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Why Do Black Athletes Dominate?

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Abstract
There is no racial superiority. Since indigenous Africans and their descendants beyond its borders have black skin, it may create the impression that the dominance of black athletes in certain sports is related to their racial or ethnic origin. In fact, the emergence of black skin has another cause and is not related to a person's physical abilities. The reason for the dominance of black athletes is related to the features of their bodies' heat conductivity, namely the ability to timely and effectively dissipate excess heat outside the organism. The level of human body heat conductivity is not related to skin color, and it is determined by the ability of the cells to effectively dissipate excess metabolic heat into the intercellular space, which depends on the amount of chromosomal heterochromatin regions.

Keywords: Human Bbody Heat Conductivity, Chromosomal Heterochromatic Regions, Cell Hermoregulation, Black Athletes' Dominance

1. Introduction

More and more countries situated at southern latitudes have started taking part in the world sport movement lately. The most notable in this process is that, natives of Africa achieve great success in sports, requiring effective heat loss (football, professional boxing, marathon race etc.). While sportsmen from northern latitudes prevail in water and winter sports and in mountaineering.

We have already discussed the question of why humans are better endurance runners than any other animals [1]. Now we decided to address this problem in a narrower sense, namely, why certain individuals in a population, particularly those with black skin colors, dominate in some types of sports. Thus, recently, only on the YouTube platform, dozens of publications have appeared about the dominance of black athletes, which were accompanied by tens of thousands of comments. At the same time, both the authors of the publications and the commentators pointed to possible reasons for this phenomenon in the world of sports in general, without ideological, racist, or other biases. In particular, they referred to environment, culture and social motivation, evolution, genetics, epigenetics and opportunity as possible causes of this phenomenon. In other words, this phenomenon in the world of sports appears as a mix of history, opportunity, culture, environment, and genetics working together.

We were unable to find targeted scientific studies dedicated to the reason for the dominance of athletes in certain sports precisely because of the color of their skin. Nevertheless, there is no doubt that it is necessary to pay attention to the heredity of athletes who demonstrate outstanding performance in certain sports (for example, marathon running, professional boxing, football), where individuals from the African continent indeed dominate. A vivid example of this can be how Kenya and Ethiopia disproportionately dominate long distance running. As is known, these two African countries are located where modern humans originated.

Without questioning the role of the aforementioned possible causes in the dominance of athletes with black skin in certain sports, we would like to point out another possible factor that has not yet been taken seriously [2,3]. Namely, the possible role of the amount of chromosomal heterochromatin regions in the genome as an important hereditary factor, the phenotypic manifestation of which is the heat conductivity of the human body.

2. Facts and Their Comments

Our hypothesis about the possible role of chromosomal heterochromatin regions (HRs), in particular, Q-heterochromatin regions (Q-HRs), which are present only in the genomes of three higher primates (*Homo sapiens, Gorilla gorilla, and Pan troglodytes*) in the dominance of athletes in certain sports is based on the results of comparative cytogenetic studies of indigenous peoples of Africa and Eurasia. Despite the fact that chromosomal Q-HRs exist in the genome of three higher primates, their broad quantitative variability is only inherent in human populations [4-14].

Two facts are related to the question discussed here:

1) Populations of humans permanently living in different climatic and geographical conditions differ in the number of chromosomal Q-HRs, and this circumstance is not related to their racial or ethnic characteristics. In particular, it turned out that the number of Q-HRs depends on the geographical latitude and altitude above sea level of the place of permanent residence of the population (Figgure 1);

