Cholinesterase Phenotyping (including cholinesterase activity)

Description	Acetylcholinesterase and acylcholine acylhydrolase (butyrylcholinesterase or pseudocholinesterase) and are the two main cholinesterase enzymes in the body; these enzymes catalyse the hydrolysis of choline esters which is important in nerve transmission. Acetylcholinesterase is found in the red blood cells, lungs, spleen, nerve endings and grey matter of the brain. Pseudocholinesterase is found in the plasma, intestine, liver, pancreas, heart and white matter.
Indications	• To investigate prolonged apnoea following suxamethonium administration during surgery. • Screening of patients at risk of suxamethonium apnoea (e.g. first degree relatives of a known atypical phenotype). • Acute or chronic occupational exposure to organophosphates e.g. agricultural or organic chemical industry workers.
Additional Info	Suxamethonium is a short-acting muscle relaxant used during surgical procedures which is hydrolysed by cholinesterases. Individuals with low or atypical cholinesterase activity due to allelic variation are unable to de-activate suxamethonium quickly enough and suffer prolonged apnoea during surgery. This may require mechanical ventilation. Sensitivity to suxamethonium is related to phenotype and drug dose. Organophosphates can inhibit cholinesterase enzymes and cause neuromuscular damage. Toxicity can occur following absorption or inhalation and may present with vomiting, paralysis or coma. Cholinesterase can fall to 40% before symptoms of toxicity occur and up to 80% before the symptoms become severe. For more information, please refer to: http://www.labtestsonline.org.uk/understanding/analytes/cholinesterase
Concurrent Tests	• **Phenotype:** Testing includes assessment of total cholinesterase activity and cholinesterase phenotype. Enzyme inhibition studies are used in deriving the phenotype. • **Genotype:** Cells are stored by the referral laboratory for three months so that genotype testing can be added on request to phenotype samples with low activities / atypical phenotypes. Patient consent must be obtained for genotype testing.
Dietary Requirements	No specific dietary requirements.
Interpretation	• Detailed interpretation is provided with the laboratory report. Do not delay treatment whilst waiting for the results of this send-away test. • DNA studies can be useful to identify silent variant alleles (e.g. J, K, H, S) which are not identified by inhibitor studies. This is more likely

	with very low cholinesterase activities. • Family studies (phenotyping in first degree relatives, especially siblings) are recommended when low activities / atypical phenotypes are discovered. • Warning cards (containing information on cholinesterase activity, phenotype and genotype) are issued to individuals that are found to be sensitive to suxamethonium for future safe prescription. • Consult Toxbase for advice on antidotes and occupational exposure. www.toxbase.org • Cholinesterase activity can be lowered in pregnancy, hepatitis, cirrhosis, liver metastasis, chronic kidney disease, shock, malnutrition, and some cancers.
Collection Conditions	• EDTA whole blood (≥2 mL). Include time / dose of suxamethonium. • Collect samples 24 hours post-suxamethonium dose. Samples collected during suxamethonium-induced apnoea exhibit falsely low cholinesterase activity.
Frequency of testing	Patient specific re-testing recommendations are provided on the report. • Cholinesterase activity is higher in children and so re-testing may be required following puberty. • Activity decreases in pregnancy so re-testing may be required. • Re-testing may be required if samples are collected during suxamethonium-induced apnoea. • As required when monitoring occupational exposure.