Genetic aptitude correlation for specific sports modalities: bioethical considerations

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Abstract

A research project made public in 2013 proposed setting up a database to study youth between 8 and 18 years age, aiming to correlate the presence of certain genes with aptitude for specific sports modalities. This news gave rise to certain discussions regarding the velocity of scientific advance and the time needed for reflection on its implications in ethical terms, in order to detect in advance any possible ill effects for sports and for human dignity itself.

Keywords: Bioethics. Genetics. Athletes.

Resumo

Correlação genética de aptidão para modalidades esportivas específicas: considerações bioéticas

Um projeto de pesquisa tornado público em 2013 propõe a montagem de um banco de dados biológicos para estudo do DNA de jovens entre 8 e 18 anos, tendo como objetivo correlacionar a presença de alguns genes com a aptidão para modalidades esportivas específicas. Essa notícia serviu como ponto de partida para algumas considerações acerca das relações entre velocidade dos avanços científicos e o tempo necessário à reflexão sobre suas implicações em termos éticos, de modo a poder detectar antecipadamente possíveis malefícios ao esporte e à própria dignidade humana.

Palavras-chave: Bioética. Genética. Atletas.

Resumen

Correlación genética de aptitud para modalidades deportivas específicas: consideraciones bioéticas

Un proyecto de investigación que recientemente se hizo público, se propone montar una base de datos biológicos que permitiría el estudio del ADN de los jóvenes de entre 8 y 18 años, con el objetivo de correlacionar la presencia de algunos genes con la capacidad para deportes específicos. Esta noticia sirvió como punto de partida de algunas consideraciones sobre la relación entre la velocidad de los avances en la ciencia y el tiempo necesario para la reflexión ética sobre sus implicancias, con el fin de detectar a tiempo los posibles daños al deporte y a la misma dignidad humana.

Palabras-clave: Bioética. Genética. Atletas.

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The field of genetic engineering has come a long way since the first experiences of Gregor Mendel in the 19th century destined for the knowledge of heredity. Many innovations have come to be studied in this area, such as pharmacogenetics, paternity and criminal testing, gene therapy [1] and, more recently, work that associates DNA with sports performance. Among this work, we highlight a research project initiated in the year 2012 with the objective of assessing the frequency of the ACTN3 allele (encoding the alpha-actinin-3 protein), correlating it with sports performance of the athletes, as the association of its genetic variations with different sports modalities [2]. This study furnished subsidies so that, the following year, on August 23rd, 2013, in the city of Curitiba, the Olympic DNA project (o projeto DNA Olímpico) could be launched publically, managed by the Secretary of the State for Sports of Paraná (Secretaria de Estado do Esporte do Paraná), under the Paraná Institute of Sports Science (Instituto Paranaense de Ciência do Esporte) [3].

In the moment of the elaboration of this article, more detailed information about the development of the project is not available to the public. However, based on the declarations of the coordinator of the project, Antonio Carlos Dourado, on the date of the launching of Olympic DNA, we understand that the project consists of the construction of a biological database with the objective of studying the DNA of young people and, starting from this study, determine the physical aptitudes of each athlete. *With this we can direct them for specific training according to their genetic characteristics* [3]. In our contact with the other authors of the project, they only informed us that the studies done up until now were approved for ethics committees in research of some colleges in the state of Paraná, as well as having been approved the constitution of the biological databases, whose rigor was considered sufficient to ensure the physical and moral integrity of the participants of the sample.

Thereby, the present article shares only the data available on the Capes [2] platform and the information published about the project [3] in the local media to reflect in a broader way about some bioethical implications of the assembling of a biological database that would permit the study of DNA to identify the specific physical aptitudes.

Thus, if the potential benefits brought by genetic engineering are considerable, their bioethical conflicts are as well. It is essential to be open to all of these achievements, but what we cannot permit is that the accelerated process of the creation of new technologies, without the due risk assessments, makes it that the results would be applied, ignoring the consequences, including the moral [4]. Apart from this, it is worth noting, that genetics many times works with probabilities, and not with certainties.

