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THE PREVENTION OF IRON DEFICIENCY IN BLOOD DONORS: THE ITALIAN APPROACH

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Rome, 28 March 2019

MAIN CAUSES OF ABSOLUTE IRON DEFICIENCY/IRON DEFICIENCY ANEMIA

Type of cause	Condition	Pathophysiologic mechanism
Increased iron requirements	Infants, preschool children, adolescents	Rapid growth
	Pregnant women: second and third trimesters	Expansion of maternal and fetal erythroid mass
	ESA treatment	Acute expansion of erythroid mass
Low iron intake	Malnutrition*	Insufficient dietary iron: low heme iron or scarcely bioavailable iron (eg, chelated by phytates)
	Vegetarians, vegans	
Decreased intestinal iron absorption	Gastrectomy, duodenal bypass, bariatric surgery	Decreased absorptive surface
	Gluten-induced enteropathy	
	Autoimmune atrophic gastritis	Increased pH
	Helicobacter pylori infection	Increased pH and blood loss
	Drugs: proton pump inhibitors, H2 blockers	Blocking of gastric acid secretion
	Genetic IRIDA†	High serum hepcidin levels
Chronic blood loss	Hookworm infestation*	Bleeding from gastrointestinal tract
	Gastrointestinal benign and malignant lesions	
	Salicylates, corticosteroids, nonsteroidal anti-inflammatory drugs	
	Heavy menses, hematuria	Bleeding from genitourinary system
	Intravascular hemolysis (PNH, march hemoglobinuria)	Urinary loss of hemoglobin (iron)
	Drugs: anticoagulants, antiplatelet compounds	Systemic bleeding
	Defects of hemostasis (hereditary hemorrhagic telangectasia, von Willebrand disease)	
	Frequent blood donors	Repeated blood letting
Multiple causes (absolute iron deficiency associated with inflammation)	Chronic infections in malnutrition*	Reduced intake, increased proinflammatory cytokines
	Chronic kidney disease	Decreased iron absorption, increased blood loss, reduced hepcidin excretion and increased production, drugs, ESAs
	Chronic systolic heart failure	Decreased iron absorption, increased inflammation, blood loss
	Inflammatory bowel diseases	Decreased iron absorption, increased blood loss, high hepcidin
	Postoperative anemia of major surgery	Blood loss, increased proinflammatory cytokines

ESA, erythropoiesis-stimulating agent; H2 antagonists, histamine receptor blockers; IRIDA, iron-refractory iron deficiency anemia; PNH, paroxysmal nocturnal hemoglobinuria.
*More common in developing countries.
†Rarely resulting from gene mutations other than TMPRSS6.100

IRON DEFICIENCY ANEMIA AFFECTS >1.2 BILLIONS INDIVIDUALS WORLDWIDE, AND IRON DEFICIENCY IN THE ABSENCE OF ANEMIA IS EVEN MORE FREQUENT.

Camaschella C, Blood 2019 133:30-39
doi: https://doi.org/10.1182/blood-2018-05-815944

The prevention of iron deficiency in blood donors: the Italian approach

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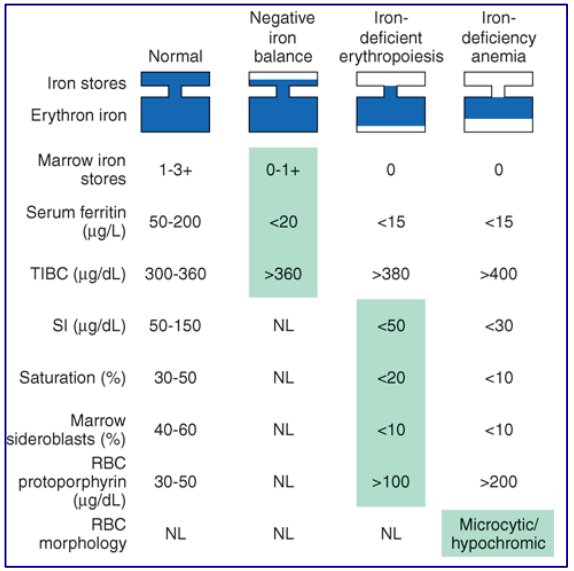
	Iron deficiency	Functional iron deficiency	Iron deficiency anemia	IRIDA	Anemia of chronic disease	Iron deficiency and anemia of chronic disease	Normal values (adult subjects)
Currently used tests							
Serum iron	↓	N/↓	↓	↓	↓	↓	10-30 μMol/L
TSAT, %	≥16	N/↓	<16	<10	N/↓	N/↓	>16<45
Serum ferritin, μg/L	<30	N	<12	Variable	>100	<100	20-200 (F) 40-300 (M)
Hb g/dL	N	N	↓	↓	↓	↓	>12 (F) >13 (M)
MCV, fl	N	N	<80	↓↓	N/↓	↓	80-95
MCH, pg	N	N	<27	↓↓	N/↓	↓	27-34
Other tests							
sTFR	↑	↑	↑	↑	N/↑	Variable	†
sTFR/log ferritin	NA	NA	>2*	NA	<1*	>2*	
ZPP	N	↑	↑	↑	↑	↑	†
Serum hepcidin	↓	↓	↓↓	N/↑	↑	N/↑	†
CHr pg	<25	<29	↓	↓	↓	↓	31.2±1.6
BM iron staining	+	±	−	+	+++	+	±

