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Mini Review

Coupling of Submissiveness Trait with Higher Intelligence in Humans but not in Non-Human Primates via Low Activity Dopamine Beta Hydroxylase

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Abstract

Dopamine beta hydroxylase (DBH) catalyzes the conversion of the catecholamine neurotransmitter dopamine to norepinephrine, and its activity varies as a function of genetics. Dopaminergic neural tissue has roles in a wide variety of traits. In humans, submissiveness trait in tandem with higher intelligence would appear to be linked with decreased dopamine beta hydroxylase activity while in non-human primates and other animals submissiveness trait and lower intelligence are in tandem with higher DBH activity. This apparent state makes clear how pivotal an event was the mutation that caused low activity DBH: the higher intelligence it afforded animals gave them a survival advantage and gave them dominance over other animals while in humans the increased dopamine acting in a large cerebrum caused the evolution of a human ability to see the wisdom of restraint and control of aggression and cooperation instead of domination.

Introduction

Submissiveness, along with narcissism, perfectionism and aggression, in humans can be posited to be an important aspect of the human character and to be caused by a varying diminishment of aggression trait.[1] Submissiveness in animals is related to decreased dopaminergic activity [2,3] while in humans submissiveness is related to increased dopaminergic activity[4,5]. A variety of dopamine related enzymes, including receptors and transporters, have been studied for a linkage with submissiveness trait, but the enzyme dopamine beta hydroxylase, converting dopamine to norepinephrine, has a pivotal role by virtue of determining the dopamine: norepinephrine ratio.

Though DBH hasn't been studied to determine its effects on submissiveness trait in humans or non-human primates and other animals, it is likely pivotal in stratifying this trait such that low activity DBH causes submissiveness trait in humans and dominance trait in non-human primates. And, because dopaminergic activity is correlated with genetic intelligence [6-9], low DBH likely causes higher genetic intelligence. Therefore, low activity DBH likely causes higher intelligence coupled with more submissive personality in humans but higher intelligence coupled with dominance personality in non-human primates.

Discussion and Conclusions

Since submissiveness and lesser intelligence in non-human primates are associated with decreased dopaminergic activity and therefore increased DBH, it makes evolutionary sense that DBH is universally of much lower activity in non-human primates than in humans. The only primate with a level even close to as high as humans is the gorilla, a primate whose size would make traits of behavior less relevant to survival. [10] It would make sense that the almost certainly increased survival of animals of low activity DBH would ensure that animals with lowest activity DBH would become the most prevalent.

So how is it that submissiveness and higher intelligence associated with low DBH are coupled in humans? DBH activity in humans varies as a genetic function. One single nucleotide

polymorphism, rs1611115, accounts for most of the variability in DBH activity, with C allele yielding increased DBH activity and T allele yielding decreased DBH activity. [11] Worldwide population frequency distributions of rs 1611115 vary with C, the high activity allele, being of the highest frequency. The Hapmap population demonstrating highest frequency (.36) of T, the low activity allele, is MEX, Mexican-Americans living in Los Angeles, California [12].

And looking at this population in some detail shows much about the possible effects of low DBH on culture. Submissiveness personality trait is evidenced by studies in Mexican-Americans which show their cultural values of cooperative and community orientation as opposed to competitive and aggressive orientation. [13-16] And further evidence supporting the linkage of low DBH with increased intelligence and submissiveness in humans is found in an exploration of the genetic source of the hapmap MEX population. Mexican-Americans in Los Angeles have been found to be an admixture of 50% Amerindian and 40% European. [17] The Amerindians of Mexico haplogroups are well studied, and they include the Y haplogroup M3(Q3) and mitoDNA haplogroup A, both of which are very common in indigenous people of Mexico and both of which are thought to have originated in the region of Siberia prior to the Bering Strait crossing. [18] So looking at some of the other indigenous populations that share those haplogroups can be enlightening: M3 is shared by the Buryats of Siberia, a group with the highest known frequency of ABO blood group B (.38). [19] And mitoDNA haplogroup A is found in Korean and Japanese groups [20] also carrying quite high frequencies of ABO blood group B. [21] Since DBH gene is in tight LD (linkage disequilibrium) with ABO gene [22], there is evidence that ABO group B is in LD with low activity DBH and further with low Persistence trait as well as higher impulsiveness trait and higher submissiveness trait [23]. Although M3 haplogroup, along with all haplogroups in the indigenous Americans, is linked with almost exclusively ABO blood group O [21], M3's origin in a high ABO blood group B cline occasions an opportunity for the low DBH allele to have been transmitted (via crossover at meiosis) to the small band of founders who carried both ABO blood group O and low activity DBH across the Bering Strait as well as traits of increased intelligence and increased submissiveness trait. And it is clear that hapmap MEX has remarkably high ABO O and remarkably high low activity DBH.

Besides this more specific evidence for the low DBH in MEX hapmap population originating in Siberian pre-Bering Strait populations, there is general logic in the European hapmap populations' tendancies toward lower frequencies of low activity DBH than Asian populations, and both European hapmap populations' and Asian hapmap populations' tendancies toward lower frequencies for low activity DBH than hapmap MEX [12], the implication being that the founders of Amerindian populations must have had a remarkably high frequency of low activity DBH (given that MEX's frequency would be approximately an average of that of Amerindians and Europeans). These Asian root populations for MEX must have had remarkably low DBH frequency and associated traits including personality traits as well as high genetic intelligence. Although IQ is only one measure of one part of overall intelligence, IQ as well as ABO blood groups B and O are higher in Asian populations compared with other hapmap populations.

Speaking to genetic penetrance, there is evidence that low DBH in Hapmap population MEX is showing other predictable phenotypes as well. High frequency of low activity DBH may be a cause of the Mexican-American Health Paradox, a name for the phenomenon whereby immigrants of Mexican-American status, even with lower socio-economic indicators, demonstrate better health indicators than their European American neighbors. [24,25] Further, Mexican-Americans born in Mexico have better health indicators than Mexican-Americans born in the USA. Since low activity DBH is associated with better health indicators than high activity DBH [26-30], this would explain the Mexican-American Health Paradox by virtue of Mexican-Americans' having much higher frequency of low activity DBH than European Americans and higher than second generation Mexican-Americans who presumably have a higher admixture of European American genetics.

Discussions of population trait and allele frequencies say little about any given individual but say a great deal about just that, populations. Can we see any population's traits' evolutionary meanings in the apparent contrast in the congruence of the role of higher dopamine activity, higher intelligence, and submissiveness in humans but not in non-human primates and other animals? The case of low DBH's conferring of higher intelligence and higher submissiveness in humans and of higher intelligence and higher dominance in non-human primates may be seen to illustrate the leap that nature made when humans evolved: this great leap forward whereby cooperativeness and self-effacement became a possible result of intelligence has set human potential apart from any other element of creation.

Conflict of Interests

None

Acknowledgements

None

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