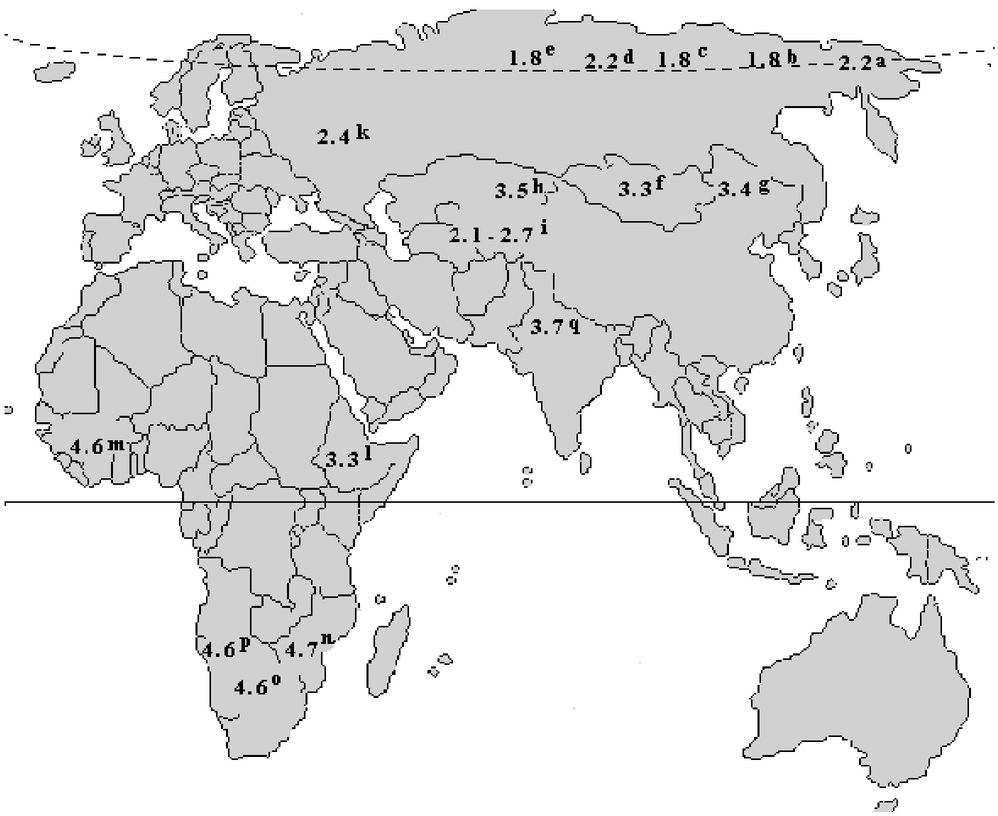

Figure 1: The values of the mean number of chromosomal Q-HRs, calculated per individual, in populations permanently living in different climatic and geographical zones of the Old World (a-Chukchi, b-Nenets, c-Selkups, d-Khanty, e-Yakuts, f-Mongols, g-Chinese, h-Kazakhs, i-Kyrgyz (highlanders of Pamir and Tien Shan), k-Russians, l-Ethiopians (Ethiopian Highlands), m-Negroes from Guinea-Bissau, n-Negroes from Mozambique, o-Negroes from Zimbabwe, p-Negroes from Angola, q-Indians from northern India.

2) Individuals in a population differ from each other in the number of Q-HRs in the karyotype. The fact is that there are individuals in the population with different amounts of chromosomal Q-HRs, the number of which ranges from complete absence to ten and does not change during ontogeny (Table 1).

Number of Q-HRs	I	II	III	IV	V	VI	VII
0	57	58	94	24	10	1	
1	116	123	221	80	13	1	1
2	141	175	363	141	51	11	21
3	56	99	242	111	85	8	54
4	13	51	137	65	58	13	78
5	2	14	50	23	49	9	79
6			13	5	24	2	55
7			2		3	2	29

8					4	1	6
9							3
							1
Mean number of Q-HRs	1.63	2.01	2.26	2.44	3.52	3.71	4.68

I: Mountaineers (n = 385); II: Northern Mongoloids (n = 520); III:Highland Mongoloids (n = 1122); IV: Russians in Kyrgyzstan (n = 449); V: Steppe Mongoloids (n = 297); VI: Indians of northern India (n = 48); VII: Lowland Negroids (n = 327) [Ibraimov, 2020].

Table 1: The distribution and mean number of chromosomal Q-HRs per individual in certain samples of Eurasian and African individuals.

In the process of studying the variability of chromosomal Q-HRs in human populations living permanently in different climatic and geographic conditions of Eurasia and Africa, as well as in newcomers, who have successfully adapted to some extreme natural conditions (high altitudes and the Far North of Eastern Siberia), the data were obtained that the amount of this material in the genome may be important for human adaptation. In particular, it turned out that in the karyotype of mountaineers the number of chromosomal Q-HRs was significantly lower than in the control sample and was close to that of the natives of high-altitude Pamir and Tien-Shan. The same results were obtained in a comparative study of newcomers (oil borers working in the open air in the oil and gas fields of the Yamal Peninsula of Eastern Siberia) who have been working in the harsh climatic conditions of the Far North, the indigenous inhabitants of Siberia and their children [13,14].

