



Review Article

CONCEPTUAL STUDY OF FORMATION OF BLOOD CELLS FROM TISSUE NUTRITIONAL LAWS
WITH ITS CLINICAL IMPACT- AN AYURVEDIC PERSPECTIVE

Sharma Giriraj G^{1*}, Sharma Pooja²

*¹Professor & HOD, Dept. of Rachna Sharira, Government Ayurved College, Junagadh, Gujarat, India.

²Assistant Professor, Dept. of Kriya Sharira, Shiva Ayurvedic Medical College & Hospital, Bilaspur, Himachal Pradesh, India.

ABSTRACT

Rakta Dhatu is the main source for life longevity and survival of human beings. Formation of *Rakta Dhatu* is a continuous process. The heterologous food after the action of bio-energies (*Agni*) in digestion phase is converting into homologous form. *Agni-bala* (strength of bio-energies) are main helping hand for 2nd *Dhatu* i.e. *Rakta Dhatu* (blood cells) in the metabolic action of the body. Further the bio-energies works with changing need of the essence part as absorption and metabolism are started so that generation of tissues (*Dhatus*) occurs smoothly in the body. The *Dhatu Siddhanta* (tissue forming laws) in which theories of tissue formation and tissue differentiation were mentioned. The *Ahara Rasa* (Productive essence part) with the help of different bio-energies in different areas in body helps to produce tissues (*Dhatus*). To understand how the tissues are formed it is necessary here to understand the logics of Ayurvedic concepts or *Siddhanta* that proves the formation of *Dhatu* from *Ahara Rasa*. The modern science explains the formation of blood cells in embryonic stage by the help mesenchymal cells. The applied aspect of this work is to prevent disorders before their manifestations occurs in the human body. Various diseases that occur due to many causative agents are like- food/*Ahara* or *Agni-Bala* (strength of bio-energies), getting poor food digestion or metabolism. On the *Ahara* ground many different type of etio-pathogenesis are aroused due to malfunctioned food or due to malabsorption (*Dhatuagnivikriti*) that may leads to *Dhatuagninasana* (metabolic dysfunction). To understand deeply we have to go step by step the physiological ground of food digestion, its laws and how the blood tissues are formed from the sciences, applied aspects of *Dhatu Nirmana* and its vitiated factors.

KEYWORDS: *Rakta Dhatu*, *Dhatu Poshana Nyaya*, Pleuripotent stem cells, haemopoiesis, *Rakta dhatu janita Vikara*.

INTRODUCTION

Ingested food part (*Ahara*) after digestion (*Pratham Avasthapaka*) with the help of bio-energies/enzymes (*Jatharagni*) makes the final product known as *Ahara Rasa* (essence part of food). After this digestion phase second phase of digestion occurs on *Ahara Rasa* with the help of another bio-energy (*Bhutaagni*). In this phase conversion of heterologous food converted into homologous foods. Then metabolism of homologous food starts with the help of bio-energies present on the level of tissues (*Dhatwaagni*).

Dhatus Poshaka Ansha (nutritional part that gives nutrition to corresponding *Dhatu*) is nourished one after another as *Rasa* to *Sukra Paryanta Dhatu* (first tissue level to last tissue). In this way the 7 kinds of *Poshak (Asthayi Dhatu)* is transported to the

respective *Poshaya (Sthayi Dhatu- next tissue)*, through *Srotases* (channels) specific to each *Sthayi Dhatu* (forming stage *Dhatu*). The *Ahara Rasa* (essence part of ingested food) is form of homologous material that is formed after the action of *Bhutaagni* (elemental bio-energy). Body is formed from nutrition that is obtained from heterologous diet which is further converted into homologous/*Sajatiyansha*. The sequence of formation of seven *Dhatus* (bodily tissues) and its progression are given in all *Samhitas* i.e., it begins from *Ahara Rasa* to *Rasa Dhatu* (lymph) and lastly to *Sukra Dhatu* (reproductive tissues) with the help of *Dhatvagni Paka* (metabolic transformative phase). As from *Ahara Rasa*, *Rakta Dhatu* is formed by the *Sukshma Ansha* (the part of nutrition that gives nutrient to the

corresponding *Dhatu*) of *Rasa Dhatu*. In Ayurveda there are different laws to understand the *Dhatu Poshana* theories. From those main theories all the seven main tissues are utilized and nourished. Tissue nourishing concepts is holistic but its applications are universal and more grounded. The other perspective is the process of haemopoiesis takes place in bone marrow. The haemopoietic stem cells are the pluripotent progenitor cell, from this the blood cells are formed. These cells having the quality of self-renewal and from this it leads to proliferation and differentiation of cell. In this haemopoietic organ gives the micro era for development of the process of haemopoiesis. Haemopoietic stem cell gives further help to lymphoid and myeloid precursors. So, in this process myeloid precursors differentiate into blood cells like- red blood cells, white blood cells and platelets. The haemopoiesis process under control of cytokine and humoral loops. For this process three theories are given like in Ayurveda *Dhatu Poshana* theories are described. Importance of knowing the ground of these theories in clinical aspect are also tried to explain on basic level.

