may not match sums because of rounding

<sup>a</sup>GH and other growth factors are not included as they hardly can be detected and were indeed never detected so far in the urine tests ordered by CVD

were found in 7.1 % of all samples in 2010–2011, and the shares of anabolic steroids and glucocorticosteroids also increased considerably, by 13.4 % and 11.4 %, respectively.

CVD's data also clearly document the medicalization of sports (see Harth et al. 2008; Waddington and Smith 2009). In fact, the athletes selected for CVD's testing are also asked to fill in a questionnaire about the legal drugs (including homeopathic products) and health products (vitamins, mineral salts, amino acids, creatine, and other dietary supplements) they have taken in the 15 days before the test. In 2011, out of 1,676 athletes tested, 64.9 % admitted using at least one of the above-mentioned products and out of these, 36.9 % declared using three or more products. The most frequent class of products used are anti-inflammatory drugs, which amount to 26.2 % of all the declared products and to 42.6 % of all drugs taken (Ministero della Salute and Istituto Superiore di Sanità 2012: 29–31). Similar rates were also recorded in the previous years (Ministero della Salute 2011a).

## 2.4 Estimates of the Users of Doping Products

To estimate the demand for doping products in Italy, we can use several datasets, none of which, however, provides a full or unbiased picture.

### 2.4.1 *IPSAD Data on the Use of Steroids in the Adult Population*

There is only one partial estimate concerning the whole Italian population and this relates exclusively to the consumption of anabolic steroids. In 2007, the lifelong, past-year, and past-month prevalence of anabolic steroid use were collected in a sample of 85,000 respondents of the Italian population aged 15–64 by researchers of the Consiglio Nazionale delle Ricerche (National Research Council, known under the acronym of CNR) through the Italian Population Survey on Alcohol and other Drugs (IPSAD).<sup>27</sup> Almost 1 % of the sample admitted using anabolic steroids at least once in their lives; 0.30 % of the sample reported having used steroids in the 12 months preceding the interview, and 0.23 % of the sample reported the use of steroids in the past 30 days (Dipartimento Politiche Antidroga 2012a; see Table 2.9).<sup>28</sup> If the sample was representative of all Italians aged 15–64, then those

<sup>27</sup> The survey was repeated in 2010 but the questions concerning steroids were not asked (Dipartimento Politiche Antidroga 2012b).

<sup>28</sup> These rates are roughly comparable with those recorded in other countries. A nationwide population survey conducted in 2008 in Sweden found a 0.9 % lifetime steroid prevalence among men aged 15–54, thus lower than the almost 1.0 % found in Italy for both sexes (Swedish National Institute of Public Health 2010: 21). However, population surveys carried out five times since 1997 in the Netherlands have found lifetime prevalence rates between 0.7 and 2.7 % for a variety of performance-enhancing drugs (Anti Doping et al. 2012: 14–15). Although these drugs are broadly defined in the Dutch surveys as to include all the most frequent doping substances as well as cocaine and amphetamines, steroids are likely to be an important component of them.



**Table 2.9** The lifelong, past-year, and past-month prevalence of anabolic steroid use in the Italian population aged 15–64: year 2007

	Rate (%)	Total population aged 15–64	Estimated users
Lifetime	0.995	39,306,261	391,054
Past year	0.300	39,306,261	117,907
Past month	0.225	39,306,261	88,436

*Source:* author’s calculations from unpublished data provided by the Dipartimento Politiche Antidroga (2012a), based on the 2007 IPSAD survey

**Table 2.10** Estimated number of users of doping substances among athletes

Year	Number of athletes	Users of doping substances
2010	4,685,257	222,707
2011	4,685,257	145,243
Average	4,685,257	183,975

*Source:* our calculations on the basis of Istat data, as reported in Istat (2007), Ministero della Salute (2011a, b), and Ministero della Salute and Istituto Superiore di Sanità (2012)

*Note:* we do not have separate estimates for the total number of athletes for 2010 and 2011

percentages would implicate a total of 391,054 such Italians as lifetime users; 117,907 such Italians as past-year users; and 88,436 such Italians as past-month users. Given the well-known biases of these surveys (e.g., Zhao et al. 2009), which usually have low response rates and are administered at home in condition of limited anonymity, the forgoing figures can be considered low-end estimates of the numbers of users. The researchers in charge of the IPSAD survey explicitly speak of a “systematic effect of underestimation of the phenomenon” (Ministero della Solidarietà Sociale 2006: 55), albeit with reference to the 2005 IPSAD survey that did not contain questions on steroids.<sup>29</sup>

### 2.4.2 Estimates of Doping Athletes

Another route for estimating the use of performance-enhancing drugs is to apply the rates for positive test results recorded by CDV in recent years, such as 2010 and 2011, to the approximately 4,690,000 adult athletes in Italy. This might also be treated as a low-end estimate of the users because positive results in anti-doping tests, even if they are as high as those of the CVD, unavoidably under-assess the true extent of doping, not least because many current doping products cannot be detected by the tests (see Chap. 1). As shown in Table 2.10, with this method, we find that the

<sup>29</sup>This under-assessment is confirmed by the comparison between the IPSAD data, for the 15–19-age group, and the data collected with the EPSAD survey. The latter exclusively targets 15- to 19-year-old students but has a very high response rate, because it is administered in class (for details, see Donati 2005).

