

# HYPERSEGMENTATION OF NEUTROPHILS

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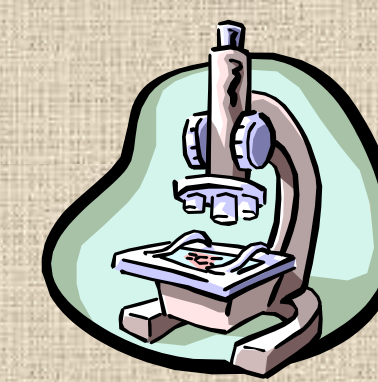
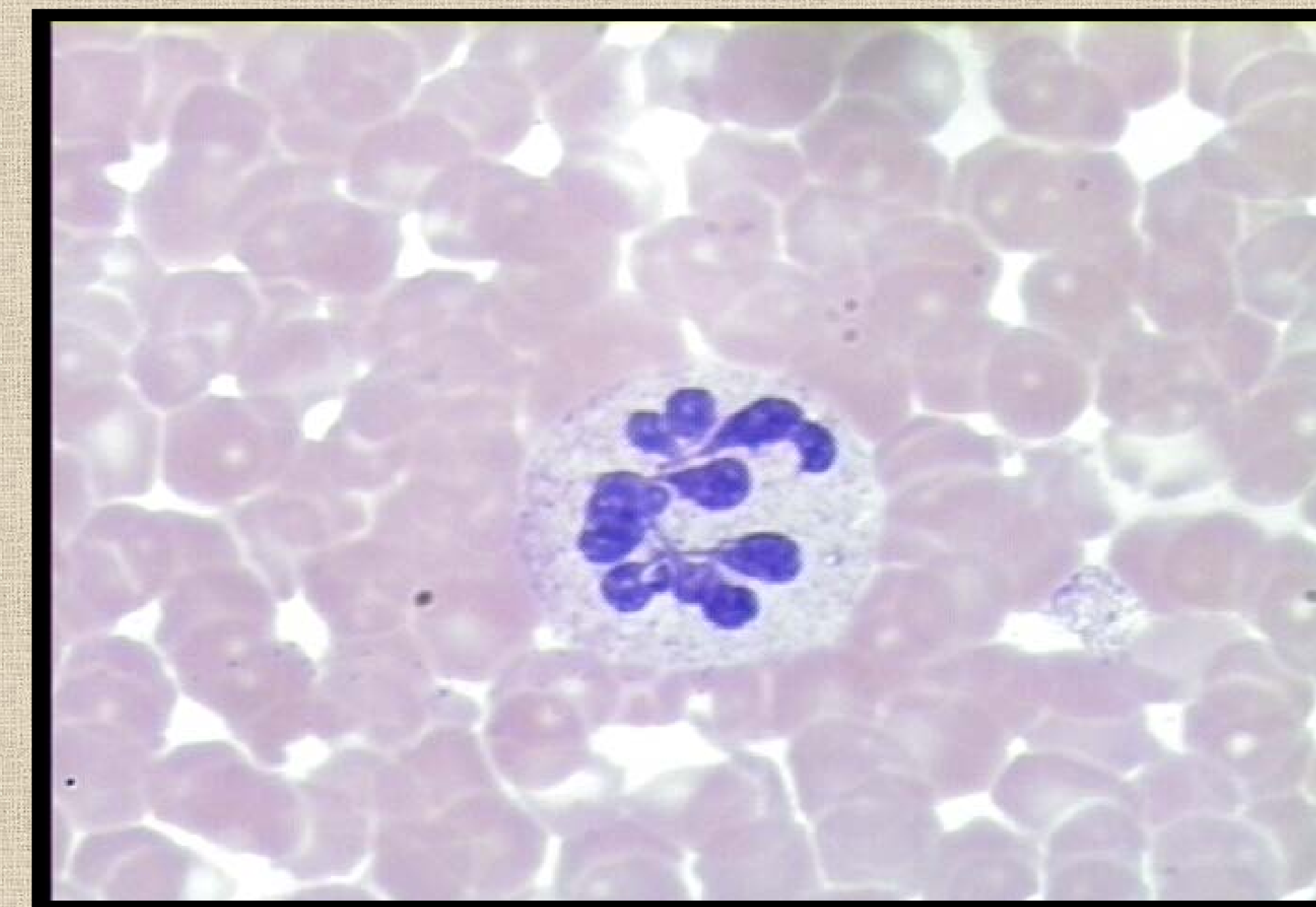
## Case Report