AIM AND OBJECTIVES

To view the formation of *Rakta Dhatu*/ blood cells and understanding the theories of tissue formation and differentiation (*Dhatu Nirmana Nyayas*) for development of blood cells.

MATERIAL AND METHODS

Various Ayurveda and modern texts are used for clearing the concept deeply.

Conceptual Concern

Nyaya

Leading scholars have widely accepted that the *Dhatu*s are nourished sequence wise from *Rasa* to *Sukra*. *Rakta Dhatu* gets nourishment from *Rasa Dhatu* and develops further; this is proved as pustule in Ayurveda. But in nourishment theory *Acharyas* had different theories. The *Nyaya* (laws or maxims) is the law that makes the idea of nourishment sequencing in between *Dhatu*s by the help of channels.^[1] One which is proved from direct perception, inferential and ideology are known as *Nyayas*.^[2] One *Nyaya* is not enough to prove the idea according to modern. So, we have to take all *Nyayas* simultaneously to come to any final conclusion. We have to elaborate all the *Nyayas* to prove the formation of *Rakta Dhatu* with the modern ideology to form blood from single functioning cell. The *Dhatu Poshana Nyaya*'s are the theories to explain the formation of *Rakta Dhatu* from the ingested diet. By going through basic transformation way the ingested food gets digested and then excreted. In this, basic nutritional changes occur as an internal storage and metabolic synthesis.

The *Ahara Rasa* gets converted to *Rasa Dhatu* by the action of *Dhatwagni*^[3] (tissue enzyme/ bio-energies). Further action is performed by *Panchmahabhoota* to help in the selection of the particular quality enriched matter from nutrient *Sara* part.^[4] In Ayurvedic texts three *Nyayas* are mentioned as mode of nourishment and formation of *Dhatu*s. The *Dhatuparinama Nyaya*'s are^[5]-

1. *Ksheeradadhi Nyaya/ Kramaparinama Paksha/ Sarvaatma Parinaama Paksha*
2. *Kedarakulyaanyaya*
3. *Khale Kapothanyaya*

1. *Ksheeradadhi Nyaya*^[6]- Law of mass transformation:

According to this maxim the earlier *Dhatu* is converted into next *Uttar Dhatu*. *Nyaya* shows the *Ksheer* (milk) is converted into *Dadhi* (curd) and next into *Takra* (butter milk) and from *Takra Navaneetham* (butter) to *Ghrita* (clear butter) and lastly from *Ghrita* forms the *Ghritamanda* (supernatant portion of Ghee column). If we understand this law, *Rakta* forms from *Rasa*, from *Rakta* forms *Maamsa* and so on.^[7]

The *Ksheeradadhi Nyaya* indicates the total change of the particular tissue to the next tissues. It shows the flow of conversion of milk into curd, in the same way first *Rasa Dhatu* from *Ahara Rasa* changes into *Rakta Dhatu*. In a similar way, further *Dhatu*s are formed like- *Maamsa- Medas- Asthi- Majja -Sukra* are formed by virtue of the progressive stages of transformation and the *Sukra* is responsible for causing progeny. So, it is called *Krama Parinamapaka*.

Substance Changes	Dhatu Changes
Milk ←	<i>Rasa</i> ↘
Curd ↘	<i>Rakta</i> ↘
Butter ↘	<i>Mamsa</i> ↘
Cheese ↘↘	<i>Medas</i> ↘
<i>Ghrita</i>	<i>Asthi</i> ↘
<i>Ghritamand</i>	<i>Majja</i> ↘
	<i>Sukra- Sarva Dhatu Sara</i>

The basic theories that explain the formation of *Dhatu*s are based on the *Rasa Dhatu* (lymph). *Rasa Dhatu* is the minute potential transformation of diet^[8]. Diet converts into *Rasa Dhatu* by the processing of digestion with the energy of *Jatharagni*^[9]. The *Prasada Sthula Bhaga* i.e. essence part gives nutrition to the same tissue for example *Rasa Dhatu* and its *Annubhaga* i.e., fine essence part is converted into next proceeding *Dhatu*. The two parts are like- essence part and other one is waste part. Later this *Prasad Bhaga* of *Ahara Rasa* is further divided into two parts when it comes in contact with

respective *Dhatwagni* like *Sthulamsha* and *Sukshmaamsha*. This *Sthula Prasadamsha* is responsible for formation and giving nutrition to the same *Dhatu* while *Sukshamasha* is responsible for formation of *Upadhatu* (depending tissues) and also formation of *Uttorata Dhatu* because it contains other *Dhatu- Sadharmi Amsha* (next tissue forming element).