**Table 2.11** Number of substances detected in CVD's controls in 2010 and 2011 and estimated numbers of users of doping products, by substance

Substances detected	Cases in 2010	Cases in 2011	Total number of cases	Users of doping substances based on 2010–2011 data
Anabolic agents	36	16	52	87,292
Peptide hormones (growth factors) and related substances, <sup>a</sup> of which	10	3	13	21,823
EPO	4	4	5	8,392
Chorionic gonadotrophin	6	2	8	13,431
Beta-2 agonists	6	4	10	16,787
Hormones and metabolic modulators	0	0	0	0
Diuretics and other masking agents	12	20	32	53,718
Stimulants, of which	10	13	23	38,610
Cocaine	3	4	7	11,751
Narcotics	2		2	3,357
Cannabinoids	7	14	21	35,253
Glucocorticosteroids	14	10	24	40,289
Beta-blockers	0	0	0	0
Total substances/users	97	80	177	297,130

*Source:* our calculations on the basis of Ministero della salute (2011a, b) and Ministero della Salute and Istituto Superiore di Sanità (2012)

<sup>a</sup>GH and other growth factors are not included as they were never detected in the urine tests ordered by CVD

number of users of doping products for the most recent 2 years, i.e., 2010 and 2011, would average about 184,000 persons.

On the basis of CVD's data, we can also estimate the number of users of the different substances. By simply considering the number of substances detected on average in the 2,791 tests carried out in 2010 and 2011, we reached the following estimates (see Table 2.11): there are about 87,300 users of anabolic agents among elite and recreational athletes. Reflecting the location of CVD's tests (i.e., in competition), the second largest group of users consists of those using diuretics and other masking agents (53,700), followed by about 45,325 using stimulants and 40,300 athletes using corticosteroids. With an estimated number of 35,253, users of cannabis represent the fourth largest group, followed by 21,800 users of peptide hormones and related substances (13,431 users of chorionic gonadotrophin and 8,392 users of EPO)<sup>30</sup> and 16,800 users of beta-2 agonists.

The sum of the estimated number of users of the different categories of substances is higher than the total number of users, as many athletes use more than one prohibited substance at a time (for example, they use a diuretic just before the competition, to mask the use of a performance-enhancing substance). As a matter of fact, CVD often detects more than one substance per sample. In 2010, for example, 19 athletes out of 52 tested positive for more than one substance: in particular, 11 tested positive for two substances, four athletes for three, three for four, and three other athletes

<sup>30</sup> As mentioned earlier, GH and other growth factors, which also belong to this class of substances, cannot be detected in tests, unless they were taken a few hours before the tests.

**Table 2.12** Number of substances detected in samples taken during CVD's anti-doping controls: 2010–2011

Number of substances	Positive athletes in 2010	Positive athletes in 2011
	No. (%)	No. (%)
1	32 (60.4)	33 (63.5)
2	11 (20.7)	16 (30.8)
3	4 (7.6)	1 (1.9)
4	3 (5.6)	0 (0.0)
5	1 (1.9)	0 (0.0)
6	1 (1.9)	2 (3.8)
8	1 (1.9)	0 (0.0)
Total	53 (100.0)	52 (100.0)

*Source:* Ministero della Salute (2011b) and Ministero della Salute and Istituto Superiore di Sanità (2012)

tested positive for five, six, and even eight substances, respectively (Ministero della Salute 2011b: 30; see Table 2.12).

Although cannabis and cocaine are on the WADA's Prohibited List (2012b), we do not regard them as part of the market for doping products for both substantive and practical reasons. Substantively, it is not always clear if the athletes testing positive to cannabis and cocaine used them for performance-enhancing or for recreational purposes. Moreover, these two illegal drugs are probably smuggled and distributed in Italy through separate channels than those supplying the doping market, despite the occasional, but growing, overlap between the doping and illegal drug markets (e.g., Paoli 2000). Practically speaking, we have no matching information for these drugs on the supply side, as the NAS investigations do not target them. For 2011, it is possible to separate those who exclusively used cannabis and cocaine from the rest, as exact data are provided about the combinations of the active ingredients found. In particular, we know that 13 users exclusively tested positive for THC, the active ingredient of cannabis, one for cocaine alone and a further person for cocaine and THC (Ministero della Salute and Istituto Superiore di Sanità (2012: 10). If we subtract these 15 cases from the 52 athletes who tested positive to tests in 2011, we are left with a positive rate of 2.3 % and therefore with 103,000 users of doping substances other than cannabis or cocaine (see Table 2.13). We do not have such detailed data for 2010, and therefore we have resorted to an alternative procedure. As shown in Tables 2.6 and 2.10, CVD detected in 2010 cannabinoids seven times and cocaine three times out of a total of 97 substances detected in 53 positive tests (Ministero della Salute 2011b: 30–32). Through use of a simple rule of proportionality (i.e.,  $10:97=x:53$ ), we calculate that almost 5.5 of the positive tests pertained to either cannabis or cocaine. Subtracting them from the total of 53, we reach a rate of 4.26 % positive test results, excluding cocaine and cannabis, and therefore arrive at an estimate of 199,592 athletes using doping substances other than cannabis or cocaine.<sup>31</sup> Making an average between the 2010 and 2011 estimates, we identify about 150,000 users of doping products other than cannabis or cocaine.

