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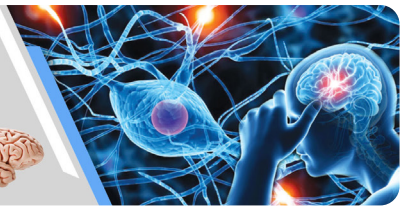

ABO Blood Groups Non-O Appear to Associate with Anterior Projecting Nasal Anatomy, Elevated Nasal Bridge and Nasal Septum Deviation

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Abstract

Nasal form shows variation between and among geographic populations. Embryology of anatomic structures suggests origins and interrelationships of the structures of the face and the functional thus clinical implications of that anatomy.

ABO blood groups are suggested to be correlated with nasal anatomy based on observations of nasal anatomy of individuals of known blood types. Studies have shown that anteriorly projecting nasal form is associated with large nasal septum and an obtuse cranial base angle as well as deviated nasal septum. Why ABO blood groups non-O would be associated with this anatomy is possibly traced to the initial H. Sapiens having both ABO A and obtuse cranial base angle. Other correlations are therefore unsurprising. Pituitary gland and hypothalamus are anatomically at the cranial base angle and appear to show variation linked to the angle and its correlates of nasal septal size and anterior projected nose and elevated nasal bridge. If the link between these anatomies and ABO blood group can be shown as significant, both anthropologic avenues of knowledge and future directions of human life can be enhanced.

Implications of this correlation are meaningful in both basic science research and in clinical medicine. A correlation of ABO blood group with anatomy opens a window into how and why there are differences in facial anatomy as well as what the differences signify about human health and well-being.

Keywords: ABO blood groups; Genetics; Nasal septum; Ontogeny; Aquiline

Introduction

Almost nothing is established with certainty about the basis of variation in facial features though much important work is being done in such fields as plastic surgery, dentistry, anthropology, embryology, genetics and ontogeny.

Geographic categories of humans across the globe demonstrate variations of configurations of facial features as to eye shape, mouth shape, nose shape and many other features, an effort called the study of physiognomy. Throughout history efforts have been made to understand these variations including ancient efforts to show that facial types correlate with character types and stereotypes of national and regional populations. For example, in remote history a high forehead signifying the individual as highly intelligent and other dubious hypotheses have been entertained and discarded.

Modern genetic studies are very slowly yielding some information about

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facial anatomy since the first human gene identified, the ABO blood group, was discovered over 100 years ago. Perhaps because this gene has a clearly understood inheritance and extensive data about how world populations stratify significantly and because the laboratory resources for ABO blood typing are widely available, much work continues to be done. A premise supporting the validity of this effort is that if individuals differ enough in ABO blood group to occasion a potentially life-threatening immune reaction between some types during transfusions, there may be a reason to think that ABO blood groups have widespread effects on physiology and anatomy. And in fact ABO blood group antigens are found in a widespread variety of cells types and not just blood cells thus supporting this possibility.

A Reasonable Conclusion

ABO non-O associates with larger nasal septum, nasal septal deviation and elevated nasal bridge. Inspection of individuals of varying ABO blood types suggests a more anteriorly projecting nasal region, this seen most clearly from profile views, but suggested as well from frontal aspect by a relatively elongated nose and nasal septal deviation visible in some frontal views in individuals of ABO non-O blood type [1]. The anteriorly projecting nasal region and elevated nasal bridge is most easily recognized in the classical Greek and Roman sculptures. Though it is recognized in varying degrees of prominence, more noticeable variants have been called aquiline or hawk noses because of a prominence to an anterior projecting bump and resultant inferior nose curvature inward.

There are geographic and ethnic differences in these anatomies with the more aquiline nose more often found in Caucasian and European populations and since ABO non-O and especially the ABO A blood groups are of higher frequency in Caucasian and European populations, population stratification could explain observations of ABO blood group correlations with these anatomic markers, but there are other explanations to consider which link these markers with the ABO blood groups [2,3].

First, genetic and biochemical and anatomic correlations are possible based on the anatomic proximity to the hypothalamic-pituitary-adrenal axis via the sphenoid-nasal septal proximity to the sphenoid sinus and the pituitary gland at the adjacent cranial base. Ontogeny studies demonstrate the embryologic origin of gonadotropin releasing hormone to be in the nasal placodes and the nasal epithelium. Migration from nasal epithelium via extracranial route via olfactory nerve to pituitary, hypothalamus and other brain regions follows. Adreno-corticotropic hormone and other pituitary products likely follow a similar ontogenic pattern. Pathway to adrenal and thyroid and other end organs via pituitary vascular route follows. In this way, at the adrenal medulla, the conversion of norepinephrine from central nervous system to epinephrine at adrenal gland occurs. The ABO blood group nexus is that ABO A and B are likely associated with higher levels of neurotransmitters norepinephrine and dopamine respectively. ABO A the most high frequency non-O ABO blood group has been associated in clinical studies with higher Dopamine Beta Hydroxylase (DBH) and thus higher norepinephrine, a state linked with higher Aggression trait in both animal and human studies. Additionally, populations with higher Aggression trait behaviors also have higher ABO A blood group frequency. So, since ABO non-O associates with higher levels of these neurotransmitters, the nasal connection with endocrinology and its links with ABO blood group specificities correlates with nasal septal anatomy and variation both by population stratification and via mendelian randomization genetically supported. That is, following the logic of mendelian randominzation: ABO A is associated with both high DBH gene activity and with chemical state of high pituitary secretion as evidenced by pituitary tumor propencity. Large nasal septal size is associated with pituitary secretion so ABO A is likely causally associated with large septal size and its anatomic correlates of projected anterior nose, elevated nasal bridge and deviated septum [4-7]. That being said, how the variation of the nasal septum size occasions variation in function in its production of pituitary and hypothalamic hormones is not clear. And how a correlation of nasal septal size with ABO blood type could translate to an ABO blood type variation in these pituitary endocrinologies is not clear, but there are some suggestive correlations as there has been found to be a variation in frequencies of pituitary tumors with variation in ABO blood types. ABO non-O is associated with pituitary tumor formation this suggesting the role of these blood types in stimulation of these pleni-potent pituitary cells [8-11].