The *Rasa Dhatu* is responsible for formation of *Updhatu* like *Stanya* (lactating milk) and *Artava* (menstrual cycle) in female.

Rakta Dhatu is responsible for formation of *Kandara* (tendons), *Sira* (blood vessels, veins) and *Mamsa* (muscles) is responsible for *Vasa* (muscle fat) and *Shat Twacha* (skin layers) and *Meda* (fat/lipids) for *Sanyu*^[10] (ligaments, sheaths, septas, capsules etc). During the process of *Dhatu* and *Updhatu* formation, there is simultaneous formation of *Mala* (tissue excreta).

The time period for conversion of one *Dhatu* to the next- as per this *Nyaya* whole *Rasa Dhatu* is converted into *Rakta* and entire *Rakta* into next *Mamsa* and so on up to *Shukra Dhatu* (reproductive part- sperm/ovum) by 7th or 30th day^[11].

So, this *Nyaya* simply lays down the conversion or transformation of material from *Ahara Rasa* to *Rasa Dhatu* to *Rakta Dhatu*.

II. Kedara- Kulya Nyaya^[12]- Law of Transportation

Kedara- Field under irrigation, *Kulya*- canal that helps to irrigate these fields. This *Nyaya* explains the transport of nutrition of the body, symbolizing the canal to the tissues which symbolizes the field. The water that is flowing in the canal is first supplied to the nearest field, after irrigating the requisite amount of water to the field; it flows to the next field and so on.

It shows that first field absorbs the *Sukshma Bhaga* and other one i.e. *Sathula Bhaga* flows on to nourish the further fields. It gives the clear denotation that after proper channelized digestion of diet with the help of *Jatharagni*, converts the diet into two separate forms- *Prasada Bhaga* and *Kitta Bhaga*.

Prasada Bhaga of *Ahara Dravya* consists of *Dhatu-Sadharmi Amsha* that shows all *Dhatu* related parts i.e. *Rasa* and *Rakta Dhatu*. A different type of *Dhatu* contains different *Dhatwagni*^[13].

This *Prasad Bhaga* of food enters into the different channels of the *Dhatu* and when the specific *Dhatu* related part comes in contact with their specific *Dhatu Agni*, it helps to make this *Sadharmi - amsha* to specific *Dhatu* and nourishes the *Dhatu*.

Therefore, this *Nyaya* shows the sequence and time taken for replacement of seven *Dhatu*s. Nourishing fluid *Rasa* replenishes *Rakta Dhatu* in the

beginning. This part of *Rasa* is necessary for the formation of *Rakta Dhatu* in *Raktavaha Srotas*. When *Rakta* absorbs its nourishment, *Rasa* replenishes next *Dhatu* i.e. *Mamsa Dhatu*. So, it shows that *Rasa* replenishes all next *Dhatu*s.

In this way the *Charaka* describes that *Rakta* is formed from *Rasa*, *Mamsa* from *Rakta*, *Medas* from *Mamsa*, *Asthi* from *Medas*, *Majja* from *Asthi*, *Sukra* from *Majja*. So, therefore, embryo from the essence of *Sukra* is justified^[14]. *Rasa-Dhatu* being activated by *Pittosma/enzymes* is imparted with a color and converted to *Rakta Dhatu*. From white color it gets changed to brown color, green, yellow, *Padma varna/ violet* like color, reddish color, deep red like color. Each stage takes one day time. Thus the whole process of transmission from *Rasa* to *Sukra Dhatu* is completed in seven days^[15].

III. Khale-Kapota Nayaya^[16]- Law of selectivity - Law of storage - Law of supply

Khala- khaliana/ field grains are heaped after cutting the crop.

Kapota- pigeon/ dove- This law means selection of individual items as per the requirement by the individual *Dhatwagnis* from the same pool of *Ahara Rasa* which can contain all nutrients. As the pigeons come from different directions and distances to collect the paddy and then fly away to their respective places of dwelling. Time of returning may vary depending upon distance and direction they have to travel^[17].