<sup>31</sup> In both cases, we have assumed a one-to-one correspondence between the number of tests and athletes. With over 4.6 million recreational athletes, the chances of being tested twice are extremely low.

**Table 2.13** Estimated number of users of doping substances among athletes, including and excluding cocaine and cannabis: 2010–2011

Year	Number of athletes	Users of doping substances	Percent of positive results on total tests w/o cannabis and cocaine	Users of doping substances other than cannabis and cocaine
2010	4,685,257	222,707	4.3	199,592
2011	4,685,257	145,243	2.2	103,076
Simple average	4,685,257	183,975	–	151,334

*Source:* our calculations on the basis of Istat data, as reported in Istat (2007), Ministero della Salute (2011b), and Ministero della Salute and Istituto Superiore di Sanità (2012)

*Note:* we do not have separate estimates for the total number of athletes for 2010 and 2011

### 2.4.3 Estimates of Doping Body-Builders

Whereas the above-mentioned estimates also include elite athletes, the first group at substantial risk of doping, they almost entirely exclude the second group, i.e., body-builders. With few exceptions, they do not participate in competitions and, hence, are not, technically speaking, “athletes.”

To estimate the number of body-builders that engage in doping, we have combined the data from the survey of gyms carried out in 2007 by the Ministries of Sports and Social Solidarity with the findings of the many NAS investigations that have targeted gyms (e.g., Tribunale di Bologna 2000; Tribunale di Ravenna 2004; Tribunale di Forlì 2009; NAS Bologna 2000; NAS Firenze 2005; Tribunale di Siracusa 2010). These investigations have been conducted in seven different Italian regions (Valle d’Aosta, Piedmont, Trentino Alto Adige, Veneto, Liguria, Emilia Romagna, Toscana, Latium, Campania, Apulia, Sardinia, Sicily) and concluded that at least 130 gyms were involved in the distributions of doping out of the 800 different gyms with body-building equipment screened over about a decade (that is, 16.25 % of the total). Applying this rate to the earlier estimates of 4,050 gyms with at least a room for body-building equipment or machines, one could argue that since the late 1990s nearly 660 such gyms have participated in illegal doping practices. As the 4,050 gyms currently serve about 1,270,000 patrons, we can apply the same 16.25 % rate and further conclude that the gyms involved in doping practices might attract about 206,000 potential body-builders. The above-mentioned judicial investigations also provide circumstantial evidence that approximately one third of these visitors—that is, just under 69,000—use on an occasional or habitual basis doping products, primarily anabolic steroids alone or in combinations with other doping substances (such as stimulants and GH).

Some further supporting evidence for the 69,000 estimate as well as for the range of substances misused emerges from a survey carried out in 2011 in Emilia Romagna among 86 managers of gyms, including those not specialized in body-building. These managers believe that 38 % of their male customers use anabolic steroids, 31 % stimulants, and 21 % growth hormones. They indicate much lower prevalence estimates for female visitors: 26 % are purported to be using anabolic steroids, 14 % stimulants, and 8 % growth hormone (Leone 2010a: 21). The survey coordinator (Leone 2010a: 19)

has acknowledged that the managers' perceptions are exaggerated, all the more so that they refer not only to visitors of gyms specialized in body-building but to the visitors of all kinds of gyms. To give an idea of the unrealistic perceptions, it is enough to state that one out of four respondents believes that anabolic steroids are used by more than 60 % of the male athletes visiting the gyms (*ibid.*). Despite the apparent exaggerations, the managers' perceptions unequivocally confirm that the use of anabolic steroids constitutes a widespread problem in gyms.

Another interesting element emerging from anti-doping investigations concerns the users themselves. Apparently, many users of anabolic steroids attending gyms work in the public or private security sector. Twenty-one police agents, for example, were reported to buy anabolic steroids from other policemen in a recent case handed in by the Tribunale di Torino (2012a; see also Numa 2010). US soldiers located in a military base in Sicily were reported to be users—importers of steroids in an investigation coordinated by the Prosecutor's Office in Siracusa (Tribunale di Siracusa 2010). Two other soldiers, one belonging to the US Army, also emerged from the NAS Investigations Database as buyers and consumers of anabolic steroids. Another criminal case handled at the Tribunale di Forlì documented the sale of anabolic steroids to several “bouncers” working in discos on the Adriatic Coast and in Bologna (Tribunale di Forlì 2009: 20 and 103). An investigation conducted by the Bologna Branch Office also documented the shipment of hundreds of steroids-containing packages to US soldiers in Iraq (Int-NAS-13).

Our respondents at several NAS branch offices (Int-1, 3, 8, 16, 17, 20, 22, and 24) also confirmed the frequent involvement of law enforcement officers and private security guards in their anti-doping investigations. Their widespread perception is that most of these officers and guards purchase anabolic steroids and other drugs solely for their own consumption; a few of them, as we will see in Chap. 3, are also active as traders or suppliers. The spread of anabolic steroids among this group confirms Hoberman's (2012) findings about steroid use among US law enforcement and military personnel and is particularly worrying. In fact, all Italian policemen and many Italian private security guards have access to weapons and are entitled to the use of force while they perform their professional functions. Given the aggressiveness and sudden mood changes stimulated by anabolic steroids, public and private security staff taking these drugs can provoke harm not only to themselves but also to uninvolved victims.