Overheating of the body, which must be eliminated in a timely and effective manner to avoid the dangerous effects of high temperature is an important factor for achieving good results in sports. It is known that for this purpose a man uses two ways of heat dissipation: evaporation of moisture from the body surface and respiratory tract. It is believed that this was facilitated by the disappearance of wool and the emergence of sweat glands for intense perspiration, which man acquired when he adapted to the hot and dry climate of the African savannah. Humans still use the characteristic of theirs for persistence hunting, like wolves. It is not by chance that endurance hunting is carried out at the hottest time of the day, thus taking advantage of the human advantage in terms of thermoregulation (for details see [1,15-17]).

Therefore, we believe that humans must possess an additional, perhaps inherent only to the species H. sapiens means of combating overheating of the organism. By this, we mean one poorly studied physical peculiarity of the human body, namely its heat-conducting ability. We came to this conclusion after many years of research on one of the forms of hereditary variability -- polymorphism of heterochromatic regions of chromosomes in human populations [18,26].

We believe that chromosomal HRs are involved in maintaining temperature homeostasis at the level of individual cells (cell thermoregulation) [18]. The essence of the cell thermoregulation (CT) hypothesis is the elimination of the temperature difference between the nucleus and cytoplasm with the help of a dense layer of condensed chromatin. The condensed chromatin (CC), the densest structure in an interphase cell, localized between the nucleus and cytoplasm, is made of chromosomal HRs. The density of CC packing, accordingly, its heat conductivity, depends on the quantity of chromosomal HRs in its structure, which can affect its heat-conducting ability [19-21].

It has been experimentally shown that the effect of CT can be indirectly assessed on the level of the whole organism as body heat conductivity (BHC). In particular, the amount of chromosomal Q-HRs influence on the level of the human BHC. In other words, there are some parallels in the distribution of the number of chromosomal Q-HRs and variability of human BHC (for details see [22-26]. Indeed, a sportsman with high BHC cannot make much progress in mountaineering and water sports because their body cools rapidly. However, this sportsman can be more successful in sports, which require effective heat-loss.

Thus, we came to the conclusion that it is not about skin color, but about the BHC, that is, the athlete's ability to timely and effectively dissipate excess heat outside the body. The level of BHC does not depend on skin color, but is determined by the ability of cells to efficiently remove excess metabolic heat into the intercellular space, which depends on the number of chromosomal HRs in the CC around the nucleus. If things are this way, then we have the right to expect that athletes with outstanding abilities in sports where it is important to timely dissipate excess heat outside the body should possess a high BHC.

3. Discussion

Chromosomal Q-HRs, together with C-HRs, which are present in the genome of all higher eukaryotes, consist of so-called redundant, non-coding DNA and make up about 20% of the DNA in the human genome. The biological role not only of chromosomal Q-HRs in humans, but of the heterochromatic part of the genome of higher eukaryotes in general, is still unknown, although there are many hypotheses. Our task did not include analyzing existing hypotheses and was limited to the scope of our own ideas about the possible role of chromosomal HRs concerning the question, why do black athletes dominate?

Historically, it so happened that in the process of adapting modern humans to the climate of East Africa, individuals with a larger number of chromosomal Q-HRs had an advantage, and accordingly high BHC, capable of effectively dissipating excess heat outside the body [1,24-26]. Such a physical characteristic of the body has been a great benefit to athletes of African origin in achieving outstanding results in sports that require effective and rapid removal of excess heat outside the body.

However, all this does not mean that athletes from temperate zones or high altitudes are incapable of achieving high results in sports dominated by athletes of African origin. As can be seen from Table 1, the number of chromosomal Q-HRs in individuals in populations living in low-altitude zones of subequatorial Africa ranges from 1 to 10, with an average of 4.7. Meanwhile, for example, among Russians, the number of Q-HRs in individuals in the population ranges from none to six, with an average of 2.4. Nevertheless, there are Russians with more than five Q-HRs, and under favorable circumstances, they can achieve results close to those of African athletes. The other matter is that the number of individuals with more than five Q-HRs makes up only a few percent of the population.

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Conflicts of Interest
None.

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Statement of Consent/Ethical Approval
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