

Clinical Utility of Reticulocyte Parameters



Elisa Piva, MD^{a,*}, Carlo Brugnara, MD^b, Federica Spolaore, MD^a, Mario Plebani, MD^a

KEYWORDS

- Reticulocyte • Immature reticulocyte fraction • Reticulocyte maturation
- Reticulocyte hemoglobin content • Reticulocyte volume
- Reticulocyte hemoglobin concentration

KEY POINTS

- Automated reticulocyte counts provide an acceptable precision and bias while parameters and indices improve the evaluation of erythropoiesis. Nevertheless, standardization and harmonization should be encouraged.
- Immature reticulocyte fraction (IRF) indicates the younger fraction of reticulocytes, reflecting erythropoietic activity. Recovery of bone marrow following bone marrow transplantation, erythropoiesis-stimulating agent therapy, or chemotherapy is reflected by increased IRF within a few days.
- Reticulocyte haemoglobin content is a real-time indicator of bone marrow iron status, and reflects the balance between iron and erythropoiesis. It is not however the appropriate measure in assessing iron adequacy in the presence of genetic microcytosis.
- Reticulocyte cell volume has a clinical utility similar to that of reticulocyte hemoglobin content, in evaluation and monitoring of anemia.

HISTORY OF RETICULOCYTES OVER THE LAST 150 YEARS

The Mid 1800s: Discovery of “Granulated” Erythrocytes

The first description of reticulocytes was made in 1865 by Wilhelm Heinrich Erb (1840–1921), a German neurologist who was a leading physician and eminent figure of his time. Thanks to his scientific interest in toxicology and histology early on in his career, he observed the effects of acetic and picric acid on the development of erythrocytes, thus discovering a population of “granulated” erythrocytes.¹ The “granular” cells were described as larger than normal erythrocytes. He studied granulated erythrocytes of calves, cats, normal adult animals, and human fetuses. He described observations on granulated erythrocytes after hemorrhage and in patients with

The authors have nothing to disclose.

^a Department of Laboratory Medicine, University-Hospital of Padova, Via Nicolò Giustiniani 2, 35128 Padova, Italy; ^b Department of Laboratory Medicine, Boston Children’s Hospital, Harvard Medical School, 300 Longwood Avenue, BA 760, Boston, MA 02115, USA

* Corresponding author.

E-mail address: elisa.piva@sanita.padova.it

Clin Lab Med 35 (2015) 133–163
<http://dx.doi.org/10.1016/j.cll.2014.10.004>

labmed.theclinics.com

0272-2712/15/\$ – see front matter © 2015 Elsevier Inc. All rights reserved.

Abbreviations	
ACD	Anemia of chronic disease
ANC	Absolute neutrophil count
BCB	Brilliant cresyl blue
CBC	Complete blood count
CD71	Transferrin receptor
CERA	Continuous erythropoietin receptor activator
CHCMr	Reticulocyte hemoglobin concentration
CHCr	Mean cellular hemoglobin concentration of reticulocytes
CHr	Reticulocyte hemoglobin content
CKD	Chronic kidney disease
CV	Coefficient of variation
CVg	Between-subject biological variation
CVw	Within-subject biological variation
EQA	External quality assessment
ESA	Erythropoiesis-stimulating agent
FDA	Food and Drug Administration
FID	Functional iron deficiency
FS	Forward scatter
GdSE	Hematology Study Group of Italian Society Of Laboratory Medicine
Hb	Hemoglobin
HFR	High-fluorescence reticulocyte
HS	Hereditary spherocytosis
HSCT	Hematopoietic stem cell transplantation
Hypo-He	Hypochromic erythrocytes
ID	Iron deficiency
IPF	Immature platelet fraction (reticulated platelets)
IRF	Immature reticulocyte fraction
IRF-D	IRF doubling time
LFR	Low-fluorescence reticulocyte
MCHr	Mean cellular Hb content of reticulocytes
MCVr	Reticulocyte mean cellular volume
MFR	Medium-fluorescence reticulocyte
MRV	Mean reticulocyte volume
MVC	Volume of mature red cells
NCCLS-ICSH	Clinical and Laboratory Standards Institute and International Council for Standardization in Hematology
NMB	New methylene blue
Ret-He	Reticulocyte hemoglobin equivalent
RET-Y	Reticulocyte hemoglobin parameter
RHCc	Reticulocyte hemoglobin cellular content
RHE	Reticulocyte hemoglobin expression
RPI	Reticulocyte production index
RSf	Red blood cell size factor
SIMeL	Italian Society Of Laboratory Medicine
sTfR	Soluble transferrin receptor

certain chronic diseases, especially after iron therapy. Erb, however, erroneously regarded these cells as transitional forms between white and red corpuscles.

The Late 1800s: Discussions About the Meaning of the Granular Basophilic Filamentous Substance

An eminent investigator in this field was the German researcher and Nobel Prize winner Paul Ehrlich (1854–1915). Ehrlich was a visionary in hematology. He was the first to discover polymorphonuclear leukocytes, making it possible to classify

Download English Version:

<https://daneshyari.com/en/article/3460377>

Download Persian Version:

<https://daneshyari.com/article/3460377>

[Daneshyari.com](https://daneshyari.com)