### ***2.4.4 Doping Use in the Rest of the Population***

Anti-doping investigations and other sources reveal that doping products are also used occasionally by a small fraction of those who participate in sports without taking part in competitions or visiting a gym with body-building equipment—about 7.8 million people in Italy<sup>32</sup>— and by an even smaller fraction of those who do not

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<sup>32</sup> We reached the 7.8 million figure by subtracting the nearly 4.7 million sportsmen and sports-women taking part in competition and the almost 1.3 million visitors to gyms with body-building equipment (whom we called earlier potential body-builders) from the approximately 13.8 million adults who practice regularly or occasionally one or more sports estimated by the Istat (2007: 5).

engage in any sport. Anti-doping investigations and particularly the “Artificial Body” investigation conducted by the Bologna Branch Office at the turn of the century (NAS Bologna 2000) indicate that these two residual groups of users resort to doping products for a variety of reasons. Performance enhancement is still an important motivation for some recreational sportspersons, even if they do not take part in competitions; weight loss appears to be a frequent reason for consuming stimulants, whereas many users of steroids among both noncompetitive sportspeople and those who do not engage in any sport want to look “healthy” or to speed up the recovery from a trauma. This variety of motives for taking performance- or image-enhancing drugs even by those who do not take part in competitions or are body-builders also emerges from surveys conducted in several countries among fitness center visitors and managers (see Anti Doping Denmark et al. (2012): 19–23) and the growing literature on human enhancement (Savulescu et al. 2011; Evans-Brown et al. 2012; Singler 2012).

A survey carried out among a sample of 952 high-school students in Rome, aged 14- to 19-year-old, sheds some light on doping consumption patterns among recreational sportspersons and people who do not undertake physical exercise, demonstrating that the use of doping products is spread not only among competitive athletes and gym visitors but also these other two groups of consumers (Lucidi et al. 2004).<sup>33</sup> Thirty-one students (3.25 % of the sample) admitted using doping products in the 3 months preceding the survey and 29 declared that they were going to use these same products also in the subsequent 3 months. Interestingly, 13 of them reported using doping products, even if they did not take part in competitions. Of these thirteen, four were gym visitors, seven engaged in sports independently, and two admitted using doping products without participating in any sports. Out of the seven who engaged in sports independently, three took stimulants (other than cocaine), three took steroids, and one took steroids with EPO. The two nonphysically active students both used stimulants.

These limited insights, however, are not sufficient to quantify properly the number of users of different doping products among noncompetitive sportspersons and physically inactive people in Italy. Despite the lack of clear evidence, we hypothesize that the consumption of doping products in the latter two groups has grown in recent years, as a result of the general medicalization of society and the growing emphasis on performance (e.g., Ehrenberg 1991; Gasparini 2004; Hoberman 2005; see Chap. 1). The latter emphasis is also reflected in the rapid expansion of the consumption of cocaine and other illegal stimulants, such as ecstasy, since the early 1990s in Italy and elsewhere (e.g., European Monitoring Centre on Drugs and Drug Addiction 2012)<sup>34</sup>: even though their consumption is mostly unrelated with sports, these stimulants are also doping, i.e., performance-enhancing, drugs.

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<sup>33</sup> We are grateful to Prof. Caterina Pesce (Rome University, Foro Italico) for giving us the raw survey data, so that we could make our own calculations.

<sup>34</sup> See the trends in past-year prevalence of cocaine use among young adults (aged 15–34) in numerous European countries published by the European Monitoring Centre for Drugs and Drug Addiction on its Web site: <http://www.emcdda.europa.eu/stats11/gpsfig14b>.

**Table 2.14** Estimated number of users of doping products in Italy

Among	Users of doping products	Percent of total	Users of doping products excluding cannabis and cocaine	Percent of total
Athletes	185,000	73	150,000	69
Body-builders	68,700	27	68,700	31
Total	253,700	100	218,700	100

*Source:* our calculations on the basis of the data presented earlier

*Note:* totals may not match sums because of rounding

As noted earlier, successful super elite athletes, who have tested positive to doping products or have been suspected of taking such products but have never been caught, also constitute powerful negative models.

### 2.4.5 Concluding Estimates

Table 2.14 summarizes our estimates of the number of users of doping products in Italy. If we consider all substances included in the WADA Prohibited List, we estimate 253,700 users of doping products in Italy. If we exclude cannabis and cocaine, we reach the lower estimate of 218,700 users. This estimate supports that doping is not limited to elite athletes and poses a serious threat to greater public health.

Even the lower figure of 218,700 users is comparable to the number of heroin misusers estimated in Italy for 2010: 218,425 people were estimated to need an opiate detox or substitution treatment based on a prevalence rate of 5.5 per thousand among residents aged 15–64 (Dipartimento Politiche Antidroga 2011: 78).<sup>35</sup> However, both figures are somewhat lower than the estimated number of cocaine users (353,000 people based on a 2010 past-year prevalence rate of 0.9 %) and dramatically lower than the estimated number of cannabis users estimated on the basis of the last population survey (Dipartimento Politiche Antidroga 2011: 8).<sup>36,37</sup>

<sup>35</sup> Our estimate of the number of users of doping products is more than twice as large as the estimated number of heroin users emerging from the last population survey (98,000 people based on a 2010 past-year prevalence rate of 0.25 %; see Dipartimento Politiche Antidroga 2011: 8).

