

## Risk Factors of Microcephaly

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### Abstract

"Microcephaly may be genetic" as claimed by the Mayo Clinic online publication of causes for the disease. It is the objective of the current work to focus on this possibility with respect to the research and work being carried out on the Zika disease and microcephaly. The progress and advances in genomic sequencing should be employed to help in identifying any more at-risk genes in people infected with the Zika virus. There is already a positive link between genetics and microcephaly. If a link is found between more gene defects or contiguous gene deletions that accompany Zika infection when microcephaly is manifested, it would help immensely to remove a lot of hype and fear for people worldwide. There could even be a combinatorial effect with Zika virus infection, alcohol and/or drug use (as necessary and sufficient to cause the microcephaly disease) which should be investigated. It could save nations and their public from a lot of guidelines regarding sexual practices, and unnecessary tests for the Zika virus. This last would be a blessing for testing labs throughout the Americas, who are already fighting various degrees of tight budgets and expanding public duties.

**Keywords:** Genes; Hereditary; Zika virus; Infant

### Background

The Mayo Clinic [1] presents the causes of microcephaly, the disease with the principal symptom as a smaller than average brain/skull/head. It typically takes place at birth, and even detectable in the womb during gestation or the conception period. In [1], the list reads as follows:

"Microcephaly may be genetic. Other causes may include:

#### Craniosynostosis

The premature fusing of the joints (sutures) between the bony plates that form an infant's skull keeps the brain from growing. Treating craniosynostosis usually means your infant needs surgery to separate the fused bones. If there are no underlying problems in the brain, this surgery allows the brain adequate space to grow and develop.

#### Chromosomal abnormalities

Down syndrome and other conditions may result in microcephaly.

#### Decreased oxygen to the fetal brain (cerebral anoxia)

Certain complications of pregnancy or delivery can impair oxygen delivery to the fetal brain.

#### Infections of the fetus during pregnancy

These include toxoplasmosis, cytomegalovirus, German measles (rubella) and chickenpox (varicella).

#### Exposure to drugs, alcohol or certain toxic chemicals in the womb

Any of these put your baby at risk of brain abnormalities.

#### Stark malnutrition

Inadequate nutrition during pregnancy can retard your baby's development.

### Unrestrained phenylketonuria also called PKU, in the female parent

PKU is a birth defect that hinders the body's capacity to assimilate the amino acid phenylalanine".

The focus of the current work is on one of the first sentences in the Mayo clinic's informational publication, i.e. that microcephaly could be genetic. The muse for the author appeared in the form of statues of microcephaly heads presented in a slide by a Brazilian researcher [2] on March 23, 2016 forum on the Zika virus, the Zika disease and microcephaly. The photographic slide showed the small heads as carvings used as separators for books on a shelf. Statues and carvings made of semi-precious stones and other materials, as collectibles and works of art are very much a favorite pastime of peoples who follow traditional Chinese culture, and other Asian cultures. It was the sign the current author [3-7] was waiting for, that the carvings of small heads was a product of art by Brazilian peoples of the rural areas in the northeast area of Brazil, and hence not something produced overnight, or even the flavor-of-the-year artistic trend. It had to be a condition that has been around for quite a while in their communities. Further research indicated that it was indeed a tradition of the northeast Brazilian natives to carve depictions of human figurines with various kinds of afflictions.

### Wikipedia Information about Microcephaly

There is information in Wikipedia [8] regarding the genetic links to the micro-cephalic disease. It has been characterized into two kinds dependent on when the disease manifested in the fetus or baby. There is the congenital kind, and the postnatal kind. Under the congenital kind, there are further classifications into syndromes, isolated, acquired, and other. The 'isolated' and 'other' sub-categories are open to new discoveries, pointing to the fact that much still to be researched and found about microcephaly. The 4 listed so far under the 'isolated' sub-category seem

to be genetic anyway. Under 'syndromes' sub-category, there are 5 types which are chromosomal, 4 types which are contiguous gene deletion, and 5 types which are single gene defects. Under the 'acquired' sub-category, there are 3 types, one of which is the 'vertically transmitted infections' sub-type. The Zika virus is only one of the 4 sub-types listed [9-11].

Under the postnatal kind [8], there are 3 further classifications into genetic, syndromes and acquired. There are 7 types which are genetic, 7 types which are single gene defect, and only 1 type which is contiguous gene deletion.