So, it indicates the following-

Ayurvedic Terms	Related Meanings
The <i>Ahara Rasa</i> -	The thrashing floor/the field,
The <i>Sthaye Dhatu</i> -	The nests,
Various <i>Poshaka Dhatu</i>	The pigeons,
Respective <i>Dhatuvaha Srotas</i>	The travelling routes of the pigeons,
The <i>Rasa- Prasarana</i> -	The flying force of the pigeons i.e. <i>Vyana Vata</i> .

Just like the pigeons move towards their nests i.e. they are attracted by their resting places/homing pigeons. The *Sathayee Dhatu* (stable tissue essence part) attracts their requisite nutrients from the *Ahara Rasa* through their specific *Dhatuvaha Srotases* and nourishes them.

As per this law the *Ahara Rasa* goes to various *Dhatu*s through different channels or *Dhatu Merges* or *Srotases* and provides them with nutrition. The part of *Ahara Rasa* meant to supply nourishment to a particular *Dhatu* does not come in contact with other *Dhatu*s. As the length of the *Srotas* increases the

diameter decreases, it takes longer time for the nutrition to pass through. So, it shows that the portion of *Ahara Rasa* giving nourishment to *Rasa Dhatu* passes through its own *Srotas* and provides nutrition to it. After providing nutrition to *Rasa Dhatu*, the portion of *Ahara Rasa* meant to provide nutrition to *Rakta Dhatu* does its work by its specific *Srotas* i.e. *Rasavaha Srotas*. So, likewise supplement is provided step by step in increasing order of *Dhatu*s^[18].

Formation of *Rakta Dhatu* as per *Dhatu Poshana Nyaya*

As the earlier explained how *Dhatu*s are formed and getting nourishment by the *Dhatu Poshan Nyayas*. Now we have to be understood how *Rakta Dhatu* (blood tissues) is formed from *Nyayas* and how much time are taken that explained by the *Acharyas* with the *Dhatu Poshan Nyayas*.

1. *Charaka* mentioned it takes six days and nights for homologous that promote *Vrishyatwa* (virility) to be formed into last *Sukra Dhatu* so it shows that forming *Rakta Dhatu* takes second day.
2. *Susruta* mentioned that the entire circulating fluid i.e. the *Rasa Dhatu* is transporting nutrients of stable *Dhatu*, and it stays each one of the six *Dhatu*s for the time space of 3015 *Kala*. So, as per this essence part took one month to be formed into last *Dhatu*. Noticed in the *Kala* basic the time

THEORIES

Stem cell^[19]- A single cell that can replicate itself and differentiate into many cell types. These are the cells which have the ability to continuously divide and differentiate/ develop into various other kinds of cells/tissues. It is a source of all kinds of blood cells. Stem cell pluripotent^[20]- has an ability to develop into all kinds of cells of tissues.

Haematopoesis^[21]- It is a process of formation of blood cellular components. All cellular blood components are derived from haematopoietic stem cells (HSCs). Hemo= Hamato= blood, Poiesis= production.