<sup>36</sup> On the basis of the past-year prevalence rate recorded in the 2010 population survey, there were over 350,000 current users of cocaine (last-year prevalence rate of 0.9 % out of over 39 million people aged 15–64) and over two million users of cannabis (last-year prevalence rate: 5.2 %). The differences would become even bigger, if the results of the 2008 population survey were considered, which were considerably higher than those recorded in 2010 (Dipartimento Politiche Antidroga 2011: 8).

<sup>37</sup> In what seems to be a back-of-the-envelope calculation, Prof. Botré, the head of the Rome Anti-Doping Laboratory, reaches much higher estimates. In fact, according to him, there are over 400,000 Italian sportspeople who use prohibited doping products. Botré reaches this estimate by applying the rate of positive tests found in his laboratory (the average of CONI's and CVD's test results) to the whole population of Italian sportspeople, which he estimates at 16 million people. Instead, we have applied CVD's rate of positive results only to the 4,690,000 sportspeople aged 15 or older who engage in competitions. Given the lack of data, we have refrained from estimating doping use among the much broader set of noncompetitive sportspeople. As discussed earlier, these are likely to use doping products less frequently than athletes (Il Nuovo ciclismo 2007).



It is worth remembering that not all users of doping products commit an offense for the mere fact of using doping substances. Even if Italy's anti-doping legislation is rightly considered to be some of the strictest in the world (Evaluation Team 2002), article 9 of Italy's anti-doping act (Act 376/2000) punishes athletes for using doping products only if they want "to improve the[ir] competitive performance." Noncompetitive sportspersons and those who do participate in sports but use doping products for lifestyle purposes are not liable on the basis of the Act 376/2000. All users, however, can be indicted of "receiving," if they buy doping substances that have been stolen, fraudulently imported, or represent the proceeds of any other crime. For example, the 18 officers of the Italian Polizia di Stato who were body-builders and bought steroids from their colleagues were charged by the Turin Prosecutor's Office of receiving an illegal product (Numa 2010; Tribunale di Torino, 2012b).

The same ambiguity can be found in the application of the world anti-doping sports rules. According to the WADA Anti-Doping Code, the users of the same doping products may or may not violate a sports rule, depending on whether or not they have a therapeutic use exemption.

## 2.5 A Preliminary Estimate of the Size of the Market

Given the number of doping products available and the preferences of the different users and their advisors, it is an almost impossible exercise to assess the quantities of the different products consumed and therefore the size of the market for doping products in Italy. As shown in Tables 2.8 and 2.11, the substances detected by CVD in its anti-doping tests provide a first, albeit partial and possibly or even likely biased indication of the products chosen by doping athletes. No such detailed statistical data exists for body-builders and therefore we have had to rely on less solid data, explained in detail below.

In a preliminary attempt to scope the quantities consumed, we have developed average consumption profiles of 100 hypothetical users of doping products (see Appendix B). In developing such profiles, we have started from the understanding that the market for doping products consists of a multiplicity of substances and methods, some complements and some substitutes, and users mix them up for performance-enhancing or lifestyle purposes. Whereas the markets for illicit drugs are usually considered separately for the purposes of estimation (e.g., United Nations Office on Drugs and Crime 2005; Paoli et al. 2009), this approach is intractable and undesirable in the case of doping.

The specific combination of doping products used and the related dosages also vary widely depending on a variety of factors, including the users' motivations and qualifications, the sports disciplines they engage in, and, in the case of athletes, the upcoming competitions. A sprinter needs different products than a boxer or a rider and an elite athlete taking part in many high-level competitions is likely to use performance-enhancing substances more frequently than a recreational one.

The extent and type of doping also depends on the perceived legitimacy of doping and specifically performance-enhancing practices in the wider social contexts in which the users operate. A recent WADA-funded study on doping practices in French, Swiss, and Belgian elite cycling, for example, shows that, whereas doping was considered a *de facto* legitimate practice in elite cycling until the 1998 Festina affair, the repeated scandals, intensified control activities as well as the moral and occasionally also legal condemnation of doping have decreased the legitimacy and probably also the prevalence of doping practices among recreational and non-super elite riders. Several elite and would-be elite riders interviewed by Brissonneau and his colleagues (2009) stressed that they were committed to staying clean even if that commitment meant that they would give up successful career prospects (no super elite riders were included in Brissonneau et al.'s sample. The fact that both the winners and the other riders of the Tour de France have increased their average speed since the 1998 Festina scandal leads Hoberman (n.d.) to conclude that doping has remained widespread among super elite riders).

Given the multiplicity of doping products and patterns of use, we have opted for the definition of 100 profiles, covering the two broad categories of users identified in the previous sections, i.e., athletes and body-builders. Reflecting their percent of the total number of users of doping products in Italy (see Table 2.11, above), athletes account for 69 % of these profiles and body-builders account for 31 % (see Table 2.14). For athletes we have developed the profiles, in such a way that the share of the substances consumed corresponds to the percentages of the substances detected by the CVD in 2010 and 2011.