Considering this, some of the questions proposed would be: what are the consequences for a young person, who in being submitted to the mapping of his DNA, would have "certainty" of his ability for sports? What is the real meaning of the use of DNA mapping in sports? To what extent is it possible to expose the human gene pool and pre-determine what genes alone do not express? Can the correlation between genetic data and physical ability provoke segregation between young athletes? What price is humanity willing to pay to enjoy the benefits of these technologies?

There are countless definitions for sports. From the baron of Coubertin, the great idealists of sports and the studies on the subject have been dedicated to defining it. In the second principle of Olympism, a comprehensive overarching and unanimous concept of sports, namely, *is a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind. Blending sport with culture and education, Olympism seeks to create a way of life based on the joy found in effort, the educational value of good example and respect for universal fundamental ethical principles* [5].

At this point, another question seems fitting: would it be ethically acceptable to determine who can or cannot devote himself to sport (professional or amateur) on the basis of only the genetic study in this individual? Among so many other questions, those which we have just listed, for being fundamental in guiding the bioethical discussion with respect to the correlation between genetic data and physical aptitude of the individual, they will be discussed in this article. To guide the analysis, we take as a focus the aspects still preliminary of the project called Olympic DNA [2,3], without deterring specifically from its propositions. The bioethical considerations were noted with the support of articles published in national periodicals, and also with the comparison, cross-referencing, collection, analysis of productions in philosophy, literature and medicine on the broader issue surrounding the problem.

Results and Discussion

The Olympic DNA Project

We adore perfection because we can't have it; it would disgust us if we had it. Perfect is inhuman, because human is imperfect.
Bernardo Soares [6].

The second semester of 2013 was marked by the launching of an initiative in the area of genetics that could interfere with the direction of the course of sports: the Olympic DNA project. The Paraná government, through the coordination of the Paraná Institute of Science of Sport and the financial support of the Araucária foundation (Fundação Araucária), developed the project, which consisted of creating a biological database for the study of DNA [1] of young people from 8 to 18 [7] with the purpose, among others, to correlate the physical aptitudes of each athlete in order to refer him to the sport in which he would obtain the highest performance [1].

The so-called athletes of high *performance* (term in English, formed by the prefix of Latin origin *per* – "totality" or "intensity" – more the noun *form* – "form") present specific genetic characteristics that contribute to the maximum efficiency in sports. Genetic studies relate 23 genes capable of influencing the phenotype of resistance [8], of which the Olympic DNA project focuses on two, specifically related to physical *performance*: the alpha actinic protein-3 (ACTN3) and the angiotensina enzyme convertor (ACE) [7]. The chance of a person possessing the reference for these 23 genes is extremely low, around 8.2×10^{-14}%. Even if this possibility presented itself, the complex interaction between the genes and the environment would not result in the expected phenotype expression, since this expression depends on the time of exposure of the gene to the stimulation of training [8].

In terms of technological advancement, such news gives an air of celebration and glamour to more new knowledge that the human mind was able to reach. It is great, the fascinatingly corrosive power that the incessant search of innovations exercises over human thought, given the disproportionate velocity between the rapid succession of the discoveries and time for the ethical reflection that these discoveries require [4]. In general, we tend to accept all of the "advances" that arise, especially when related to health, so that we always wait for the novelty, for the new cure, for the fastest technique. It is rare to stop to question the implications of these advances in the quality of life of human beings [9]. In other words, it is indispensable to ponder how far to advance, entering the ethical uncertainties of the genetic myth presented to us.

Why the bioethical concern?

In doing that which I want to do, I have done so many things I did not want to do. The act has not been pure, for I have left some traces.
Emmanuel Lévinas [10].

If, for a moment, we take for the counter-argument that, facing so many other bigger problems, it is useless for bioethics to occupy the discussion of the genetic techniques in sports, we are reminded of the words of The President's Council on Bioethics: *...Many aspects of human life are indeed more significant or more worth worrying about than athletics. Nevertheless, if one is interested not only in combating human misery but also in promoting human excellence, the world of sport is an extremely useful case study* [11]. Thus, discussing the genetic correlation of the physical aptitudes of each athlete, it is much more than stopping at the simple discussion of sports performance; it implies the reflection of the concept of "evolution" itself and the notion of respect for human dignity [12].

