



Russ (Hb) Findings, Variants & Clinical Significance.

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I) Abstract : Russ (Hb) is very rare finding in the study of Haemoglobinopathy. It is benign variant of Hemoglobin and doesn't affect patient in any abnormal way Clinically:

Haemoglobin Russ was discovered in 1962 by HUISMAN And SYDENSTRICKER in a Five Family members of Caucasian family.

This is though abnormal Hb type detected very rarely but it is benign one not causing any problems to the individuals and having no significant troubles to the individual observed in them.

In India, very few case of Russ Hemoglobin are found & there is no effect of Age Sex and Geographical situation.

Measurement of the proportion of abnormal Hemoglobin in a hemosylate is essential for differentiation simple and compound heterozygous (eg. Sickle cell Trait Vs Sickle Thalassemia), for differential of alpha and beta thalassemia in compound heterozygotes," and for differentiation of various type of beta-thalassemia in such persons. Utilization of Such measurements is hampered by the imprecision and inconvenience of current methods. We have adopted a readily available agar electrophoresis method for this purpose, scanning unstained gels at 420 nm. The new method is particularly valuable for rapid estimation of percent of Hbs

after partial exchange transfusion in patients with sickle cells Anaemia.

It can not be used for quantitation of HbF or for quantification of Haemoglobins that Comigrate with HbA, contrawise, it can be used for hemoglobins that only separate from HbA on Agar (e.g. Hb Bethesda). That is why it is now most commonly technique is HPLC (High Performance liquid Chromatography).

Keywords - Russ (Hb), Types of Hemoglobinopathy HPLC (High performance liquid Chromatography, Cincal significant.

II) Introduction :- Hemoglobin Russ ($\alpha_2^{51arg}\beta_2$) is called known as AE, S- aminoethy derivative).

High performance liquid chromatography (HPLC) was used to separate tryptic peptides of the normal α , β , α and σ chains of human hemoglobins A, F, and Az of the abnormal chains of 25 hemoglobin variants.

In addition to the separation of chymotryptic peptides of oxidized core of the normal α -chain by HPLC was evaluated.

HPLC has Several advantages over conventional methods used for separation of proteolytic fragments of haemoglobin chains. The method is fast, and reproducible, and

requires only small quantities of material. Several peptides are eluted as single zones, thus eliminating the need of rechromatography For further Purification. Characteristic change in the elution pattern of the peptides often indicate specific modifications.

Russ (Hb) is one of the major haemoglobin fraction with the mobility with Hbs like Mobility on HPLC and also minor abnormal Fraction (A₂ Russ) with mobility almost identical to that of Of the chain (Delta Chain) abnormal. HbA₂ were detectable by Starch Gel Electrophoresis in the red cells, hemolysates of those individuals.

III) Experimentation :- from the period of 1st April 2022 to 30th April 2023 total 150 cases were studied in well equipped Pathology Laboratory & Research Centre situated at Nagpur Maharashtra.

The Patients were walk in patients came to the Laboratory for the Investigation Hemoglobin Electrophores by HPPLC Method.

There are two categories of patients -

- (1) Patients were came For routing Hb electrophoresis Check up having Low Haemoglobin percent and having complaints of joint pain
- (2) Second categories of patient belonging to Antenatal care check up which includes Hb electrophoresis by HPLC method.

In total 150 Cases of Hb electrophorens, 100 patients shows normal Hb electrophoresis pattern by quantitative method. The pattern was found to be HbAA₂ Pattern 30 patients were diagnosed as Sickle cell Trait (HbAs) pattern 15, patients were diagnosed as Sickle Cell Disease (Hbss Pattern), 05 percent show Normal HbAA₂ Pattern with Hb Russ quantity in their Hemoglobin

Table 1 - Showing results of HB electrophoresis by HPLC

Total Cases Studied	Normal Hb Pattern	Sickle cell Trait pattern	Sickle cell diseases pattern	Russ (Hb) found
150	100	30	15	5

IV) Conclusion

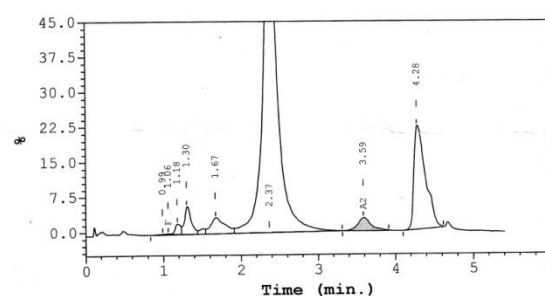
in the above study carried out the quantities of the Two components, estimated by DHAE-Cellulose Chromotography were ranging from 10.7 to 12.3 % for the Hb A Russ fraction and 0.4 % for HbA₂ Russ subunit Hybridization of the HbA study of HbA Russ indicated that the β Chain was normal and α chain abnormal. The occurrence of the abnormality in the Heterozygous carrier was not associated with any appaarent Clinical & Haematological manifestation. These Cases were advised for the DNA analysis fro further confirmation.

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Conflicts of Interests - No.

Graph I Graphical presentation of Russ (Hb) pattern - by HPLC

Graph 2



Graph 1

Patient Data	Analysis Data
Sample ID: MH000730002970	Analysis Performed: 04/24/2023 17:41:27
Patient ID:	Injection Number: 24260
Name:	Run Number: 40
Physician:	Rack ID: 0002
Sex:	Tube Number: 3
DOB:	Report Generated: 05/11/2023 14:30:22
Comments:	Operator ID:

Peak Name	Calibrated Area %	Area %	Retention Time (min)	Peak Area
Unknown	---	0.1	0.99	1099
F	0.1*	---	1.06	2585
Unknown	---	1.0	1.18	17856
P2	---	2.8	1.30	52635
P3	---	3.6	1.67	67328
Ao	---	71.7	2.37	1344031
A2	2.8	---	3.59	50619
S-window	---	18.0	4.28	338206

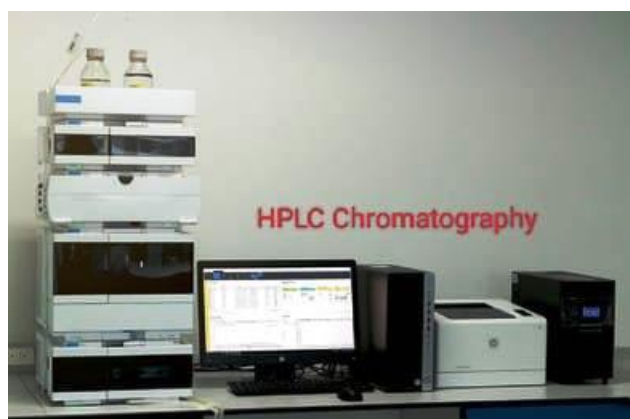
Total Area: 1,874,359

F Concentration = 0.1* %

A2 Concentration = 2.8 %

*Values outside of expected ranges

Analysis comments:



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