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Eating, Eating, Eating. What Time was your Last Food Intake?

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Diagnostic methods in medical sciences (i.e. laboratory hematology testing) is an essential part of the decision-making process, wherein results of laboratory testing often influence diagnosis and treatment of a variety of hematology disorders [1]. We have read with interest the article by Klop et al. where the authors address important aspects of preanalytical variability as regards the postprandial period [2]. Preanalytical variability, including biological variability and patient preparation (i.e. adequate fasting time before blood collection) is still an important source of variability in laboratory testing [3, 4]. Therefore, the preanalytical phase actually represents the most critical area to target for achieving major improvements in the total quality of laboratory diagnostics. Quality and safety in diagnostic testing is, however, essential to furthering the goal of high-quality, beneficial healthcare outcomes and patient safety. Klop et al. had shown that transitory changes in leukocyte cell population - in the 4 to 8 hours postprandial period – due to oral fat loading test are similar to alterations detected during various infections [2]. Thus, caring physicians unaware of the real patient situation might abstain from appropriate treatments as a consequence of such variations in the postprandial period. In a previous study Lippi et al. evaluated the influence of a regular, light meal on hematological tests at one, two and four hours after a standardized food intake. The different leukocyte populations showed the following after-meal variations: i) at one hour, significant increases in neutrophils (7.4%, $P=0.009$), whereas lymphocytes and monocytes, were significantly decreased (-17.4%, $P<0.0001$ and -6.9%, $P=0.014$ respectively); ii) at two hours, the neutrophil count remained significantly increased (7.6%, $P=0.043$), whereas lymphocyte and eosinophil counts were significantly decreased (-18.7%, $P<0.0001$ and -15.4%, $P=0.001$ respectively); and iii) at four hours, eosinophils were significantly decreased (-23.2%, $P=0.003$) [5]. As regards lymphocytes Klop et al. had shown a significant increase four and eight hour after meals (10%, $P<0.05$ and 25%, $P<0.001$ respectively) [2]. In order to compare Lippi et al. vs. Klop et al. results we calculated the mean % differences (Table 1). Looking at the results: i) Klop et al. could have missed an initial decrease in lymphocyte counts during the first hours of the oral fat loading test; ii) the comparison between studies is challenging since different meal compositions were used (light meal versus a fat load) [2]. We hence wonder whether Klop et al. actually observed a significantly increase (3.4× higher than that specified by desirable bias based on biological variation, see Table 1) eight hour after fat load, or this was rather due to preanalytical variability? Unfortunately this question remains unanswered because essential details about specimen handling are missing (i.e., staff that performed blood collection, time of tourniquet application, mixing tubes, etc). Previous study had shown that the venous stasis per se can increase lymphocytes from 0.8 to 2.8% [6]. We believe that the 25% lymphocyte variation shown by Klop et al. really represents an important information about postprandial-induced variability but a better description as suggested by Rifai et al. [7] could add reliability to this important study. Presently in daily practice the laboratory staff and/or phlebotomists only ask patients about fasting time for glucose and/or lipid profile (triglycerides and cholesterol fractions). In our opinion it is time to standardize the fasting time for all diagnostic blood specimen collections. In the hospital setting the most important question should be "What time was your last food intake?" at patient admission. With this information the laboratories could provide a personalized blood collection during hospitalization period, thus minimizing the variability due to the postprandial period, able to influence both diagnosis and follow-up.

References

1. Hallworth M, Hyde K, Cumming A, Peake I (2002) The future for clinical scientists in laboratory medicine. Clin Lab Haematol 24: 197-204.

2. Klop B, van de Geijn GJ, Njo TL, Janssen HW, Rietveld AP, et al. (2013) Leukocyte cell population data (volume conductivity scatter) in postprandial leukocyte activation. Int J Lab Hematol .

3. Lippi G, Becan-McBride K, Behúlová D, Bowen RA, Church S, et al. (2013) Preanalytical quality improvement: in quality we trust. Clin Chem Lab Med 51: 229-241.

4. Lima-Oliveira G, Salvagno GL, Lippi G, Gelati M, Montagnana M, et al. (2012) Influence of a regular, standardized meal on clinical chemistry analytes. Ann Lab Med 32: 250-256.

5. Lippi G, Lima-Oliveira G, Salvagno GL, Montagnana M, Gelati M, et al. (2010) Influence of a light meal on routine haematological tests. Blood Transfus 8: 94-99.

6. Lima-Oliveira G, Lippi G, Salvagno GL, Montagnana M, Scartezini M, et al. (2011) Transillumination: a new tool to eliminate the impact of venous stasis during the procedure for the collection of diagnostic blood specimens for routine haematological testing. Int J Lab Hematol 33: 457-462.

7. Rifai N, Annesley TM, Berg JP, Brugnara C, Delvin E, et al. (2012) An appeal to medical journal editors: the need for a full description of laboratory methods and specimen handling in clinical study reports. Am J Hematol 87: 347-348.

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	Desirable bias (%)	1 hour after meal mean % difference		2 hour after meal mean % difference		4 hour after meal mean % difference		8 hour after meal mean % difference	
		Klop et al.	Lippi et al.	Klop et al.	Lippi et al.	Klop et al.	Lippi et al.	Klop et al.	Lippi et al.
Total leucocyte	5.6	NA	- 3.0	NA	- 2.4	**+ 8.3**	+ 4.3	**+ 18.7 ****	NA
Lymphocyte	7.4	NA	**- 17.4 ****	NA	**- 18.7 ****	**+ 10.0 ***	- 4.9	**+ 25.0 ****	NA
Monocyte	13.2	NA	- 6.9 *	NA	- 3.0	- 2.2	+ 4.4	**+ 14.8 ****	NA
Neutrophil	9.0	NA	+ 7.4 *	NA	+ 7.6 *	**+ 11.6**	**+ 10.7**	**+ 13.6**	NA
Eosinophils	19.8	NA	- 6.8	NA	- 15.4 **	NA	- 23.2 *	NA	NA
Basophils	15.4	NA	+ 4.2	NA	- 6.2	NA	+ 0.3	NA	NA

NA: not available; * P<0.05; ** P<0.001

Mean % differences were determined according to the formula:

mean % difference = [(postprandial period after meal - basal) / postprandial period after meal] $\times$ 100.

The bold mean % differences represent clinically significant variations, when compared with desirable bias. Desirable bias is conventionally one of the three levels of quality specification; it is the higher level of expectation in terms of quality, followed by optimal and minimal.

Table 1: Leucocyte variability in postprandial period.