The theories to explain the haematopoietic formation are-

1. Monophyletic theory
2. Polyphyletic theory
3. Extramedullary theory

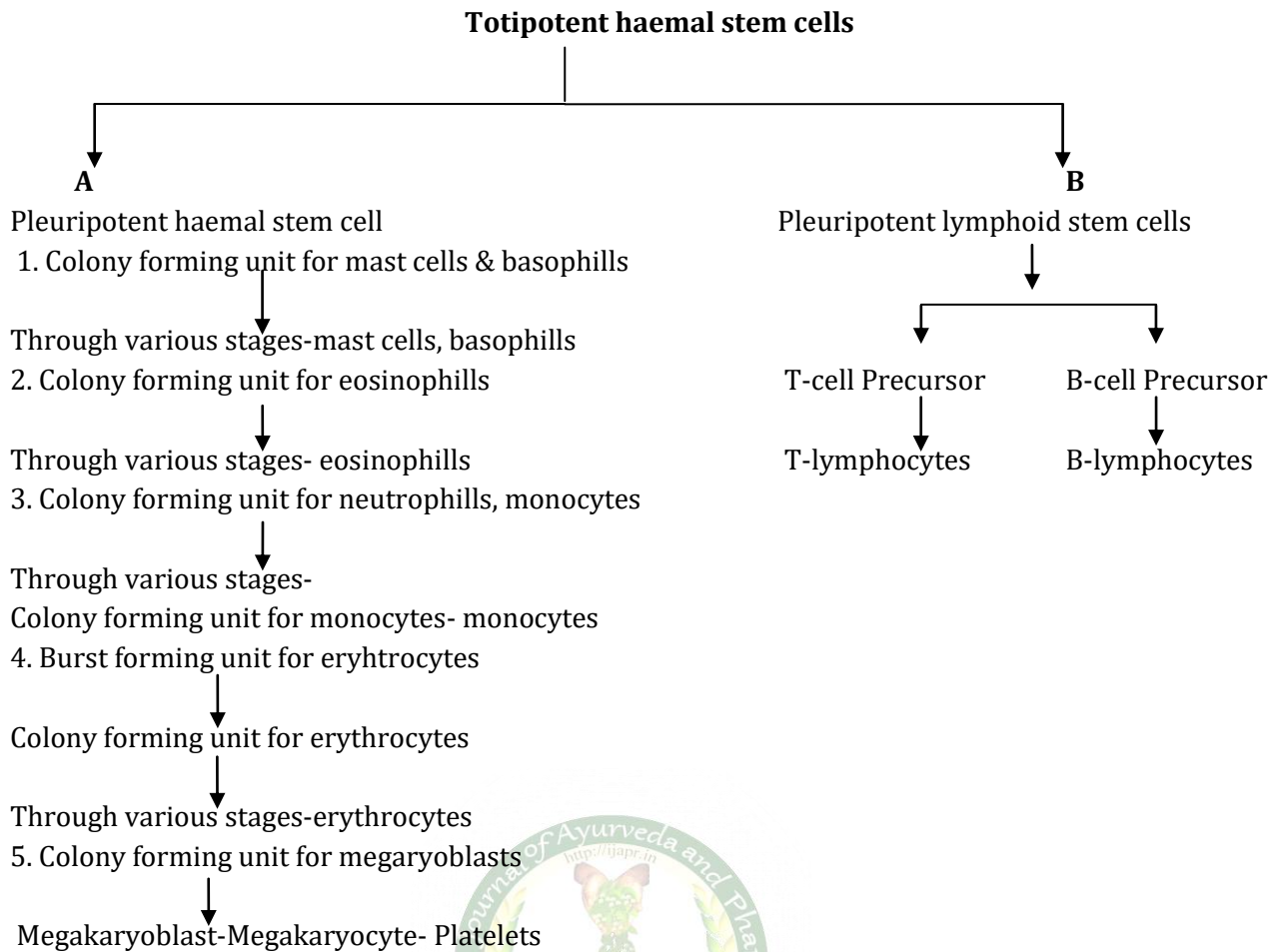
1. Monophyletic theory^[22]- This is widely acceptable theory, also known as unitary theory. It suggests that there is a common parent cell of all forming elements of blood in different mesenchymal cell, which is able to form cells of lymphoid, myeloid, erythroblast line. As per this, all blood elements develop from one origin cell, stem cell^[23]. As per this theory different types of blood cells arise from a single ancestral cell known as Pluripotent stem cell present in the bone marrow. Pluripotent stem cells are many potent structures to enhancing new structures.

for all *Dhatu*s to form are 18090 *Kala*. According to this *Rasa Dhatu* takes five days so 3015 *Kala* contribute to each *Dhatu* space. The *Rakta Dhatu* are formed from this basis takes time of next five days so 10 days i.e. 6030 *Kala*.

3. *Parashara* mentioned in *Chaakarpani* on *Charak chiktisha* 15th chapter- that it takes seven days for the formation of last *Dhatu*. So, the *Rakta Dhatu* takes 3rd day to form from *Rasa Dhatu*.
4. *Vagbhata* explains the same as above time periods for *Rakta Dhatu*.

Rakta Dhatu formation under three conversion point known as *Tridha- Parnimana-* as per this three conversion are occurred from *Rasa Dhatu* to *Rakta Dhatu* in the subtle level is as follow.

- From nutrient *Dhatuansha* in the presence of *Dhatvagni* (biochemical enzymatic action) it changes into *Sthayi Dhatu* (stable *Dhatu*, supplementary *Dhatu* called as *Updhatu*).
- Next *Dhatu* nutrition is provided to help the formation of next *Dhatu*.
- Waste material is formed in the formation of *Dhatu* as enzymatic or *Dhatva- agni* is working. In this way for *Rakta Dhatu Tridhaparnimana* are- from *Shukshma Ansa Rakta Dhatu* is formed and *Updhatu* i.e. *Artava* and *Satanya* are formed and in the presence of *Rakta Dhatvaagni* next *Mamsa Dhatu* are ready to form and *Rakta Dhatu Pitta Mala* are formed.



2. Polyphyletic theory^[24]- There are separate stem cells present in the bone marrow for each main variety of blood i.e. granulocytes, monocytes, lymphocytes, erythrocytes and platelets. As per this theory there are several independent types of stem cells. There is no doubt that in the embryo all blood forming cells are derived from mesenchyme and that the earliest stem cells are capable of forming all types of blood cells. But in same way the potency of stem cells become restricted.