We present a case of marked hypersegmentation of neutrophils in the presence of normal vitamin B12 and folate levels.

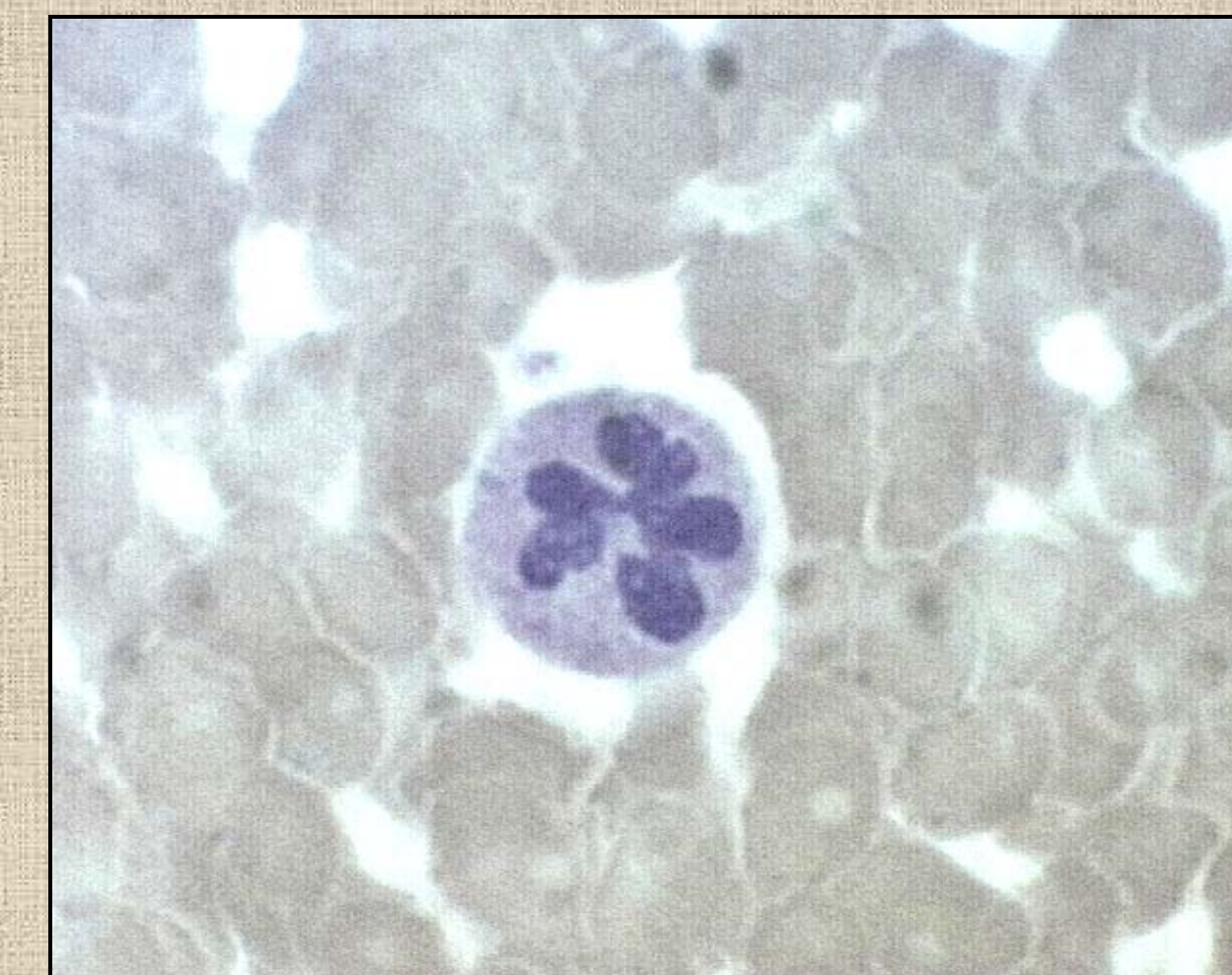
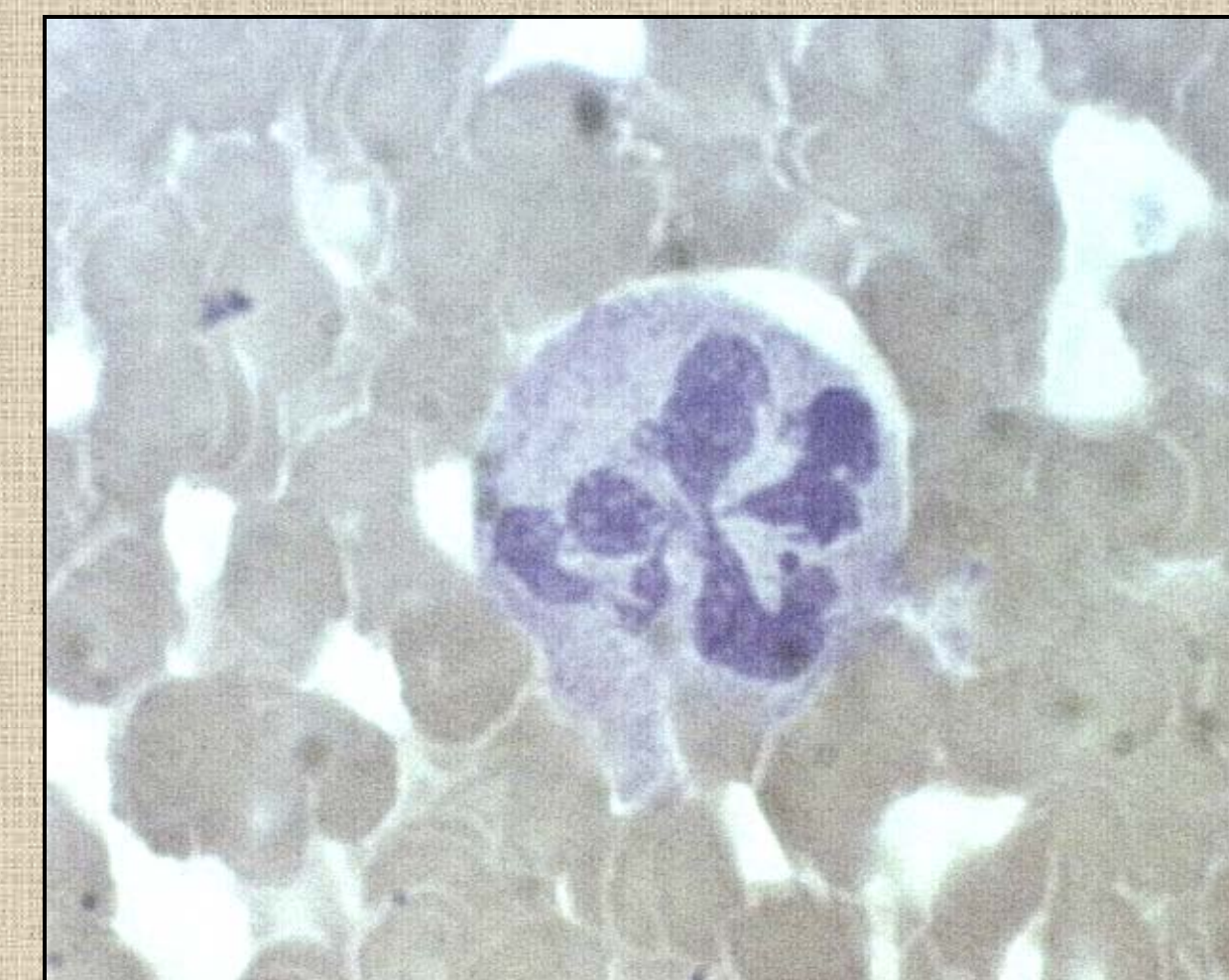
A blood sample was received in the Hematology laboratory for complete blood count and peripheral blood smear examination. The hemoglobin was 7.26 gm/dl, WBC count was  $0.220 \times 10^3/\mu\text{l}$ , and the platelet count was  $14.6 \times 10^3/\mu\text{l}$ . Since the total white blood cell count was extremely low, a buffy coat smear was prepared to perform the differential count (neutrophils 49%, lymphocytes 35%, monocytes 2%, eosinophils 12%, basophils 2%). Multiple hypersegmented neutrophils were identified and one unique 12 lobed neutrophil was present.