N indicates normal; TSAT, transferrin saturation; F, females; M, males; Hb, hemoglobin; ZPP, Zn Protoporphyrin; CHr, reticulocyte Hb content; BM, bone marrow; MCV, mean corpuscular volume; MCH, mean corpuscular hemoglobin; and sTFR, soluble transferrin receptor.
* According to Weiss and Goodnough.[28]
† Normal values are according to the method used.
Adapted from Camaschella.[14]

Camaschella C, ASH 2016



Harrison Principles of Internal Medicine, 18° Edition

Low **serum ferritin levels** are the hallmark of absolute iron deficiency, reflecting exhausted stores.

Levels < 30 μg/L are the accepted threshold that identifies **mild cases**; in the presence of **anemia, ferritin levels are usually lower (<10-12 μg/L)**. In the absence of inflammations/infections, serum ferritin shows the best correlation with bone marrow stainable iron, once **the gold standard in assessing depletion of iron stores**

Camaschella C, Blood 2019

Under normal conditions, levels of serum ferritin show a close correlation with iron stores in liver biopsy samples, ***the "gold standard" for measuring the amount of iron in the body.*** **WHO defines low serum ferritin < 15 μg/L in men and <12 μg/L in children. A level of 30 μg/L has been identifed as the most sensitive (92%) and specifc (98%) cutoff level to indicate iron defciency, correlating with the absence of iron stores in the bone marrow regardless of the presence or absence of anemia**

Dignass A, Intern Journal of Chronic Diseases 2018

LITERATURE OVERVIEW 1

Simon TL et al. *JAMA*. 1981.	1017 505 M 516 F	IRON DEFICIENCY Ferritin <12 µg/L	Iron deficiency absent in first time M donors, 12% in first time F donors; Iron deficiency in repeat donors: 8%M 23% F
Milman M et al. Ann Haemat. 1998	268 F 18-30 yrs	IRON DEFICIENCY Ferritin <16 µg/L	Iron deficiency observed in 9.7%, iron deficiency anemia in 2.2%.
Cable R.G. et al. REDS II-RISE Transfusion 2011	2425	AIS (absent iron stores) : Ferritin <12 µg/L IDE (iron deficient erythropoiesis): log (sTfR / ferritin) ≥ 2.07	15% of donors with AIS and 42% with IDE prior to donation. 10% deferred due to low Hb; IDE in 66% F and 49% M frequent blood donors (of these, 27% F and 16% M AIS) . Gender, donation frequency, and country of birth, as well as age, were significantly associated with iron deficiency.
Stribolt Rigas A et al. Transfusion 2014	25877	IRON DEFICIENCY Ferritin < 15 µg/L.	Iron deficiency in 9, 39 and 22% of M, premenopausal F, and postmenopausal F high frequency donors, respectively. The strongest predictors of iron deficiency were: sex, menopausal status, number of blood donations in a 3-year period, and time since last donation.
Magnussen et al. Transfusion 2015	62663	IRON DEFICIENCY Ferritin < 15 µg/L	13% of M showed ferritin <30 ug/L and 1.5% had levels of <15 ug/L. 43% of F had ferritin levels <30 ug/L and 11% <15ug/L.

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LITERATURE OVERVIEW 2

Goldman M et al. Transfusion 2017	12595	Ferritin <25 µg/L	Low-ferritin donors (<25 µg/L) were sent a letter and information sheet and not called for 6 months. Low-ferritin donors: 2.9% of first-time and reactivated male donors, 32.2% of first-time and reactivated female donors, 41.6% of repeat male donors, and 65.1% of repeat female donors. Ferritin increased by 16.3 and 12.1 µg/L in male and female low-ferritin donors and decreased by 17 µg/L in male and female normal-ferritin donors.
Vassallo et al. Transfusion 2018	110,417 (Teens)	Low ferritin (LF) < 20 µg/L F < 30 µg/L M	Donors with LF were deferred from red blood cell (RBC) donations (12 months for females, and 6 for males) and counseled to take low-dose iron for 60 days. LF is more common in teenage female than male donors and those with RBC donations in the prior 24 months.
Dijkstra A. et al. Transfusion 2019	21	IDE Ferritin < 30 µg/L	Donors with Ferritin < 30 µg/mL showed a significantly lower value for hemoglobin, mean corpuscular volume (MCV), reticulocytes, and reticulocyte hemoglobin content compared to the normal ferritin group Repeat whole blood donors with a ferritin value of 30 µg/L or less have iron-deficient erythropoiesis and therefore require a longer donation interval