For body-builders, we have, above all, relied on the data emerging from the anti-doping investigations and in particular from the at least 15 investigations in which Donati has been a consultant at over the years. The latter task, included among others, reading hundreds of pages of wiretapped conversations, in which body-builders, other users, and their suppliers discuss dosages. For body-builders, we have also analyzed the consumption suggestions given in numerous Web sites.<sup>38</sup>

Except for GH, our estimates of body-builders' consumption profiles are comparable with the data collected by Parkinson and Evans (2006) in a 2004 anonymous Internet survey of 500 steroid users, a large majority of whom (78.4 %) were non-competitive body-builders and nonathletes. Parkinson and Evans' study constitutes the most recent study and one of the rare studies of consumption levels of doping products (see also Perry et al. 1990; Pope and Katz 1994; Evans 1997; Bolding et al. 2002). Almost all of their respondents (95 %) practiced polypharmacy, taking other drugs in addition to steroids, with one in four users taking GH and insulin. Parkinson and Evans' respondents reported using between 70 and 6,000 mg of testosterone and other steroids per week for "cycles" ranging between 4 and 20 weeks. Converting Parkinson and Evans' data to annual average dosages by using 10 mg as a dose, we conclude that the 500 respondents had an average annual consumption of 28,810 mg or 2,881 doses of steroids. The latter figure is only slightly lower than the 2,525

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<sup>38</sup> For example, <http://www.bodybuilding.com/fun/drobson221.htm> and <http://www.anabolicsteroids.com/steroids-deca.html>.

doses of steroids consumed on average by the 31 hypothetical body-builders of our model (78,300 doses/31 body-builders). By applying the same conversion method, we also conclude that Parkinson and Evans' respondents consumed about 10,500 mg or 420 doses of 25 mg of stimulants on average on an annual basis—a figure almost coinciding with the 393 average doses we estimate in our model. Only our assumptions concerning GH consumption are significantly lower than the data recorded by Parkinson and Evans. In fact, reflecting the findings of Italian investigations, we estimate that our 31 hypothetical body-builders consume on average 55 doses of GH on a yearly basis, whereas the average GH consumption in Parkinson and Evans' study would correspond to 315 doses (each corresponding to 1 IU or 0.333 mg) of GH. Together with a few other hormones, GH is one of the most expensive doping substances available. Reflecting the official price of GH in Italy, we estimate that each dose of GH costs 13.90€ (see Chap. 7).<sup>39</sup> Italian body-builders' lower GH consumption can perhaps be partially explained with the lower purchasing power of Italian body-builders' vis-à-vis their US counterparts.

To increase the profiles' validity, we have also discussed them in detail with two Italian experts. The first is Dr. Bellotti, whose qualifications and key role in improving CVD's testing performance we have already mentioned. The second expert is Dr. Roberta Pacifici, director of the Observatory on Smoking, Alcohol and Drugs at the Higher Institute for Public Health in Italy, President of the Italian Society for Clinical Biochemistry and Clinical Molecular Biology and the Higher Institute for Public Health's representative within CVD. As part of the latter role, Pacifici coordinates the writing of CVD's yearly reports. Except for Bellotti and Pacifici's feedback, though, we are fully aware of the fact that our consumption profiles lack external validation, and we present them as a work in progress, hoping to obtain feedback and suggestions for improving them from other experts worldwide.

By applying the average quantities of the different products consumed by the two classes of users, we estimate that on a yearly basis over 371 million of doping doses are consumed annually in Italy (see Table 2.15). Among them, steroids represent the lion's share with 58.9 % of the market, followed by stimulants with 13.9 %. Three other classes of substances have similar shares: diuretics and other masking agents represent 8.7 % of the market, followed by glucocorticosteroids with 5.8 %, and peptide hormones, growth factors, and related substances with 6.4 %. All other classes of substances are marginal.

Our calculations also indicate that body-builders, although they represent only 31 % of the users, account for a very large share of the market (55.2 %). Body-builders, in fact, consume steroids and other doping products continuously throughout the year and some of them take very large dosages, whereas athletes are usually more selective in their choices of doping products and, depending on the products, take them only during training, for a few weeks or months, or just before a

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<sup>39</sup> The cost of a GH dose in the United States is comparable. We have checked the prices of GH packages sold by seven leading drug manufacturers on a US Web site (see <http://www.somatropin.net/hgh-brands.html>) and conclude that a dose of 1 IU of GH currently costs US\$17 or 13.60€.

**Table 2.15** Estimated doses of doping substances consumed in Italy, by type of users and classes of substances

Substances	Athletes	Body-builders	Total doses per class	Percent of total
Anabolic agents	45,304,348	173,522,903	218,827,251	58.93
Peptide hormones, growth factors and related substances <sup>a</sup> , of which	19,956,522	3,767,419	23,723,941	6.39
EPO	7,675,907	0	7,675,907	2.07
GH <sup>b</sup>	n.a.	3,564,001	3,767,419	0.96
Chorionic gonadotrophin	12,280,615	203,418	12,484,033	3.36
Beta-2 agonists	13,130,435	11,081	13,141,515	3.54
Hormones and metabolic modulators	0	132,968	132,968	0.04
Diuretics and other masking agents	32,391,304	55,403	32,446,708	8.74
Stimulants	24,739,130	27,036,774	51,775,905	13.94
Narcotics	7,000,000	0	7,000,000	1.89
Glucocorticosteroids	21,130,435	531,871	21,662,306	5.83
Beta-blockers	2,608,696	0	2,608,696	0.70
Total doses	166,260,870	205,058,419	371,319,290	
Percent of total	44.78 %	55.22 %	100.0 %	

*Source:* our estimation on the basis of the data presented earlier and the consumption profiles developed in Appendix B