In this context, it is pointed out that the social programs and projects are fundamental in the construction of citizenship, in the creation of opportunities for children and excluded young people, thus opening a perspective of a better future. It makes it possible for children and young people experience sports and pedagogical activities, have access to balanced nutrition and, above all, enjoy the right to be able to play and have fun, to socialize with the other children, creating bonds of friendship, as well as push them away from drugs and make them aware of their danger, are some of the objectives of the social projects offered by governments and institutions. In other words, does excluding the young people, for physical or genetic disabilities, not mean to preclude a great project of socialization and social life? What are the real objectives of disseminating a sport practice: to distribute medallions or to make citizens aware of their functions for the proper functioning of the social gear? [13].

Conducting studies focused on the related findings to DNA can bring benefits, but our concern is not in the fact that the possible good results are always quickly identified, whereas the possible ethical and social problems resulting from biotechnology –

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more precisely, in this case, the genetic correlation of the physical aptitudes – are detected for the long term, being able to transpose the initial limits and objectives of the action promoted [12].

There is a central question to be raised: when the harm is identified, will there be time to repair it? Usually, ethical conflicts are perceived after the consequences of an act or when someone or some situation fails to comply with consensual ethical notions in a certain social environment. Thus, the ethical discussion is restricted, most of the time, to resolve conflicts already installed. Therefore, our objective, with this article, is to instigate a reflection on the acts, before their consequences reveal themselves and are deemed impossible to repair [14].

The main space that society grants to bioethics is referred to as its deontological way, prescriptively, and not the reflective proposals, that show us that balance, in the list of the related functions of human life, is fundamental to maintain the excellence in relation with the environment, with others and with ourselves. Ethics cannot be seen as a set of punitive laws, which serve to patch up the damage already done, going beyond, reflection should be brought to the light before the implementation of the action [14].

The loss of meaning

The perfection of proper conduct consists of maintaining each one to his dignity without harming the freedom of others.
Voltaire [15].

What defines us? What makes us human? What is essential to sport? Could the manipulation of genetic material from sportsmen be used for other purposes? Could there be interests of the pharmaceutical industries when they offer products that improve *performance*? Keeping in mind these questions will help to guide ethical reflection on the subject. What matters is what defines us in general, our differences and, by consequence, alterity as well. To define ourselves simply as "human beings" is an abstraction: it does not satisfy us. The big problem is in that this is a matter of quality, which is found less and less in our society. We live in a place in which we are identified by our taxpayer identification number (Cadastro de Pessoa Física - CPF), measured by purchasing power and embodied in statistics; that is, the value that defines us is subsumed in parameters conditioned by the quantity, parameters that ignore the intrinsic differences of each arising from our unique qualities. It is in this great contradiction about the human essence facing sports [14] and the possibility to genetically identify the physical aptitudes for sports.

When "sports" (and here the quotations are justified by non-correspondence between the first meaning of sports and what will be outlined next) is the fruit of this that comes from the sense that we live in a post-modern world, also losing its essence and summing up the victory at any cost, to the number of medals or profits earned. *Fair play* (overcoming physical and psychological limits, healthy competition, etc.) is lost. It loses meaning. And, when meaning for doing is lost, everything is lost [14].

In sports, *it is possible to perceive the development of socio-affective relationships, communicability, and sociability, socially adjusting this man to the environment in which he lives* [16]. Sociability, that is, the exchange of experiences, enriches our lives, making us see beyond ourselves. Helping someone, challenging limits, overcoming obstacles, are some of the events experienced during sports. Yet, unfortunately, in many urban centers, such experiences are becoming increasingly rare, due to several factors: violence, lack of adequate space, child or adolescent labor, as well as the presence of a virtual world, that keeps children from sports to leave them at the computer for hours, entertained with games, social networks and relationship sites, in such a way that *in times of cultural crises, the image of man is the first to be shaken. Man feels lost and in danger* [17].