LITERATURE OVERVIEW 2

Bialkowski W et al. Vox Sang. 2015 Mast AE et al. Transfusion 2016 Cable RG, et al. Transfusion. 2017. STRIDE	692	AIS : Ferritin <12 µg/L IDE : Ferritin < 26 µg/L	Donors randomized to educational groups either received letters thanking them for donating, or, suggesting iron supplements or delayed donation if they had low ferritin. Donors randomized to interventional groups either received placebo, 19-mg or 38-mg iron pills. Iron deficient erythropoiesis was present in 52.7% of males and 74.6% of females at enrolment. Incidence of deenrolment within 60 days more common in the interventional groups than in the educational groups (P = 0.002), but not more common in those receiving iron than placebo (P = 0.68).
Kiss et al. REDS III JAMA 2015	215	Iron-depleted Ferritin ≤26 µg/L Iron-replete Ferritin >26 µg/L	Randomized, non-blinded clinical trial (one tablet of ferrous gluconate daily vs no iron for 24 weeks after donating a unit of whole blood - 500 mL). Iron supplementation shortened time to 80% Hb recovery in both low-ferritin and higher-ferritin groups. Recovery of iron stores in all participants who received supplements took a median of 76 days; without iron supplementation, median recovery time was longer than 168 days; P < .001. Without iron supplements, 67% of participants did not recover iron stores by 168 days
Di Angelantonio et al. INTERVAL Lancet 2017	45 263		Whole blood donors randomly assigned (1:1:1) to: M- 12-week vs 10-week vs 8-week inter-donation intervals, F- to 16-week vs 14-week vs 12-week intervals. More frequent donation resulted in more donation-related symptoms), lower mean Hb and Ferritin concentrations, and more deferrals for low Hb (p<0·0001 for each)

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LITERATURE OVERVIEW 2

International forum: an investigation of iron status in blood donors

Vuk T et al. *Blood Transfus 2017*

Table II - Donation interval, frequency and volume.

Country	Reporting level	Interval[1]		Donations/year		Volume collected (mL)	
		Females	*Males*	*Females*	*Males*	*Units*	*Samples*
Austria	National	8 weeks	8 weeks	-	-	450±10%	40
Belgium	National/Institutional*	2 months	2 months	4	4	Max 470*	Max 30*
Bulgaria	National	2 months	2 months	4	5	450±10%	17
Croatia	National	4 months	3 months	3	4	450±10%	35
Cyprus	National	120 days	90 days	3	4	450±10%	≤10
Chech Republic	Institutional	10 weeks	10 weeks	4	5	450 target	Max 20
Denmark	Regional	90 days	90 days	4	4	450±10%	Approx. 40
Estonia	National	2 months	2 months	4	6	450±10%	Approx. 35
Finland	National	91 days	61 days	4	6	465 target (415-515)	30
France	National	8 weeks	8 weeks	4	6	Max 500 (not >13% TBV)	30-40
Germany	Regional	56 days	56 days	4	6	Target 500	Max 30
Greece	National	2 months	2 months	3-4	4-6	450±20	20-30
Italy	Local	90 days	90 days	2	4	450 target	Max 40
Latvia	National	9 weeks	9 weeks	4	6	450	35
Lithuania	National/Institutional*	2 months	2 months	4	6	405-495*	20*
Luxembourg	National	4 months	3 months	3	4	500±10%	30
Malta	National	4 months	3 months	3	4	475±10%	10-15
The Netherlands	National	8 weeks	8 weeks	3	5	450-550	30
Poland	National	8 weeks	8 weeks	4	6	450±10%	Approx. 40
Portugal	Local	4 months	3 months	3	4	450±10%	35
Romania	Institutional	90 days	70 days	4	5	450±10%	Approx. 18
Slovakia	National	4 months	3 months	3	4	450 target	25
Slovenia	National	4 months	3 months	3	4	450±10%	23
Spain	Regional	2 months	2 months	3	4	411-495	24
Sweden	National	12 weeks	12 weeks	3	4	450±10%	No data
United Kingdom	National	12 weeks	12 weeks	7 times in 2 years (advise)		475±10%	20-35

[1]Data reported as per individual contributions; *institutional data. TBV: total blood volume.

Minimum haemoglobin levels to donate blood and blood components resulted nearly identical among member states , following the European Union Directive 2004/33/ EC. Clear differences exist when comparing the minimal intervals between whole blood donations and the maximum number of donations that can be collected annually. Despite the great interest of professionals in this topic, relatively few studies have been conducted to investigate iron stores in blood donors in the European Union. Although 38% of participants use ferritin measurement, this method is implemented on a larger scale in only three countries. Although a majority of participants (14/26) use supplementation as a means to manage iron deficiency in blood donors, there are important differences in the approaches to administering supplementary iron to prevent or correct iron deficiency

THE ITALIAN APPROACH

GAZZETTA UFFICIALE

DELLA REPUBBLICA ITALIANA

PARTE PRIMA Roma - Lunedì, 28 dicembre 2015 SI PUBBLICA TUTTI I GIORNI NON FESTIVI

ACCERTAMENTO DEI REQUISITI FISICI DEL DONATORE ED ESAMI OBBLIGATORI AD OGNI DONAZIONE E CONTROLLI PERIODICI

PARTE A

1. **Requisiti fisici per l'accettazione del donatore di sangue intero e di emocomponenti mediante aferesi**

