

## A BRIEF REVIEW ON RAKTA DHATU AS A MATRUJA BHAVA WITH SPECIAL REFERENCE TO GENE MUTATION IN X CHROMOSOME

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### ABSTRACT

*Rakta* is a *Matruja bhava*. *Rakta* is essential for life. *Rakta* contributes to the formation of various organs of *matruja bhava* like *Yakrut*, *Pleeha*, *Phuphusa*, *Unduka*, *Antra*, *Guda*, *Basthi*, *Jihwa*, *Vrukka* and *Hrudaya*. Organs derived from the maternal source in the embryo are nothing but the organs formed from the *Artava* of the mother. X chromosome of both the ovum and sperm can be considered as a part of *Artava* as a female child retains her two X chromosomes from her mother and father's mother (grandmother) and a male child retains his X chromosome from his mother. Mutations in the genes of X chromosome lead to abnormalities in RBC which re-validates *Rakta* as a *Matruja bhava*. This article is a sincere effort to correlate modern genetics with ancient Ayurvedic knowledge.

**Keywords:** *Rakta*, *Matruja bhava*, *Artava*, X chromosome, Genes

### INTRODUCTION

*Garbha* is formed out of the combination of *Matruja bhava*, *Pitruja bhava*, *Atmaja bhava*, *Satmyaja bhava*, *Satvaja bhava* and *Rasaja bhava*.<sup>1</sup> Factors responsible for the growth of *garbha* in the womb of mother are *Matrujadhi Garbhakara bhava*, proper regimen of the mother, availability of nourishment and heat through *upasneha* and *upasweda* re-

spectively, proper time and natural tendencies.<sup>2</sup>

### REVIEW OF LITERATURE

*Rakta* is a *matruja bhava*. It is derived from mother.<sup>3</sup> *Rakta* is essential for life.<sup>4</sup> Normal blood is crimson red in colour like the *indragopaka* insect, not too thick and free from discoloration. *Indragopaka* is an insect

coming out of earth in rainy season.<sup>5</sup> *Rakta* contributes to the formation of various organs of *matruja bhava* like *Yakrut*, *Pleeha*, *Phuphusa*, *Unduka*, *Antra*, *Guda*, *Basthi*, *Jihwa*, *Vrukka* and *Hrudaya*.<sup>6</sup>

Red blood cells also known as erythrocytes are responsible for the red colour of blood. The major function of RBC is to transport haemoglobin which in turn carries oxygen from lungs to tissues.<sup>7</sup>

Chakrapani explains that organs derived from the maternal source in the embryo are nothing but the organs formed from the *Artava* of the mother.<sup>8</sup> At the time of conception predominance of *Shukra* produces male child and that of *Artava* creates a female child.<sup>9</sup>

Both males and females retain one of their mother's X chromosomes, and females retain their second X chromosome from their father. Since the father retains his X chromosome from his mother, a human female has one X chromosome from her paternal grandmother (father's side), and one X chromosome from her mother. Sex determination is done according to the presence of sex chromosome in the gametes. At the time of fertilization if the sperm is X-bearing the zygote will have 44+X+X chromosome and the offspring is a girl. If the sperm is Y-bearing the zygote has 44+X+Y chromosome and the offspring is a boy.<sup>10</sup>

## RELATION OF X CHROMOSOME WITH RED BLOOD CELLS

**X-linked Sideroblastic anemia** is an inherited disorder that prevents developing red blood cells (erythroblasts) from making enough haemoglobin, which is the protein that carries

oxygen in the blood. People with X-linked sideroblastic anemia have mature red blood cells that are smaller than normal (microcytic) and appear pale (hypochromic) because of the shortage of haemoglobin. This disorder also leads to an abnormal accumulation of iron in red blood cells. The iron-loaded erythroblasts which are present in bone marrow are called ring sideroblasts. **Genes related to X-linked sideroblastic anemia-** Mutations in the ALAS2 gene cause X-linked sideroblastic anemia. The ALAS2 gene provides instructions for making an enzyme called erythroid ALA-synthase, which plays a critical role in the production of heme (a component of haemoglobin protein) in the bone marrow. ALAS2 mutations impair the activity of erythroid ALA-synthase, which disrupts normal heme production and prevents erythroblasts from making enough haemoglobin. Because almost all of the iron transported into erythroblasts is normally incorporated into heme, the reduced production of heme leads to build up of excess iron in these cells. This condition is inherited in an X-linked recessive pattern. The gene associated with this condition is located on X chromosome.<sup>11</sup>