Such values can construct as much as deconstruct the human being for a life in society. Beresford [18] reminds us that the same thing, the same situation can be good for one person and bad for another. Wishing excessively for a victory, harming another in order to get ahead in the game, lying to win a game, are situations that are constructing a series of disvalues, such as dishonesty, greed, individualism. Disvalues that end up distorting the young people for the world. In perceiving that they gain *an advantage* by being dishonest, violent or individualistic, these same methods are applied in their social lives. Even if in the beginning we do not gain anything for being honest, in a certain way, not being violent in a game, *we know that we should do good, even if it is with a disadvantage* [18]. Only then, will we give meaning to our words in referring to values: when we incorporate them into our lives, when they are a part of our being, anywhere we are. Only then will we be successful in educating our young people about the values that guide the society and the world as a whole.

Thus, it would be fitting to question: when we say that the genetic code of individual brings him advantages over the other, would we not be getting dangerously close to segregation, of eugenics? Would it not mean teaching him that the genetic code permits him behaviors that in another would be condemned? Accepting uncritically the identification of ability for specific sports from genetic data only confirms, once again, the supremacy of the quantity over quality. It reduces the grandeur of sport to a mere dispute (without much grace) based on the attempt to create predetermined heroes. With this the true purpose of sports is forgotten. Is everything now reduced to the number of medals and the financial spins behind the competitions? [19] Sports and the natural course of disputes are priceless, because they cannot be substituted for an equivalent; therefore, they have dignity, as Kant says, as quoted by Rodrigues [20].

The baron educator Coubertin, a defender of sports education, employed the term "olympism" to designate a set of values that contribute to the betterment of humanity, values achieved through sports [21]. To imagine that the values would be those that want to promote the betterment improvement of humanity, it is necessary to start from a lower level, daily, which, after all, is an aspect of all that we usually call "humanity", but, being familiar, allows better comprehension.

If someone had a son who practiced sports, would it be that it is so important that he would be in the type of sport in which he would have the most physical efficiency, how many medals he would win or how much money he could earn with his performance? Or, if a person, to be a great fan of a sports team, only needed to know the number of favorable results of his or her team or which athletes of this team are invincible for having been graced by genetics with a determined chromosomal map? These may seem like absurd and cruel questions, because they do not take into consideration what really matters. And like this they are for a single reason: they reflect the loss of meaning.

Therefore, is perceived that, to ponder about the impasses of everyday life, it is important to not forget what really matters, considering the issue in its broadest dimension, as an emerging global problem. What are sports but the celebration of differences, the active process of complementation of individuals in search for balance between body and mind? The meaning of these activities is not the same as an unbridled unrestrained a frantic search for perfection, and much less the modest amount of square meters or square centimeters of the sponsorship in the athletes' T-shirts or the *outdoors* [14].

Limits

In everything, there is a limit that is dangerous to cross, because, once crossed, there is no process for turning back.
Fiódor Dostoiévski [22].

To what extent can we expose the gene pool of a human being and still consider ourselves capable of determining what the genes alone do not determine? For, as with genes related to diseases, having or not having a determined genetic sequence does determine whether or not the individual has the corresponding characteristic, but only that he is predisposed to it. Each one of us is made up of complex interactions between genetics and the physical and social environment. Soon, establishing who will be good at a particular sport modality or not, based on mere genetic probabilities can lead to unnecessary stress, and to unfounded segregations. Yet it can create the illusion that it is possible to eliminate all the imponderable mystery of sports competitions, reducing the probability of the human being to be considered fit and to feel happy by practicing a certain sport modality. Thus, the grandeur will be reduced to a dull dispute, based on trying to create pre-determined heroes [19].

Genetic research is very important in all areas of science, but the fine line between the findings and genetic terrorism requires constant ethical reflection about the actions to take, and not an afterthought in order to placate its consequences. In addition, there is still the fact that there are few professionals capable of dealing with this information and properly passing it on to the general population. It is not necessary to follow with the absurd idea of "disposal of the imperfect", mainly because there is no such thing as good genes and bad genes, only mutations responsible for good or bad expressions, as much as they interact with the environment [19].

On this point, another question arises: what is "good"? Having genes that may enable excellence in some sport or in the practice of sports itself as a form of self-knowledge and overcoming limits, sports that, through adequate investment, also bring good results? Again, what is wanted to be stimulated is the reflection about a social belief in "rapid" and "efficient" results, detrimental to other people; and as the preference to invest only in those that "are worth it", as if the human function were to generate wealth profit. The process of dehuman-

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ization blinded by genetic myths of perfection is a frightening feature of our so-called "evolution" [19].