1.1. Ad ogni donazione il donatore di sangue e emocomponenti deve essere valutato per i parametri di seguito indicati e in relazione ai relativi requisiti:
- 1.1.1. Età compresa tra 18 e 65 anni
- 1.1.2. Peso non inferiore a 50 Kg
- 1.1.3. PA sistolica inferiore o uguale a 180 mm di mercurio
- 1.1.4. PA diastolica inferiore o uguale a 100 mm di mercurio
- 1.1.5. FC regolare, compresa tra 50 e 100 battiti/minuto
- 1.1.6. Hb ≥ 13,5 g/dL nell'uomo
- 1.1.7. Hb ≥ 12,5 g/dL nella donna

1.2 La donazione di sangue intero da parte di donatori periodici di età superiore ai 65 anni fino a 70 può essere consentita previa valutazione clinica dei principali fattori di rischio età-correlati.

1.3 Persone che esprimono la volontà di donare per la prima volta dopo i 60 anni possono essere accettati a discrezione del medico responsabile della selezione.

1.4 I donatori che pratichino attività sportiva agonistica o intensa possono essere accettati anche con frequenza cardiaca inferiore ai valori di riferimento indicati.

1.5 I donatori addetti a lavori che comportino rischio per la propria o l'altrui salute possono essere ammessi alla donazione qualora osservino il riposo nella giornata della donazione.

1.6 I donatori eterozigoti per alfa o beta talassemia possono essere accettati per la donazione di sangue intero, nell'ambito di protocolli definiti dal Servizio Trasfusionale, con valori di emoglobina non inferiori a 13 g/dL nell'uomo e 12 g/dL nella donna.

1.7 I soggetti rilevati portatori di emocromatosi, con documentazione clinica di assenza di danno d'organo, possono essere accettati per la donazione di sangue intero. Il numero di donazioni nell'anno non deve essere superiore a 4 per l'uomo e per la donna non in età fertile, a 2 per la donna in età fertile.

1.8 Dopo la donazione il donatore deve osservare adeguato riposo sulla poltrona o sul lettino da prelievo e ricevere congruo ristoro comprendente l'assunzione di liquidi in quantità adeguata. Al donatore debbono inoltre essere fornite informazioni sul comportamento da tenere nel periodo post-donazione

Hb levels ≥ M 13,5 mg/L
F 12,5 mg/L

Minimal interval between whole blood donations : 90 days

Max nr of donations/year:
4 → M and and non-childbearing age F
2 → F

Target volume of whole blood donations :
450 ml + max 40 ml

THE ITALIAN APPROACH

GAZZETTA UFFICIALE

DELLA REPUBBLICA ITALIANA

PARTE PRIMA **Roma - Lunedì, 28 dicembre 2015** SI PUBBLICA TUTTI I GIORNI NON FESTIVI

DIREZIONE E REDAZIONE PRESSO IL MINISTERO DELLA GIUSTIZIA - UFFICIO PUBBLICAZIONE LEGGI E DECRETI - VIA ARENULA, 70 - 00186 ROMA
AMMINISTRAZIONE PRESSO L'ISTITUTO POLIGRAFICO E ZECCA DELLO STATO - VIA SALARIA, 691 - 00138 ROMA - CENTRALINO 06-85081 - LIBRERIA DELLO STATO PIAZZA G. VERDI, 1 - 00198 ROMA

2. Per ciascuna di queste indagini, in caso di campioni inizialmente reattivi deve essere applicato l'algoritmo diagnostico indicato nell'allegato VIII.
3. In occasione della prima donazione devono essere inoltre eseguiti i seguenti esami:
   3.1 fenotipo ABO mediante test diretto e indiretto
   3.2 fenotipo Rh completo
   3.3 determinazione dell'antigene Kell e, in caso di positività dello stesso, ricerca dell'antigene Cellano.
   3.4 ricerca degli anticorpi irregolari anti-eritrocitari.
4. Alla seconda donazione, se non già confermati, devono essere confermati fenotipo ABO ed Rh completo e l'antigene Kell. Su ogni successiva donazione devono essere confermati il fenotipo ABO (solo test diretto) ed Rh (D).
5. La ricerca di anticorpi irregolari anti-eritrocitari deve essere ripetuta in presenza di eventi che possono determinare una stimolazione immunologica del/della donatore/donatrice.
6. Il donatore periodico è sottoposto, con cadenza almeno annuale, ai seguenti controlli ematochimici: glicemia, creatininemia, alanin-amino-transferasi, colesterolemia totale e HDL, trigliceridemia, protidemia totale, ferritinemia.
7. L'esame emocromocitometrico e il dosaggio della ferritina sono sistematicamente tenuti in considerazione ai fini della prevenzione della riduzione patologica delle riserve marziali nel donatore e della personalizzazione della donazione.
8. Entro 12 mesi dall'entrata in vigore del presente decreto il CNS effettua le necessarie valutazioni in merito all'opportunità di introdurre ulteriori evoluzioni tecniche del test HIV 1 NAT e la determinazione aggiuntiva dell'HIV 2 RNA, ove già non effettuata.