Two or more different stem cell are required to further create blood cells, like – two main stem cell- haemopoietic stem cell – creates haemocytoblast and it gives RBC, and other one- lymphopoietic stem cell it gives lymphocytes.

3. Extramedullary theory^[25]- also called as extramedullary hematopoiesis (EMH), this is known by the formation and development of blood cells (RBC, WBC and platelet production) but outside the bone marrow medullary spaces. In this common sites included the liver and spleen. But these types of formation are not profound in adults. Therefore, this EMH may be shown in pathophysiological variations in HSCs. This needs to be research material. Spleen is a frequent site of extramedullary blood formation during the post natal period and found minor factor in the embryonic stages of hematopoiesis. The fact usually known that the spleen environment is acidic

and various macrophages are inhospitable for HSCs, even though EMH occurs within the red pulp. In liver, EMH is found normally in infants' up to the age of five weeks and in adult with pathology. EMH is mostly observed in hepatic sinusoids. EMH is also found in lymph nodes. Other tissues where EMH are associated include- the heart, fatty tissue, adrenal glands, kidney, periosteum, pleural cavity, paravertebral regions, intra- spinal tissue, presacral region, nasopharyngeal region, paranasal sinuses and various types of neoplasm.^[26]

EMH may be seen in hemolytic anemias like thalassemia intermedia or major, sickle cell anemia and rare cases in polycythemia vera. EMH leads to increase in size substantially.

DISCUSSION

Poshana means nourishment. Seven *Dhatu* (tissues) are formed in *Garbha* (embryonic stage) condition as well as after birth; *Rakta Dhatu* (red blood cells) gradually grows after birth. Nourishment of *Dhatu* after birth depends upon food that a child consumes. *Vyana Vayu* further helps to distribute the nutritional part to *Rakta Dhatu Nirmana*^[27]. Three main reasons of having healthy food.

1. Replenishment of *Dhatu*
2. Repairing of damaged *Dhatu*s
3. Building up of new *Dhatu*

Therefore, the quality of *Ahara Rasa* (essence part of food) for giving *Poshana* to *Rakta Dhatu* is essential. *Nyayas*/theories that explain the processes of synthesis of *Dhatu* from *Ahara Rasa* are called as

Dhatu-Poshana Nyayas. Neither *Charaka* nor *Susruta* has explained the *Nyayas*. *Chakarpani* and *Dalhana* the commentators have explained the *Nyayas* (laws of tissue formation and differentiation) in detail.

Nyaya's	Modern Theory	Explanation
<i>Kshira Dadhi Nyaya</i>	Monophyletic theory	Theory that explains the total transformation describes
<i>Kedara Kulya Nyaya</i>	Polyphyletic theory	Theory that explains circulation and transportation
<i>Khale Kapote Nyaya</i>	Extra Medullary Haemopoiesis	Theory that explains selective absorption

Role of *Dhatu-Poshana Nyaya* in synthesis of *Rakta Dhatu*

- I. *Kshira –Dadhi Nyaya*- Transformation of *Poshaka Rakta* nutrients in *Ahara Rasa* into *Poshya Rakta Dhatu*.
- II. *Kedara Kulya Nyaya*- Transportation of *Poshaka Rakta* to liver and spleen through *Raktavaha Srotas*.
- III. *Khale Kapota Nyaya*- Action of *Ranjaka Pitta* selectively on *Poshaka Rakta*.

Poshaka rakta	Poshya rakta
Nutrients of <i>Rakta Dhatu</i> present in <i>Ahara-Rasa</i> are called as <i>Poshaka Rakta</i> . <i>Poshaka Rakta</i> is formed from food. <i>Poshaka Rakta</i> is unstable. <i>Poshaka Rakta</i> transforms into <i>Poshya Rakta</i> .	It is stable form of <i>Rakta Dhatu</i> . It is synthesized from <i>Poshaka Rakta</i> . <i>Posya Rakta</i> is synthesized in liver and spleen. All <i>Kriyatamaka</i> functions are performed by this.