### **Leader of Neighboring Country Denies Link between Microcephaly and Zika**

The progenies of the European races are in political control of the Americas offer considerable support that the Europeans are less peaceful than the natives of the many countries of these continents. An important one of the myriad causes for the overpowering of the Incas, for example, was that the Incas did not have horses as living military tanks for war or defense. That the natives of South America never did train any of their animals or bred them as machines of war is a qualitative sign about the less aggressive nature of these natives. The aim of this paragraph is to point to the diverse genetic make-up of the peoples of the Americas, particularly in South America. There are communities in South America, and specifically in the northeast region of Brazil, where there is still a predominance of communities with particular natives and their characteristic genes. Brazil was the first nation to sound the alarm about microcephaly and its association with Zika.

That the President of Colombia [12] came out in early February 2016, with the statement that there were thousands of Zika cases in his country (which neighbors Brazil), and yet no connection to microcephaly, is another undeniable claim that has been made by an accepted leader of a legitimate modern nation, and a member of the United Nations. Apparently, there were 3,177 expectant mothers infected with the Zika virus, none with any diagnostic evidence of microcephaly in their fetuses. Zika has also infected more than 25,600 Colombians; only 3 mortality cases of the paralyzing Guillain-Barre syndrome have been attributed to cases of Zika. It seems to the author a typically Latin American manner of slighting your neighboring country (a historical rival), as well as politely endorsing the Mayo Clinic's first suggestion, that microcephaly could be genetic. There is an implication that microcephaly may be preferentially limited to the inhabitants who are more genetically related to the natives of northeast Brazil, in addition to being infected by the Zika virus. In other words, the adult male or female who has been infected with the Zika virus is more likely to parent an infant with microcephaly if they also have the necessary at-risk gene defects or genetic make-up.

### **Royal Incas Shaped the Heads of their Infants**

From [13-16], there were 3 examples of child human sacrifices completely mummified, and well preserved that were offered up by the Incas. They are being exhibited, one at a time, at the Museum at Salta, northern Argentina. The eldest was a 13-year old virgin, the second a 4- to 5-year old boy, and the third a girl about the same age. These youngsters seem to be related to the Incan royalty. In [16], it was reported that young royals showed that their heads had been shaped as infants. The Incas used two pieces of plank-like devices and shaped the infants' heads in an A-shape, with the intersection of the two planks above the head [16]. This fact is proof that the Incas admired this shape of head, and may have encouraged its propagation via physical manipulation and marital selection (in whatever manner they could).

It is the submission of the current work that this physical and/or genetic selection may have been the fashion-forerunner of the reduced skull size of microcephaly. It was reported in [13-15] that the 3 humans

were drugged for several months with alcohol and coca leaves before their death. Alcohol and drugs were consumed by the privileged and powerful in Incan society. Both alcohol and drugs at conception are risk factors for microcephaly [1,8]. It is conceivable that their mothers may have taken alcohol and drugs to increase the chances of obtaining the desired shape heads, since these children were considered privileged to be so chosen as sacrifice. That their mothers may have been so convinced via culture and traditional practice, is a good possibility.

### **Discussion and Conclusion**

That the presence of Zika virus alone does not lead to severe illness each time, is a prime motivation for the current paper. That there is an elected leader of Colombia, who denies any link between microcephaly and the Zika virus, is another good reason to explore other avenues more thoroughly. Other evidences appear in the form of cultural practices, and archeological evidence. Moreover, there is at least one group of doctors [17] who claim that the World Health Organization (WHO) was too swift in linking the Zika virus to microcephaly. The reason for haste seemingly was the pressure from Brazil, the host of the 2016 Olympic Games, and the complaints about slow action in the face of the 2013 Ebola virus crisis in West Africa. The group [17] claimed the over-dosage of alarvicide used in the water supply in Brazil, was the cause of the microcephaly instead.

Through a systematic review of the evidences, the main conclusion is that there is a good payoff to gain if success is found by pursuing the route of new genetic causes of microcephaly associated with the Zika virus. In other words, that the Zika virus has to be present together with the necessary gene defects or deletions to produce microcephaly cases. Such a finding could also save countries and the residents from a lot of rules regarding sexual practices, and needless tests for the Zika virus. As another example of possible combinations of risk factors (that may together be necessary and sufficient to cause the microcephaly disease), Zika virus infection together with alcohol and/or drug use by the mother during pregnancy could be researched and studied. Positive results from studies like the ones suggested here could result in a financial windfall for testing laboratories in the American continents, which are struggling with lean budgets and increasing public obligations. Facts about the Zika virus are published [18]. Work should be funded and performed to discover the possible link between gene defects and contiguous gene deletions associated with Zika infection and the disease of microcephaly. In addition, the use of alcohol and/or drugs during pregnancy and with Zika infection might be a good avenue to investigate. The presence of the Zika virus is necessary in every case that would count as evidence in these dual-type causations. The point is to establish necessary and sufficient conditions to cause microcephaly disease, not just a listing of risk-factors.

### **Acknowledgment**

This work is dedicated to the peoples of the Americas.

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