FERRITIN TEST

at least once/yearly in regular donors

IRON DEFICIENCY MANAGEMENT

Complete blood count and ferritin levels are systematically taken into account with the aim to prevent iron deficiency, tailoring blood donation

IMMUNOHEMATOLOGY AND TRANSFUSION MEDICIN UNIT, POLICLINICO UMBERTO 1, «SAPIENZA»

FERRITIN TEST

performed at least once a year

M < 30 µg/L

F < 15 µg/L

- **MEDICAL EXAMINATION -> blood loss, inadequate diet or defects in iron absorption ?**
- **OCCULT BLOOD LOSS -> screening for fecal occult blood, gastrointestinal or rectosigmoid endoscopic ultrasonography**
- **INADEQUATE DIET -> diet correction**
- **YOUNG FEMALE DONORS -> evaluation of menstrual abnormalities**
- **IN CASE OF PERSISTENT LOW FERRITIN VALUE -> evaluation of malabsorption syndromes and / or other diseases (celiac disease).**

IRON THERAPY or LENGTHENING INTER-DONATION INTERVAL

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GENERAL PURPOSE AND AIMS OF THE PROJECT

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

MAIN ENDPOINTS

1. To evaluate the efficacy of the Italian strategy to prevent iron deficiency in blood donors
2. To define incidence and distribution of iron deficiency in periodic blood donors
3. To schedule the best strategy to manage donors at high risk to develop Iron deficiency

FERRITIN
≤ 30 µg/L
≤ 15 µg/L

Complete Blood Count

INCLUSION CRITERIA AND RESULTS

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

Inclusion Criteria:
All consecutive repeat whole blood donors
from July 2018 to December 2018

Transfusion Medicine and Immunohematology Unit

RESULTS (on regular donors)	
DONORS (Total Nr)	6006
WHOLE BLOOD DONATIONS	5821
DONORS WHO DONATED WHOLE BLOOD AT LEAST TWICE IN THE PREVIOUS 6 MONTHS	436
DEFERRALS (Total) on regular donors	318
DEFERRALS FOR LOW HB LEVELS	96

The prevention of iron deficiency in blood donors: the Italian approach

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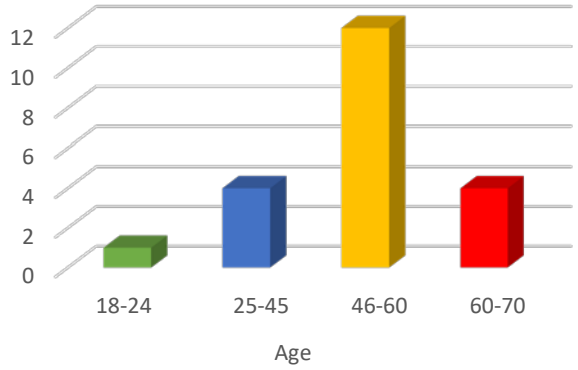
RESULTS

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

General Characteristics		
Sex M F	397 39	91% 9%
Age 18-24 25-45 46-60 60-70 Median Age Range	20 125 238 53 50 yrs 18-69 yrs	4.58% 28.66% 54.6% 12.1%
Donation of WB in past 12 months 2 >2	 433 3	 99.3% 0.68%
Ferritin Median and Range (µg/L) Hb Median and Range (g/dL) M F Ht Median and Range (%) MCV Median and Range (fL)	43 (9-250) 14.6 (12.6-16.7) 14.5 (13.1 -16.7) 13.3 (12.6-14.9) 43.3 (38.3-52) 87 (77-101)	
Donors with Ferritin ≤ 30 µg/L M F Donors with Ferritin ≤ 15 µg/L M F	126 107 19 21 9 12	28.9% 85% (26.9% of M) 15% (48.7% of F) 4.8% 42.9% (2.3% of M) 57.1% (30.8% of F)
	Total 436	