The formation of *Rakta* depends upon many factors. To understand the formation of *Rakta* at the basic level, both the sciences have mutual concepts but with different names. In Ayurveda the formation of *Rakta* is explained according to the *Dhatu Poshana Nyaya*. According to this, the concept of maxims the *Nirman* (formation) of blood totally depends on the *Ahara Rasa* or what the individual consumes. As the individual ingests, the digestion of diet makes the nutrient part and that *Ahara Sukshma Ansha* further helps to make the tissues or blood tissues. *Acharyas* mentioned three laws on that basis; the formation of *Rakta* depends upon *Kshira Dadhi Nyaya*, *Khale Kapota Nyaya*, *Kedari Kulya Nyaya*. This gives the idea of formation of *Rakta Dhatu* (other *Dhatu*s) sequentially. And in modern there is one cell which imparts growth to other different type of cells called as stem cell. Stem cell is the basic cell which helps to grow, replicate and differentiate. Stem cell is mainly of four types in which pluripotent stem cells are known to start hemopoiesis.

As the clinical aspect of *Dhatu Poshan Nyaya's* and *Rakta Dhatu* formation- various diseases occurs due to unwholesome food intake. Various foods are not good for one's individual as this depends on the *Prakriti* (temperament). As the *Vataj Prakriti* having more prone to *Vata* disorders if he follows *Vata* enriched food supplements in their diet like for other two *Prakriti* individuals i.e. *Pittaj Prakriti* and *Kaphaja Prakriti* respectively. For understanding the importance of the topic we take the Hypertension disease as the example point. In Ayurveda

Hypertension called as *Vyanabala Vaishmya* (disorder due to *Vata* type *Vyana*). This clearly implicates the hypertension occurs due to vitiation of *Vyana Vata*. *Vyana Vata* normal function is to help for smooth functioning of heart and all the circulations of the body i.e. body to heart and heart to body. But in this condition *Vyana Vayu* vitiated due to *Vata* enriched food and lifestyle that alters the *Dhatu Poshana* and *Dusti* (malfunctioning) of *Ahara Rasa* that further leads to *Dusth Rasa Dhatu Utpati* and vitiated *Rakta Dhatu Utpan*. So, it clearly shows that how wholesome *Ahara* is important for dealing with the *Dosha-Dushaya Samurchana* (amalgamation of *Dosha* and *Dhatu*s). For the treatment purpose of this disease we have to key monitor the diet and daily activity of the patient. We give *Vyana Vata Shamana* remedies and medicine so that first hand prevention occurs and then next forming *Dhatu*s will be corrected. Likewise we understand many diseases with the help of *Tridosha* theory, *Prakriti*, for correcting the diet of the individuals.

CONCLUSION

Firstly digestion of food occurs and then absorption of *Ahara-Rasa* (essence part of food) takes place. It then leads to synthesis of *Rasa-Dhatu* (lymph) which then enters into hepato-splenic circulation. By the action of *Ranjaka Pitta* (*Pitta Dosha* Sub type that resides in stomach and liver) synthesis of *Rakta Dhatu* (red blood cells) occurs and finally *Rasa* (lymph) acquires red color. It clearly shows that the formation of *Rakta Dhatu* as per

Dhatu Poshana Nyaya (theory of tissue formation and differentiation) in 3 maxims i.e. *Kshira Dadhi Nyaya* (law explains complete transformation), *Kedari Kulya Nyaya* (law explains sequential conversion) and *Khale Kapota Nyaya* (law explains selective conversion), these all gives the idea how *Rakta Dhatu* (red blood cells) is formed and similarly in modern concept, the formation of blood i.e. hematopoiesis also has three theories- Monophyletic theory, Polyphyletic theory and Extramedullary theory. So in this way-

Ksheera Dadhi Nayaya - Monophyletic theory,
Kedari Kulya Nayaya - Polyphyletic theory,
Khale Kapota Nayaya - Extramedullay theory.

As in *Ksheera Dadhi Nayaya* the conversion of *Ksheer Bhaga* (milk) into purified *Ghrita* (clarified butter), similarly the *Ahara Rasa* (essence part) is totally converted into *Purva Dhatu/Rasa Dhatu* (lymph/plasma). *Rasa Dhatu* in the presence of *Rakta Dhatvagni* (bio-chemical entities that helps to form next tissue i.e. blood cells) forms *Rakta Dhatu*. In the same way the monophyletic theory works. Totipotent haemal stem cells totally gets converted into two other stem cells Pleuripotent haemal stem cell and Pleuripotent lymphoid stem cells. Then further it helps to form RBC, WBC, Platelets cells etc. so the laws of total transformation are proved by Ayurveda as well as modern physiology.

As in *Kedari Kulya Nyaya* the law of transportation from one major place to other areas i.e. from *Ahara Rasa to Rasa, Rakta* etc takes place in sequential order. As per Polyphyletic theory there are several independent types of stem cells. From embryo stage they are derived from mesenchyme. Different types of stem cells are form different structures of blood.