**Mcleod neuroacanthocytosis syndrome** is a primarily neurological disorder. People with this condition have abnormal star shaped red blood cells (acanthocytosis). **Genes related to Mcleod neuroacanthocytosis syndrome-** Mutations in the XK gene cause Mcleod neuroacanthocytosis syndrome. The XK gene provides instructions for producing the XK protein, which carries the blood antigen Kx. Blood antigens are found on the surface of red blood cell and determine blood type. The func-

tion of XK protein is it plays a role in transporting substances into and out of cells. XK gene mutations typically lead to the production of an abnormally short, non functional protein or cause no protein to be produced at all. A lack of XK protein leads to an absence of Kx antigens on red blood cells. Mcleod neuroacanthocytosis syndrome is inherited in an X-linked recessive pattern. The gene associated with this condition is located on the X chromosome.<sup>12</sup>

## DISCUSSION

By comparing the function and appearance of *Rakta* with the functions and appearance of RBC, *Rakta* can be correlated to RBC of blood.

X chromosome of both the ovum and sperm can be considered as a part of *Artava* as a female child retains her two X chromosomes from her mother and father's mother (grandmother) and a male child retains his X chromosome from his mother.

Predominance of *Artava* at the time of conception leads to female child explains that X chromosome of both ovum and sperm can be considered as a part of *Artava*.

Mutations in the ALAS2 gene and XK gene of X chromosome leads to X-linked Sideroblastic anemia and Mcleod neuroacanthocytosis syndrome respectively where abnormalities in the RBC are observed which explains the importance of genes of X chromosome for healthy RBC.

## CONCLUSION

RBC is essential for life and are crimson red in colour and may be considered as an integral part of the *Rakta Dhatu*.

X chromosomes of both ovum and sperm can be considered as a part of *Artava* which are responsible factors for the formations of organs derived from the mother.

*Rakta* is a *Matruja bhava* because abnormalities in the *Rakta* are observed in mutations of ALAS2 gene and XK gene of X chromosome

## REFERENCES

1. Achaarya Charaka, Charaka samhita. Vaidya Jadavaji Trikamji Acharya, editor. 5<sup>th</sup> edition. Varanasi: Chaukambha Sanskrit Sansthan; 2001; 738:316
2. Achaarya Charaka, Charaka samhita. Vaidya Jadavaji Trikamji Acharya, editor. 5<sup>th</sup> edition. Varanasi: Chaukambha Sanskrit Sansthan; 2001; 738:321
3. Achaarya Charaka, Charaka samhita. Vaidya Jadavaji Trikamji Acharya, editor. 5<sup>th</sup> edition. Varanasi: Chaukambha Sanskrit Sansthan; 2001; 738:310
4. Achaarya Vagbhata , Astangahrdaya. Pt.HariSadasiva Sastri Paradakara, editor. Reprint 2010. Varanasi: Chaukhamba Surbharati prakashan; 2010; 956:183
5. Achaarya Sushrutha, Sushrutha samhitha. Vaidya Yadavaji Trikamji Acharya and Narayan Ram Acharya, editors. 9<sup>th</sup> edition. Varanasi: Chaukhambha Orientalia; 2007; 824:64
6. Achaarya Sushrutha, Sushrutha samhitha. Vaidya Yadavaji Trikamji Acharya and Narayan Ram Acharya, editors. 9<sup>th</sup> edition. Varanasi: Chaukhambha Orientalia; 2007; 824:357-358
7. Arthur C.Guyton & John E.Hall. Text book of Medical Physiology. 11<sup>th</sup> edition.

New Delhi :Elseveir India Private Limited  
; 2006;1115:419

8. Achaarya Charaka, Charaka samhita. Vaidya Jadavaji Trikamji Acharya, editor. 5<sup>th</sup> edition. Varanasi: Chaukambha Sanskrit Sansthan;2001; 738:310
9. Achaarya Sushruta, Sushruta samhitha. Vaidya Yadavaji Trikamji Acharya and Narayan Ram Acharya, editors. 9<sup>th</sup> edition. Varanasi: Chaukhambha Orientalia; 2007; 824:351.
10. Inderbir singh & G.P.Pal, Human Embryology.9<sup>th</sup> edition. New Delhi: Macmillan india LTD; 2012; 341:42
11. <http://ghr.nlm.nih.gov/condition/x-linked-sideroblastic-anemia>
12. [http://ghr.nlm.nih.gov/condition/mcleod-neuroacanthocytosis syndrome](http://ghr.nlm.nih.gov/condition/mcleod-neuroacanthocytosis-syndrome)

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