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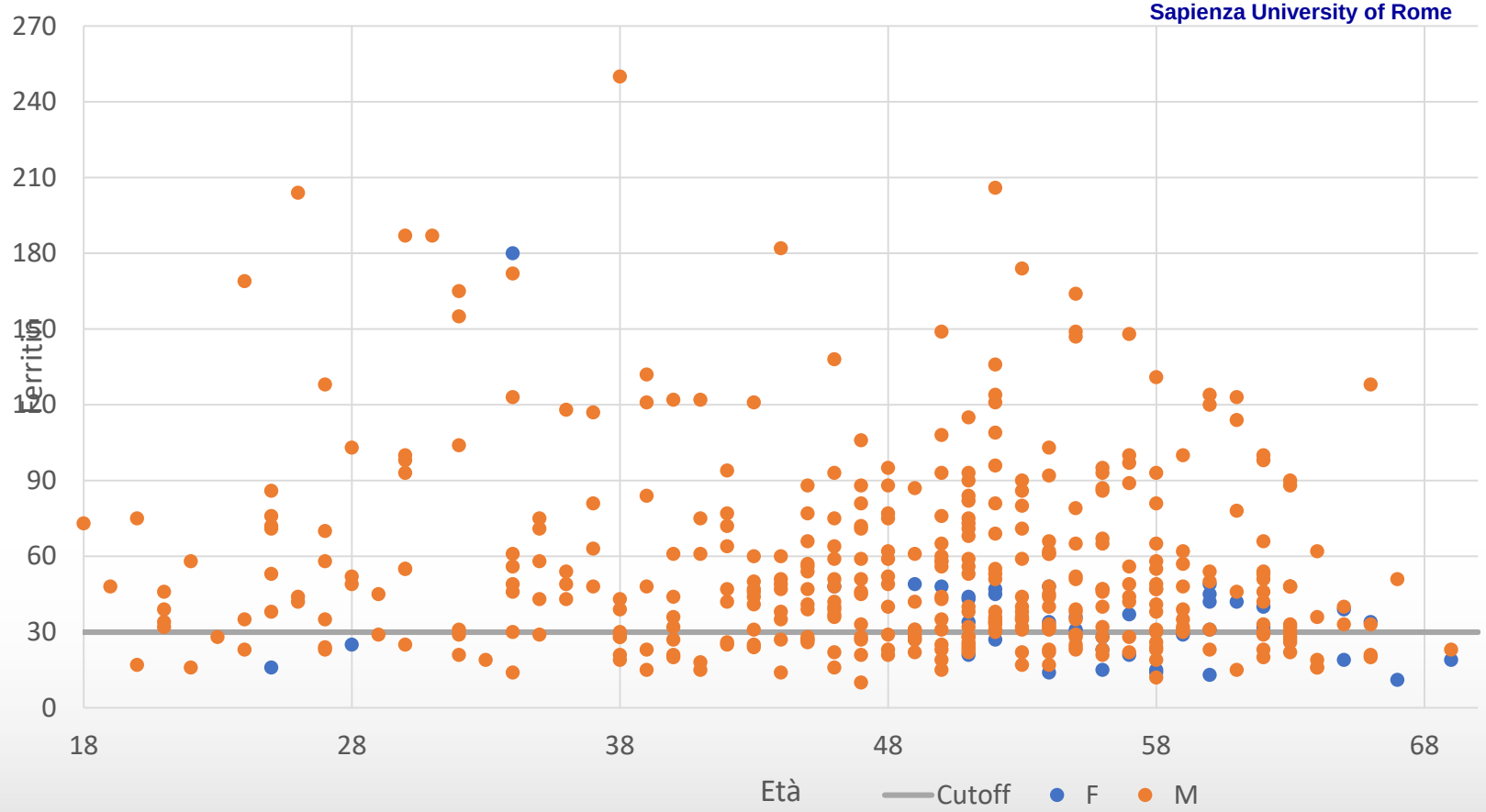
FERRITIN DISTRIBUTION ACCORDING TO AGE AND SEX

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome



Ferritin Median and Range : 43 (9-250)

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FERRITIN ACCORDING TO AGE AND SEX

RETROSPECTIVE MONOCENTRIC STUDY
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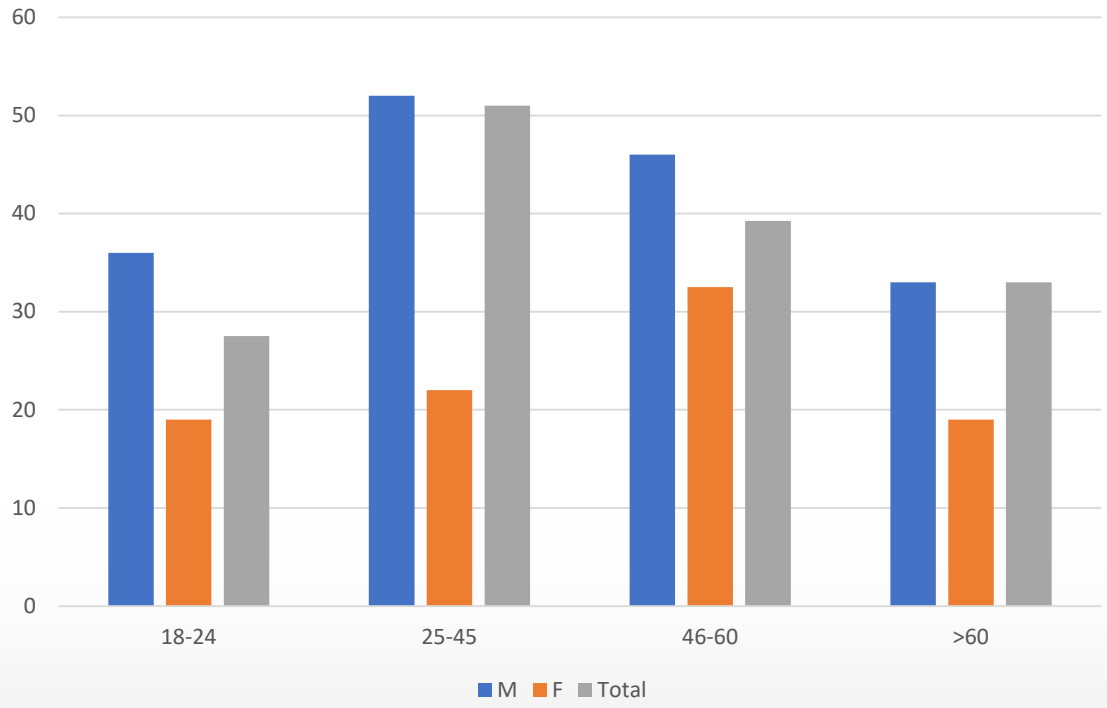

