

Neutrophil phagocytic capacity is lower in patients with abnormal thyroid function in critical illness

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Background: Thyroid function is affected by critical illness – termed as non-thyroidal illness – and usually presents with low serum TSH and FT3 levels but normal FT4 concentrations. Critically ill patients may also have impaired immune function that could contribute to increased susceptibility to acquired infections and mortality. Thyroid hormones influence neutrophil levels and function but the effect of non-thyroidal illness on neutrophil function in critically ill patients is unknown.

Methods: Critically ill patients (n=24) admitted to three Intensive Care Units (ICU) were studied. Blood samples for assessment of thyroid function and neutrophil phagocytic activity were obtained on a single day within 72 hours of admission. Neutrophils were isolated from whole blood using a percoll gradient separation technique and incubated with opsonised zymosan on a 24 well plate. Light microscopy was used to determine the percentage of neutrophils ingesting ≥ 2 zymosan particles. Severity of illness was assessed by APACHE II scores.

Results: Prevalence of abnormal thyroid function in critically ill patients was 79.2% (19/24): isolated low FT3 syndrome 38% (9/24), overt hyperthyroidism (1), overt hypothyroidism (1), subclinical hyperthyroidism (4/24) and subclinical hypothyroidism (2/24) whereas one patient each had low TSH, FT4 and FT3 and normal TSH with low FT4 and FT3 levels, respectively. Neutrophil phagocytic capacity was significantly lower in the abnormal thyroid function group compared to those with normal function, 38.9% vs 53.7%; $p=0.03$. No association was found between phagocytosis and any single thyroid function parameter or with severity of illness. However, day of sampling after admission was found to be a significant confounder.

Conclusions: Abnormal thyroid function is common within the first 72 hours) after admission to ICU with low FT3 syndrome being the dominant picture. Patients with abnormal thyroid function have lower neutrophil phagocytic capacity than those with normal thyroid function but this is likely to be influenced by duration of illness. These results need to be confirmed in a larger sample and at varying time points after admission.