The patient was a 41-year-old Afro-American female who had been diagnosed with right thigh high-grade pleomorphic sarcoma for which she had been given two courses of chemotherapy with Adriamycin and Ifosamide. After the first course, she had neutropenic fever that was treated with Granulocyte Colony Stimulating Factor (GCSF), Erythropoietin and antibiotics. She subsequently developed renal tubular acidosis and acute renal failure, but recovered with supportive care. After the second course of chemotherapy, she was diagnosed with isolated hyperbilirubinemia and the liver biopsy showed toxic injury. She also had fever, thrush and was given ampicillin for urinary tract infection due to group D enterococcus.

In view of the marked hypersegmentation seen in the neutrophils, B12 and folate levels were done. Serum B12 was 1748 pg/ml (normal: 200-900 pg/ml), serum folate was 4.2 ng/ml (normal 2.5-17 ng/ml), and RBC folate was 490 ng/ml (normal 130-500 ng/ml). Therefore, the values were within normal range or higher. The MCV was 81.7 fl, MCH 27.3 pg, MCHC 33.5 g/dl, and RDW was 18.7.



Buffy coat smear showing 6-8 lobed neutrophils (below) and one unique 12 lobed neutrophil (above).



## Conclusions

This is a case of **marked hypersegmentation of neutrophils in the presence of normal vitamin B12 and folate levels**. Over 75% of neutrophils nuclei have more than four lobes, **many 6-8 lobed neutrophils are identified and an unique 12 lobed neutrophil is present**.

Based upon the retrospective data and review of the literature **the possible causes** of such marked hypersegmentation include **GCSF therapy** that the patient received. Other possible causes could include the **chemotherapeutic drugs**, her transient **uremia** or some yet unknown cause.

## Discussions

**Hypersegmentation of neutrophils signifies megaloblastic “arrest” and thus impaired DNA synthesis. It is defined as any neutrophil with 6 or more lobes, or 5% of neutrophils with 5 lobes, or majority have more than 4 lobes.** A lobe is considered distinct if it is separate from the nucleus or connected by a fine chromatin thread. It has been suggested that hypersegmentation can be most reliably detected by use of the segmentation index ( % of neutrophils with five lobes or more, relative to the number of four-lobed neutrophils).

**The better known causes of hypersegmentation of neutrophils are vitamin B12 or folate deficiency.** It is considered that neutrophilic hypersegmentation may be a much more sensitive indicator of folate or B12 status than their blood levels or MCV and RDW. Other causes include: iron deficiency, uremia, hyperthermia, myelodysplastic syndromes. Drugs including chemotherapy, steroids and GCSF can induce neutrophil hypersegmentation. It is also known in a congenital condition (autosomal dominant) affecting 1% of the population. Hypersegmentation of neutrophils has also been described in inflammatory cell infiltrate in Langerhan cell histiocytosis and in women with breast carcinoma who had undergone irradiation.

## References

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