Second, population variations in anatomic features of the aquiline or anteriorly projecting nasal region are well characterized. In those individuals with large nasal septum, the larger nasal septum is correlated with the more anteriorly projecting nasal region as well as a more obtuse cranial base angle, this state thought related to spatial relationships requirements in the cranial base and face ontogeny. The cranial base angle is created by the position of the sphenoid between the frontal and occipital bones. A more acute cranial base angle with accompanying less anterior nasal projection and more projection just below the nose is more associated with sub-Saharan African populations instead of European populations while the obtuse cranial base angle is found with the aquiline type facial profile [1,12]. Evolutionary correlations are suggested by this stratification of populations. If ABO A is the ancestral allele as is the consensus, it is not surprising that a projecting nasal region characterized by an obtuse cranial base angle is also the ancestral state in the cranial base angle and thus nasal projection anteriorly. This is demonstrated by the finding that the non-human primate

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ancestors closest to human are characterized by the obtuse cranial base angle. The ancestral state of the obtuse cranial base angle is also shown in studies of the fossil record. A reasonable conclusion is that since both ABO A and the obtuse cranial base angle are ancestral, ABO non-O is associated with the obtuse cranial base angle and resultant anteriorly projecting nasal region [1,12].

Future Work Indicated

Anatomic correlates of ABO blood groups yield useful information clinically since ABO O vs. ABO non-O evidence some variations in health risks. Laboratory performed blood typing in case of need for transfusion is the standard in identifying an individual's ABO blood type. But if laboratory results are not available, information including history and physical exam including anatomic markers is always helpful in patient care in such timely questions as risks of bleeding diatheses or thrombosis. ABO blood groups are most clearly associated with differential risks such as ABO O being more at risk for bleeding diatheses and ABO non-O for thrombosis.

More long-term risks associated with the ABO blood groups include higher pancreatic cancer risks with non-O blood groups. Higher peptic ulcer risks with ABO O is well documented as well though higher risk of stomach cancer with ABO non-O is noted. So anatomic clues to these blood types may be helpful in the absence of laboratory based ABO blood typing.

Other ABO blood group correlations include personality and behavior variation though consensus has not been reached. ABO non-O association with Aggression personality trait has some support in that high activity dopamine beta hydroxylase and thus high norepinephrine is in linkage disequilibrium with ABO A, this supporting empiric data that ABO A is associated with higher Aggression trait in populations.

So as more markers are data supported to differentiate ABO blood groups, evolutionary course is more clearly understood. This can only benefit all knowledge based conclusions about human status. Next step should be gathering of population data on ABO blood group and nasal anatomy. No studies have yet been published on this, but nearly 100 years ago, a study of ABO blood groups and physiognomy in a community in British Columbia Coastal Indians (First Peoples) was done. The author noted that individuals with ABO A blood types appeared more Caucasian in facial features though he didn't detail his criteria for the characterization of Caucasian facial features except to site the skin coloration as well as using the term facial features in general. Very high frequency of ABO O blood group in those who migrated across the Bering Strait some 10,000 years ago is noted in their descendants in modern times. Similar findings met the researcher of the study referenced from nearly 100 years ago, but it was known that some mixing of populations of high ABO A frequency such as Japanese and European with the British Columbia coastal Indians (First Peoples) was causing the findings of ABO A in the groups the researcher studied in British Columbia of 100 years ago. The researcher included photographs of a large group of these individuals thus allowing the modern day reader an assessment of facial physiognomy between different blood types. Inspection of these photographs being of lower resolution and mostly frontal views as they may be appears by inspection to support the current hypothesis above. Other studies of population surveys can be done looking for ABO blood group correlation with the markers of anteriorly projecting nasal region to include elevated nasal bridge as well as nasal septal deviation [13]. One would expect to find higher frequency of the aquiline type nose in European derived populations, but one would look for the specific correlation of ABO blood groups non-O with this anatomy within this population. It isn't clear if this correlation holds true for all geographic and ethnic populations or for just European derived populations.

An area for clinical use is in the care of nasal septal deviation. This is thought by workers in the field to be a correlate of nasal septal size and anteriorly projecting nasal region and obtuse cranial base angle. Nasal septal deviation is a common clinical finding with individuals sometimes presenting with symptoms such as respiratory deficits that are caused by this deviation of the septum. So much data has been studied on nasal septal deviation though no studies on ABO blood group correlations have been published though this would be a fruitful clinical area of investigation and would theoretically support the hypothesis of this article.

Conflict of interest statement

The author states that there are no conflicts of interest to declare.

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