Eugenics

> *Now it is the genes that compose* [...] *our individual essence* [...] *to touch, to transform, to act on my genes is then,* [...] *to manipulate that which makes me me* [and] *to run the risk of transforming the human species* [...] *into an unknown species, monstrous, abnormal. That is how fears are manifested.*
> Lucien Sfez [23].

The term "eugenics" was originally created by Francis Galton in 1865. A relative of Charles Darwin, Galton did not accept the idea that humans were guided only by the blind force of natural selection, considering that it was necessary to interfere artificially in human beings as a way of promoting physical and moral progress in the future [24]. In the century that followed, the idea that eugenics oscillated between peak and decline, reified by the fallacious notion of "race", was used to justify all types of atrocities.

It is clear that the projects for the genetic identification of aptitude for specific sports modalities are not meant to select the genes before the birth of the child, and much less bring with them the brutality of the eugenics movements that have marked recent history, as the Nazi conception guided by Hitler [25]. However, the bias of eugenics can permeate the discourse that it justifies, especially when trying to select athletes who are "genetically gifted", and to the detriment of those whose genome did not reveal prove themselves to be as adequate for the objectives of sports.

So once again it is seeking to separate what is identified as "fragile" or "imperfect" in the human species. It is discourse, not of intolerance, because it is at some moment restricting access of any person to sports, but of tolerance, that is: I "allow" the existence of another in his difference and fragility, because tolerance is the reason of the stronger one [26], but also limits his chances of competing in certain sports, a certain way, in case he or she does not have genes that could lead to probable victories and profits. In other words, tolerance is better than intolerance, the latter being inadmissible. However, could it be that this is the best way to establish respect and a social life with someone who is different? And in this sense the idea of hospitality is established, since tolerance is nothing more than the reason of the stronger one than at any time will be removed, because it is not welcome. Hospitality, yes, is housing the foreigner without asking who he is or what he came for [26]. It is the acceptance that the human being can have defects and that the genes may not translate into the pre-determined characteristics, because they depend on the action of the environment, but even so, it is preferred to invest in the person with the greatest chance of having the best *performance* in a certain sport.

This argument reinforces the core of the ideas of discrimination and segregation, which are the basis of concerns with respect to the genetic identification of the ability for specific sports modalities, presented in this text. It allows uncritically the spreading of casting doubts on what is put at risk by applying the "good news" that biotechnology offers us, without understanding its consequences. We may be creating a "brave new world," in which – possibly – there is a lack of space for ethics, as well as well as deepening the understanding of the meaning of our own humanity.

Final considerations

Taking as an the example the genetic identification of aptitude for specific sports modalities, this article aimed to raise some ethical issues, ensuring the possibility of previously pondering about the possible social and environmental impacts of the use of the genetic findings. There are few doubts that this identification would improve human abilities in sports, which would probably lead to more sports titles and records. However, human dignity, the pleasure of sports practice and the accessibility of all to the competitions can be left in second place, in that the focus is strictly on the cold numbers of victories or in the financial amount collect in sponsorships and awards.

As for the reflection proposed in the introduction of which is the concept of "evolution" today, it is concluded, employing the words of Sánchez Meca based on Nietzsche's thought, that *There is no humanity like the unitary totality, there is no evolution of humanity like a continual process that progresses uniformly. The evolution of every culture is frequently interrupted with breaks, discontinuities, setbacks, in a becoming that does not pursue any predetermined object or obey any metaphysical character of purpose* [27]. That is, a charge of more genetic control, for profit, victories or decorations, is not consistent with the concept of evolution. Progress, in our view, will be much more associated with appreciating and accepting the other in his differences. Thus, when it

is more precisely about sports, the "profits, victories and decorations" can be present, not as an end, but as a consequence.

Thus, previously discussing the genetic identification of the ability for specific sports modalities allows for warning of possible harm to sportsmen, to sports and to all of society, something more prudent than looking for ethical reflection *a posteriori*, as a way of judging errors already committed and, perhaps, with irreparable consequences.

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