FERRITIN ACCORDING TO AGE AND SEX (median and range)

18-24 yrs
M 36 (15-128)
F 19 (11-34)
Total Nr. 20

25-45 yrs
M 52 (14-250)
F 22 (19-25)
Total Nr. 125

46-60 yrs
M 46 (17- 250)
F 32,5 (13-49)
Total Nr. 238

> 60 yrs
M 33 (15-128)
F 19 (11-38)
Total Nr. 53

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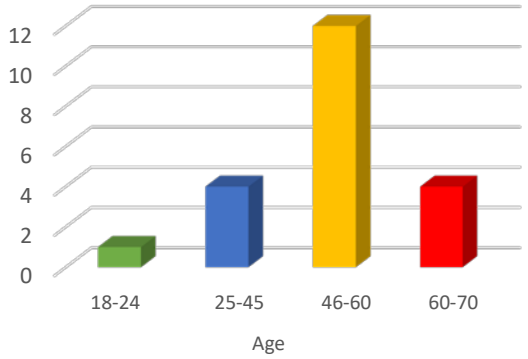
DONORS WITH LOW FERRITIN VALUE

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

Donors with Ferritin ≤ 30 µg/L		
Sex M F	107 19	85 % 15 %
Age 18-24 25-45 46-60 60-70 Median Age yrs Ragne yrs	7 31 70 18 50 20-68	5.6 % 24.6% 55.5% 14.3%
Ferritin Median and Range (µg/L) F - Ferritin > 15 µg/L and < 30 Hb Median and Range (g/dL) M F Ht Median and Range (%) MCV Median and Range (fL)	24 (9- 29) 7 14.2 (12,5-16,4) 14.3 (12,8-16,4) 13.7 (12,5-14,9) 43 (38,1-48,6) 86 (77-98)	
	Total 126	28,9%



Sex	Hb g/dL	Nr. of Donors	Nr. of Donors %	Ferritin (µg/L) Median and Range	Nr. of donations in past 12 months
F	12.5-12.9 ≥13.00	5 14	26.3% 73.7%	13.5 (12-15) 23 (9-34)	2 2
M	13.5-13.9 ≥14.00	18 89	16.8% 83.2%	24 (10-35) 22 (10-63)	2 2

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DONORS WITH LOW FERRITIN VALUE

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
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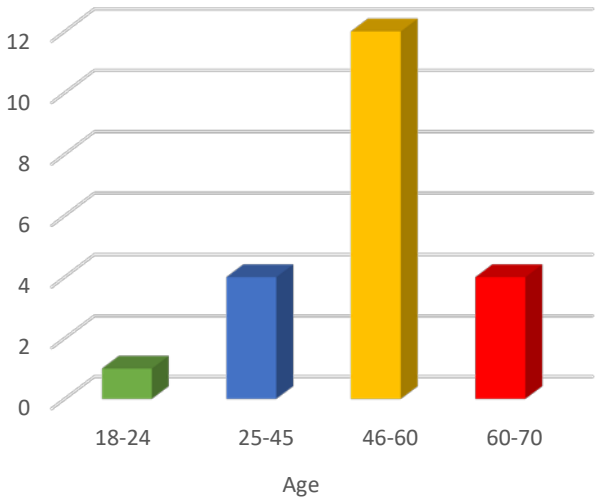
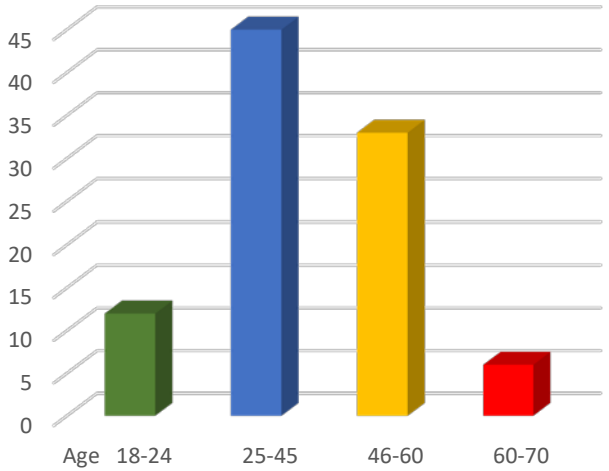
Donors with Ferritin ≤ 15 µg/L		
Sex M F	9 12	42.9 % (2.3% TOT M) 57.1% (30.8 % TOT F)
Age 18-24 25-45 46-60 60-70 Mean Age (yrs) Range	1 4 12 4 55 24-67	4.8% 19% 57.2% 19%
Ferritin Median and Range (µg/L) Hb Median and Range (g/dL) M F Ht Median and Range (%) MCV Median and Range (fL)	14 (9- 15) 13.8 (12.6-15.7) 13.9 (13.2-15.7) 13.6(12.6-13.8) 41.5 (38.1-48.4) 86.5 (77-93)	
	Total 21	4,8%