<sup>a</sup>In the 100 consumption profiles we make detailed estimates for each user only in terms of the general category of substances belonging to this class. In fact, whereas we have considerable information on the dosages of EPO and GH, we have no basis to hypothesize the annual doping doses for other substances included in this class, such as chorionic gonadotrophin, ATCH, gonadorelin, or insulin. However, we distinguish among the EPO, GH, and chorionic gonadotrophin (the three main substances belonging to this class that have been either detected in CVD's tests or seized by NAS; see Tables 2.2 and 2.11) in aggregate terms, for each set of users, i.e., athletes and body-builders. This differentiation is necessary for the subsequent estimate of the financial size of the market, given the considerable differences in prices among the substances included in the category of peptide hormones, growth factors, and related substances (see Chap. 6). For this differentiation we have relied, for athletes, on CVD's positive test results. In 2010 and 2011 there were 13 positive tests for this class of substances, five for EPO and 8 for chorionic gonadotrophin. We have thus split the total number of doses on the basis of the same proportion. For body-builders, we relied on NAS seizure data to estimate the consumption of GH and chorionic gonadotrophin—this focus is made plausible by the focus on NAS investigations on body-building (see Chap. 7). In doing so, we have excluded EPO seizures, as NAS investigations have never delivered any proof of EPO being consumed by body-builders: in other words, we have assumed that the EPO seized by NAS is entirely bound for athletes. We have also excluded other substances belonging to this class, as we cannot estimate their consumption. Moreover, these other substances represent only a negligible share of the substances seized by NAS. Reflecting the relative share of GH and chorionic gonadotrophin in NAS seizures, we have hypothesized that GH accounts for 94.6 % of the total doping doses of this class consumed by body-builders, whereas peptide hormones, growth factors and related substances, and chorionic gonadotrophin account for 5.4 %

<sup>b</sup>We have no estimate of GH consumption by athletes because our estimates are based on the results of CVD's anti-doping tests and GH has never been detected in such tests

competition. Therefore, it is plausible that athletes account for only 44.8 % of the market, even if they represent 69 % of the users.

We would like to point to two biases in our estimates of the doping substances consumed by athletes. As we rely on the results of CVD's anti-doping tests, we underestimate the use of other doping substances consumed out of, rather than in, competition. CVD's data were, however, the only way to anchor our estimates to objective data. For the same reasons, we do not factor in the use of GH and other hormones that have never been detected in CVD's tests.

A 2000 analysis of the blood parameters of athletes preparing for the Sydney Olympic Games, which was carried out by CONI Scientific Committee, gives some hint about the spread of GH misuse among Italy's elite athletes. Such an analysis anticipated the current blood passport and was intended to determine 10 % variations from the athletes' average parameters of hematocrit, hemoglobin, GH, testosterone, IGF-1 (insulin-like growth factor), and others. Between May and July 2000, CONI Scientific Committee carried out 538 controls among athletes of 20 different disciplines, identifying numerous anomalous values and specifically 61 anomalies in the case of GH. The GH anomalies were concentrated in just a few sports. Among females, 32 of the 36 cases concerned swimming, volleyball, track and field, canoeing, and weightlifting; among males, 20 out of 25 cases involved swimming, rowing, cycling, and canoeing. Seven of the athletes with these blood anomalies won gold medals at the Sydney Olympics, and several others won silver and bronze medals (see Chiusano 2000). The results were later confirmed by a commission of experts set up by the Turin Prosecutor Raffaele Guariniello, which reanalyzed 250 of the 538 samples and found 43 subjects with GH/IGF-1 anomalies (Müller et al. 2002; see also Toti 2002 and Donati 2012: 211–213 and 219–223).

As GH can be used in many different sports disciplines, a conservative assumption would be to hypothesize that it is used as least as frequently as blood-boosting EPO, the main hormone detected by CVD in the category of peptide hormones, growth factors, and other related substances, which is attractive only for the athletes of endurance disciplines. As shown in Table 2.11, EPO was detected in 2.82 % of CVD's 2010 and 2011 anti-doping tests corresponding to 8,392 athletes using that drug and 1,116,501 doping doses of 200 IU or 1 mcg each. On the basis of such data, we could conservatively assume that athletes also use a comparable amount of GH doses.

Other data collected by CVD also suggests the extensive misuse, presumably for doping purposes, of gonadorelin, which is also included in the classes of peptide hormones, growth factors, and related substances. Gonadorelin is a hormone of very limited therapeutic use, capable of freeing chorionic gonadotrophin and thus stimulating the endogenous production of testosterone with the related anabolic effects. Until 2008 it could not be detected in anti-doping tests. In 2008 Cologne anti-doping laboratory validated a method for the detection of gonadorelin from urine samples (e.g., Thomas et al. 2008). However, the analysis for gonadorelin is not automatically included in the standard screening procedures; it is an additional analysis that has to be requested by the federations or the NADOs. As of December 2012, there had been no positive test yet for gonadorelin in Italy (Ministero della Salute and Istituto Superiore di Sanità 2012) or Germany (Geyer 2012, personal communication).