As in *Khale Kapota Nyaya*- the law of selectivity, when the storage is less many energy will be supplied by *Dhatvagni*. This maxim explains the origin of the disease due to the transportation of *Doshas* travelling in different *Srotases* (channels) and the place where there is vitiation called as *Kha Vegunyata* (empty space that leads to vitiation of *Doshas* energy). Similarly, extramedullary theory of blood formation explains the same thing i.e. when the production in bone marrow slows down then hematopoiesis starts at its outside i.e. in liver, spleen. This law holds good both in physiological as well as in pathological conditions.

Further Scope: This study may help other scholars to see *Dhatu-Poshan Nyaya* as main source for *Rakta Dhatu Nirmana* and how pathology occurs. How disease can be corrected by correcting at the level of *Poshan* of *Dhatu*s.

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REFERENCES

1. Sushruta, Sushruta Samhita, with Bhanumati commentary of Chakarpani, Chaukhambha Surbharti Prakashana, Varanasi, Edition 4th, 2008. Sutra Sathana-14/14 & 15.
2. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 15.
3. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 14.
4. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 14.
5. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 16.
6. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Sutra Sathana 28/ 4.
7. Sushruta, Sushruta Samhita - Kaviraj Ambika dutt sastri, Sutra Sathana, Chauhambha Sanskrit Sansthana, Varanasi, UP, 2016. Chapter-14, verse-10.
8. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 16-17.
9. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya,

- Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 03.
10. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/18-19.
 11. Vagbhata, Astanga Hridaya, with Sarvang Sunder commentary of Arundatta & Ayurved Rasayana commentary of Hemadri, edited by Pt. Harshastri, Krishnadas Academy, Varanasi. Year, 2001. Sharira Sathana- 3/65-66.
 12. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Sutra Sathana 28/4.
 13. Sushruta, Sushruta Samhita, with Bhanumati commentary of Chakarpani, Chaukhambha Surbharti Prakashana, Varanasi, Edition 4th, 2008. Sutra Sathana-14/10&15.
 14. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Chikitsa Sathana 15/ 16-17.
 15. Sushruta, Sushruta Samhita, with Nibhand samgraha commentary of Dalhana, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Surbharti prakashana, Varanasi, 2008. Sutra Sathana- 46/528.
 16. Sushruta, Sushruta Samhita, with Bhanumati commentary of Chakarpani, Chaukhambha Surbharti Prakashana, Varanasi, Edition 4th, 2008. Sutra Sathana-14/10.
 17. Agnivesha, Charak Samhita, revised by Charak and Dridhabala with Ayurveda Dipika commentary of Chakrapanidatta, edited by Vaidya Yadavaji Trikamaji Acharya, Chaukhambha Sanskrit Sansthan, Varanasi 4th edition 1994. Sutra Sathana 28/ 4.
 18. Vagbhata Vridha, Astanga Sangraha with the commentary of Indu, Chaukhambha Surbharti prakashana, Varanasi, year-2006. Shareera Sthana,-7.
 19. Michael Smith Foundation for health research, by John Schrader, Stem cell physiology, type-research unit award, year- 2004.
 20. A textbook of anatomy and physiology by William Arnould Taylor, edition-3rd, year-1998
 21. Concise Medical Physiology by S.K. Chaudhuri, edition 4th, publication-new central book agency (P) limited, year-2006.
 22. Textbook of human Histology by Inderbir Singh, edition 6th, chapter- 5th -the vascular system, published by Jaypee brothers medical publishers (P) limited in 2011.
 23. Monophyletic theory of hematopoiesis. Stem cell. By tereshchenko Iryna, second medical faculty, Charles University in Prague, the term stem cell, maksinov proposal in 1998.
 24. Textbook of human Histology by Inderbir Singh, edition 6th, chapter- 5th -the vascular system, published by Jaypee brothers medical publishers (P) limited in 2011.
 25. Textbook of human Histology by Inderbir Singh, edition 6th, chapter- 5th -the vascular system, published by Jaypee brothers medical publishers (P) limited in 2011.
 26. Sohawon D, Lau KK, Lau T & Bowden DK: Extra-medullary haematopoiesis: a pictorial review of its typical & atypical locations. J med Imaging Radiat Oncol. 56: 2012.538-534.
 27. Charaka Samhita with Ayurveda Deepika commentary of Charapani Datta, Chikitsa sthana, Varanasi, 2016, chaukhambha surbharti prakashana. chapter- 15, verse- 36.

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***Address for correspondence**

Dr. Sharma Pooja

Assistant Professor

Dept. of Kriya Sharira,

Shiva Ayurvedic Medical College &

Hospital, Bilaspur,

Himachal Pradesh, India.

Email:

poojasharma9894@gmail.com

Mobile: 8219526817

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