DONOR DEFERRAL DUE TO ANEMIA

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

Donors deferred due to Anemia		
Sex M F	45 51	46.9% 53.1%
Age 18-24 25-45 46-60 60-70 Median Age (yrs) Range	12 45 33 6 42 20-64	12.5% 46.9% 34.4% 6.2%
Donation of WB in past 12 months 2	29	64.4%
Ferritin Median and Range Donor with Ferritin ≤ 30 µg/L M F Donor with FerrItin ≤ 15 µg/L M F	23 (5-123) 45 12 33 19 5 14	 46.85% 26.6% 26.6% of M 73.4% 64.7% of F 19.8% 26,32% 11.1% of M 73,68% 27.4 % of F
	Total 96	30.2 % of deferrals 1.5% of total repeat donors



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DONOR DEFERRAL DUE TO ANEMIA

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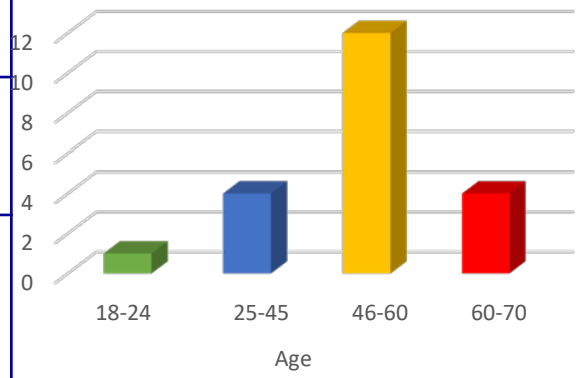
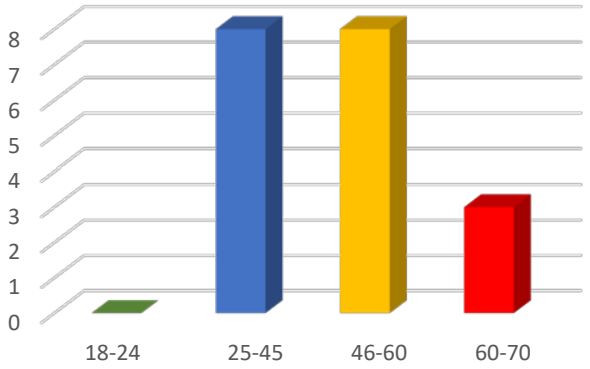
Donors with Anemia and Ferritin ≤ 30 µg/L			
Sex M F	12 33	26.6% 73.3%	26.6% of M (with anemia) 64.7% of F (with anemia)
Age 18-24 25-45 46-60 60-70 Mean Age (yrs) Range	5 18 18 4 45 20-64	11.1% 40% 40% 8.9%	
Donation of WB in past 12 months Median Range	 1 0-2		
	Total 45	46.85% of donors deferred for anemia 14.5 % of deferrals 0.7% of total repeat donors	



DONOR DEFERRAL DUE TO ANEMIA

RETROSPECTIVE MONOCENTRIC STUDY
Transfusion Medicine and Immunohematology Unit
Sapienza University of Rome

Donors with Anemia and Ferritin ≤15 µg/L		
Sex M F	5 14	26.6% 11.1% of M (with anemia) 34.4% 27.5 % of F (with anemia)
Age 18-24 25-45 46-60 60-70 Mean Age (yrs) Range	0 8 8 3 41 25-63	0 42.1% 42.1% 15.8%
Donation of WB in past 12 months Median Range	1 1 0-4	
	Total 19	19.8% of donors deferred for anemia 6% of deferrals 0.3% of total repeat donors



FINAL CONSIDERATIONS

- Detection of subliclinical iron deficiency in blood donors is important to prevent donors from becoming anemic;

- In our experience, ferritin levels ≤ 30 µg/L were found in 28.9% of repeat donors (26.9% and 48.7% of M and F, respectively); a ferritin level ≤ 15 µg/L in 4.8% of repeat donors (2.3% and 30.8% of M and F, respectively)
- Low hemoglobin occured in 1.5% of repeat donors (30% of deferrals);

- In case of iron deficiency, it is important to assess a complete evaluation, taking into account factors like donor's age and sex, menstrual status, family history of gastrontestinal cancer, the presence of any symptoms or signs of possible underlying conditions
- Additional studies are required to successfully develop the optimal intervention in iron deficient donors

PROPOSAL

Survey
with the aim to propose a common consensus
on Iron deficiency management in blood donors

Prospectic multicentric Study
Including all first time and regular blood donors

Ferritin evaluation at baseline and after Whole blood donation

In case of Ferritin value ≤ 30 µg/L

Randomization
- Interval lenghtening
- Iron supplement → all days or alternance days

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