

# A LEMON a Day Keeps Fatigue Away – The ABCDE of Fatigue

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**F**atigue is a common symptom in clinical medicine. The complex and multifaceted etiopathogenesis of fatigue is a challenge for the differential diagnosis and management of fatigue. This brief communication shares two simple mnemonics – LEMON and ABCDE – which help in the evaluation of fatigue. These frameworks are as relevant to endocrinology and diabetes as to general practice. The mnemonic LEMON stands for lifestyle, endocrine, medical/metabolic, observer (physician) and nutrition-related factors which may cause fatigue; ABCDE lists the aetiology of fatigue in three columns related to physiological/nutritional, psychosocial and biomedical causes (each column includes one cause and how this relates to the ABCDE rubric).

## Keywords

Diabetes fatigue syndrome, endocrine fatigue syndrome, energy, salutogenesis, type 1 diabetes, type 2 diabetes

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Fatigue is a frequently encountered symptom in clinical practice.<sup>1</sup> This is especially so in endocrine clinics, which have a higher proportion of persons living with chronic disease. While debate continues regarding the exact definition and measurement of fatigue,<sup>2</sup> it is not difficult to recognise fatigue in the medical setting. Defined as a feeling of tiredness or exhaustion or a need to rest because of lack of energy or strength, fatigue can present as physical, mental or sexual weakness.<sup>3</sup> Patients may complain of difficulty in carrying out normal activities of daily living, inability to work energetically or a feeling of tiredness even upon waking up.

## Aetiology of fatigue

The wide range of symptomatology of fatigue is matched by an equally long list of causes of fatigue. The overall clinical picture is diverse enough to be termed as a syndrome of chronic presentation (chronic fatigue syndrome),<sup>4</sup> which may be specific to medical conditions (diabetes fatigue syndrome).<sup>5</sup>

Because of this heterogeneity, it sometimes becomes challenging to evaluate various differential diagnoses of fatigue. This implies that it is not always possible to address the patient's complaints and resolve fatigue.

## Differential diagnosis

Taking a cue from the adage 'an apple a day keep the doctor away', we posit a new adage: 'a LEMON a day keeps fatigue away'. LEMON is a simple mnemonic which lists various aetiologies of fatigue in five categories (*Table 1*). Fatigue can be due to lifestyle, endocrinopathy, metabolic disturbance, medical diseases, observer (physician) error, or nutritional deficiency. The various causes are listed and classified in *Table 1*. One must note that many cases of fatigue are due to lifestyle or nutritional factors. While medical and endocrine diseases, as well as iatrogenic causes, must be ruled out, one must focus on lifestyle and nutrition optimisation as well. The table includes various screening and diagnostic tools which may help identify the aetiology of fatigue. It must be noted that these tools are not limited to biochemical investigations or endocrine assays; they include clinical features and patient-reported instruments such as the GlucoCoper (a tool to assess for coping skills) and the Diabetes Distress Scale (a scale to measure diabetes distress).<sup>6,7</sup>

The ABCDE mnemonic divides causative factors of fatigue into physiological/nutritional, psychosocial and biomedical, and uses simple nomenclature to list these causes in alphabetical order (*Table 2*).

## Discussion

With LEMON, we have purposely used a salutogenic or health-promoting title rather than a pathogenesis-based heading to list the aetiologies of fatigue. This should help facilitate a positive approach amongst health care professionals. The brief nature of this table belies the comprehensive coverage of pathophysiology and clinical features that it succeeds in achieving. The self-explanatory columns facilitate its use as an aid to clinical decision making and management.

Table 1: A LEMON a day keeps fatigue away

Class		Aetiology	Screening/Diagnosis
Lifestyle		Physical activity/exercise, lack of	History taking
		Stress	GlucoCoper/Diabetes Distress Scale
		Sleep hygiene, impaired	Sleep questionnaires
Endocrine	Common	Thyroid disorders	TSH
		Diabetes	HbA1c, continuous glucose monitoring
		Hypogonadism	Testosterone/oestrogen
	Relatively uncommon	Hypopituitarism	LH, FSH, testosterone/oestrogen; TSH, thyroxine
		Adrenal disorders	Serum cortisol, ACTH stimulation test
		Parathyroid disorders	Serum PTH, calcium, alkaline phosphatase
Metabolic	Dyselectrolytemia	Clinical context, serum electrolytes	
	Fluid metabolism disorders	Clinical context/dehydration	
	Vitamin D deficiency	25 hydroxy vitamin D <30 ng/ml (insufficiency) or <20 ng/ml (deficiency)	
Medical	Hepatorenal impairment	Renal/hepatic function tests	
	Rheumatologic disease	Clinical features, C-reactive protein, ANA, rheumatoid factor	
	Gastrointestinal dysfunction • motility disorders • malabsorption	Clinical features, faecal fats, faecal elastase, antigliadin and antiendomysial antibodies	
Observer (Physician)	Drug-induced fatigue	Drug history	
	Inappropriate treatment	Drug history	
	Complementary and alternative medicine	Drug history	
Nutritional	Macronutrient deficiency	Dietary review	
	Micronutrient deficiency	Dietary review	
	Meal distribution/pattern	Diet recall	

ACTH = adrenocorticotropic hormone; ANA = anti-nuclear antibodies; FSH = follicle stimulating hormone; HbA1C = glycated haemoglobin; LH = luteinising hormone; PTH = parathormone; TSH = thyroid stimulating hormone.

Table 2: The ABCDE of diabetes fatigue syndromes

	Nutritional/Physiologic	Psychosocial	Biomedical
A	Ageing	Apnoea (obstructive sleep apnoea): poor sleep hygiene, sleep deprivation	Anaemia: iron deficiency, renal impairment, drug induced
B	Vitamin B1, B6, B12 deficiency	Behavioural issues: diabetes distress, depression	Bulimia/anorexia nervosa
C	Calorie restriction/inadequacy	Conditioning, poor physical	Comorbid conditions: renal, hepatic, gastrointestinal disease
D	Vitamin D deficiency	Drug-induced: glucose-lowering, non-metabolic drugs; complementary and alternative medicine/substance abuse	Diabetes complications: nephropathy, heart failure, infections/infestations
E	Dyselectrolytemia	Exercise, lack of	Endocrine dysfunction: thyroid, adrenal, gonad

In the ABCDE of fatigue, we utilise a framework which lends itself to easy memorisation. This allows it to be used as a teaching tool and serves as a basis for further understanding of the concept of fatigue in diabetes, as well as in general medicine. □

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