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Can we always take analysis of complete blood count by automated blood cell analyzer as absolutely correct?

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Dear Editor,

Automated blood cell analyzer is a rapid and cost-effective method for complete blood cell count (CBC) and leukocyte differential count (LDC), and the results are very precise and reliable. However, in certain situations where results do not correspond to the clinical findings, it may be advisable to perform a manual LDC [1]. We recently experienced such a case.

Before travelling abroad for several months, a 76-year-old female patient, in whom only monocytosis and granulocytopenia were found in November 2013 (CBC – hemoglobin 130 g/l, white blood cells 4.77×10^9/l, platelets 280×10^9/l; LDC – neutrophils 11.2%, lymphocytes 37.8%, monocytes 36.2%, basophils 0.9%, eosinophils 4.3%, and large unstained cells 9.6%) underwent a regular control of all laboratory data, including a complete blood count. On subsequent controls, performed in respectable laboratories in November 2014, April 2015, and October 2015, LDC showed presence of severe granulocytopenia and monocytosis, which was constantly above 40%. The patient remained without any complaints throughout the stated period of time, with normal physical findings and in completely good health. Biochemistry data were within normal limits all the time. On abdominal ultrasonography, both liver and spleen were homogenous and of normal size. The accessory spleen in the splenic hilum of 2.5 cm in diameter was seen. Small nodes of up to 3 mm in diameter were seen on ultrasonography in both lobes of the thyroid gland. There was no lymphadenopathy.

The patient was referred to the hematologist in a highly respectable hematology institution in Belgrade where CBC, LDC, and biochemistry were reexamined. After checking the results, the hematologist expressed suspicion that the patient might have had a myelodysplastic syndrome, CMML type (chronic myelomonocytic leukemia) and suggested an examination of bone marrow cytology and histology. Being completely symptom-free, the patient did not accept the examination as she had to travel again and stay abroad for several months. Hence, the patient was advised to undergo regular CBC monitoring abroad and to take 1,000 mg of vitamin C, two tbl (5 mg) of folic acid, 1,000 mg of vitamin B_{12} daily. As she stayed asymptomatic throughout her stay abroad, the patient did not follow the advice on monitoring CBC. After the patient returned, another CBC checkup was performed, again showing the same results as before: granulocytopenia and monocytosis above 40%.

On October 5, 2015, the patient came to the Laboratory Department of the Clinic of Hematology, Clinical Center of Serbia, Belgrade, where CBC and LDC were checked, both using automated blood cell analyzer and manual differential leukocyte formula, both showing almost exactly the same data: neutrophils 50%, lymphocytes 39%, monocytes 8%, eosinophils 2%, and basophils 1%. The dilemma about the cause of "severe granulocytopenia and monocytosis" was solved as error of automated blood cell analyzer. Apparently, the number of the previous machine count had been incorrect for some reason, taking most of the granulocytes as monocytes.

What can be a possible explanation for repeated mistakes of the automatic blood cell analyzer?

The blood monocytes are the largest cells in normal blood. They are in transit between the bone marrow and tissues, where they transform into macrophages. They participate in virtually all inflammatory and immune disorders, and thus their concentration may be increased in many such conditions, including autoimmune diseases, gastrointestinal disorders, sarcoidosis, and several viral and bacterial infections [2]. All such conditions could have been excluded as the patient has stayed well for more than two years now, without any symptom and with normal all other laboratory data. As profound monocytosis may represent a hematologic disorder or malignancy, such as myelodysplastic and myeloproliferative syndromes or monocytic leukemia, a further, more sophisticated and aggressive analyses should be performed in such a case. All these possibilities were taken into consideration, but were very unlikely in our patient. That's why we considered the monocytosis as probable automated blood cell analyzer error. Hence, before undertaking

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these invasive procedures in the patient, we performed a classical manual blood film examination, which proved to be the right decision.

We believe that, in absence of clinical symptoms and signs of any disease, an "abnormal" CBC and LDC alone should be interpreted within the context of an individual's health condition and sometimes checked using classical methods before performing invasive diagnostic procedures. At the end, one has to be aware of the well-known fact that as much as 5% of the general population without disease may display laboratory values outside the statistically assigned "normal" reference range [3].

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