Through Federfarma, Italy's federation of pharmacies, CVD collected data about 2009 gonadorelin pharmacy sales from 16,669 pharmacies corresponding to 96.7 % of all Italian pharmacies. These reported selling 101,310 packages of gonadorelin.<sup>40</sup> Whereas there was considerable difference in the dosages contained in different types of packaging, each package contained on average 5.75 doses of 1.2 mg of gonadorelin. The data reveal gross differences in the territorial distribution of sales, which cannot be justified on the basis of gonadorelin therapeutic use. As shown in Table 2.16, the provinces of Novara (1,184), Ferrara (669), Salerno (561), Caltanissetta (949), and Palermo (434) and the whole region of Calabria (763) reported very high sales per 100,000 inhabitants. Leaving aside these provinces and the respective regions, the sales ranged from a maximum of 1.3 packages per 100,000 in Umbria to 134 in Friuli. Sometimes the differences between neighboring provincial and regional contexts are striking. Whereas 669 gonadorelin packages per 100,000 inhabitants were sold in Ferrara province, the neighboring provinces of Bologna and Modena recorded rates of 1 and 10 per 100,000, respectively. Likewise, Calabria reported 792.5 packages sold per 100,000 inhabitants and the neighboring region of Apulia 3.4 per 100,000.

Given gonadorelin's very high price, the "aberrant" provinces and regions report much higher expenditures than the rest. Although they account only for 9 % of the total population, their share of gonadorelin pharmacy sales and expenditures in 2009 was about 35 %. If we apply the average rate of 119.4 packages of gonadorelin sold per 100,000 inhabitants to these provinces and region and then subtract the results from the packages effectively sold, we come to the conclusion that 24,408 packages at a value of over eight million euro were abnormally sold in these provinces and region, corresponding to 24 % of the packages sold in all of Italy and 30 % of the total market value, respectively. Thus, we can hypothesize that about a quarter of annual gonadorelin sales is diverted for nontherapeutic, most probably doping purposes.

In short, we do not claim to have ironclad bases for all our assumptions, and we are aware that our model underestimates the consumption of some substances and sets of users. Nonetheless, we believe that this first estimate of the size and the different shares of the Italian market for doping products may provide relevant insights to policy-makers. In Italy, the problem of doping is still largely conceptualized as a problem of the elite sports world and, except for a few projects such as the Palestra Sicura project mentioned earlier, most resources are still focused on the prevention and control of doping in sports and particularly in elite sports. One just has to consider the number of annual tests carried out by CONI (approximately 10,000 for about 10,000 super elite athletes) with those conducted by CVD (on average 1,313 between 2006 and 2010), even though the latter targets a much wider, albeit not precisely determined, number of athletes. By singling out the users who consume doping products more abundantly, namely, the body-builders, our estimate can help (re-)focus resources on this rather neglected group of users who are likely to suffer most harm. "What is at stake," Turin Prosecutor Guariniello (2011) pointed out "is not only protecting the health of top athletes, of the privileged individuals that make up the sporting élite. What is at stake is first and foremost protecting the health of the many people, young and not so young, who engage in any sport or go to fitness clubs."

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<sup>40</sup> Pharmaceutical companies also sell gonadorelin directly to hospitals and other health care centers, but CVD collected no data on these sales.

**Table 2.16** Gonadorelin pharmacy sales in Italian regions and selected provinces in 2009

Region/province	Inhabitants	Packages sold	Total value	Packages sold per 100,000	Total value per 100,000
Piedmont	4,432,571	28,178	7,342,211	635.7	165,642
Novara province	343,040	4,063	1,113,759	1,184.4	324,673
Aosta Valley	127,065	28	8,106	22.0	6,379
Trentino Alto Adige	1,018,657	97	26,557	9.5	2,607
Venetium	4,885,548	5,675	1,661,377	116.2	34,006
Friuli	1,230,936	1,645	507,734	133.6	41,248
Liguria	1,615,064	814	235,196	50.4	14,563
Emilia Romagna	4,337,979	2,942	758,387	67.8	17,482
Ferrara province	357,980	2,396	623,474	669.3	174,164
Tuscany	3,707,818	851	203,713	23.0	5,494
Umbria	894,222	12	1,576	1.3	176
Marche	1,569,578	867	242,723	55.2	15,464
Latum	5,626,710	872	233,825	15.5	4,156
Abruzzo	1,334,675	42	5,211	3.1	390
Molise	320,795	401	147,955	125.0	46,121
Campania	5,812,962	12,311	2,921,818	211.8	50,268
Salerno province	1,106,099	6,207	1,508,804	561.2	136,408
Apulia	4,079,702	157	35,247	3.4	864
Basilicata	590,601	270	89,674	45.7	15,184
Calabria	2,008,709	15,317	4,297,389	762.5	213,938
Cosenza province	733,508	7,049	2,024,430	961.0	275,993
Sicilia	5,037,799	8,542	2,266,027	169.6	44,980



Caltanissetta province	272,289	2,583	748,339	948.6	274,833
Palermo province	1,244,680	5,406	1,393,428	434.3	111,951
Sardegna	1,671,001	431	78,859	25.8	4,719
Total	60,045,068	101,310	26,727,207	168.7	44,512
Selected provinces and region	5,332,797 (8.9 %)	35,972 (35.5 %)	9,685,193 (36.2 %)	674.5	181,616
Rest of country	54,712,271	65,338	17,042,014	119.4	31,148
Hypothetical sales in selected provinces and region at average rate	5,332,797	11,564	1,661,081	119.4	31,148
Difference between effective and hypothetical sales	n.a.	24,408 (24.1 %)	8,024,112 (30.0 %)	n.a.	n.a.

Source: CVD (2010) and Istat, for the population data

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