

## Supplementary data

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## Sodium content of parenteral drugs

A number of parenteral formulations contain a significant amount of sodium ions (Table A1). This sodium load is unlikely to be important in most patients, but could be clinically significant for some patient groups (e.g. neonates and patients with significant liver impairment). Table A1 is not exhaustive but lists the sodium content of more frequently used drugs or drugs in which the sodium level is particularly high. The absence of a drug from the table does not necessarily mean that it has a low sodium content—check additional sources. If a drug is reconstituted or infused with sodium chloride 0.9% solution, this further ↑ the sodium load (by 15mmol sodium for each 100mL of sodium chloride 0.9% solution). Note that some oral preparations, especially soluble tablets, can have high sodium levels.

### Other sources that quote the sodium content of parenteral formulations

Royal College of Paediatrics and Child Health and the Neonatal Paediatric Pharmacists Group (2003). *Medicines for Children*. London: RCPCH Publications.

Barber N, Wilson A (1999). *A Clinical Pharmacy Survival Guide*. Edinburgh: Churchill Livingstone.

Shulman R et al (ed) (1998). *Injectable Drug Administration Guide*. Oxford: Blackwell.

### Summaries of product characteristics

**Table A1** Sodium content of parenteral drugs

Name	Vial/ampoule size	Sodium content per vial (mmol)
Acetylcysteine	2g	12.78
Aciclovir	250mg	1
Addiphos®	20mL	30
Amoxicillin	250mg	0.7
Ampicillin	250mg	0.7
Amphotericin lipid complex (Abelcet®)	100mg	3.13
Amphotericin liposomal (Ambisome®)	50mg	<0.5
Atenolol	5mg	1.3–1.8
Benzylpenicillin	600mg	1.68
Cefotaxime	500mg	1.1
Ceftazidime	500mg	1.2
Ceftriaxone	1g	3.6
Cefuroxime	50mg	1.8

**Table A1** (Contd.)

Name	Vial/ampoule size	Sodium content per vial (mmol)
Chloramphenicol sodium succinate	1g	3.14
Clomethiazole	500mL	15–16
Ciprofloxacin	200mg	15.4
Co-amoxiclav	600mg	1.6
Co-trimoxazole	480mg	1.7
Desmopressin	4micrograms	0.15
Diazoxide	300mg	15
Disodium hydrogen phosphate	10mL	12
Ertapenem	1g	6
Flucloxacillin	250mg	0.5
Fluconazole	200mg	15
Flucytosine	2.5g	34.44
Folinic acid	15mg	0.2
Foscarnet	1g	15.6
Furosemide	250mg	1
Ganciclovir	500mg	2
Granisetron	3mg	1.17
Heparin	25000IU/mL	0.625–0.8
Human albumin solution (all concentrations)	100mL	100–160 (check label for exact amount)
Hydrocortisone:		
sodium phosphate	100mg	0.66
sodium succinate	100mg	0.37
Imipenem	500mg	1.72
Levofloxacin	500mg	15.4
Meropenem	1g	3.9

(continued)

**Table A1** (Contd.)

Name	Vial/ampoule size	Sodium content per vial (mmol)
Metoclopramide	10mg	0.27
Metronidazole	500mg	13–14.55
Ofloxacin	200mg	15.4
Pamidronate:		
dry powder	15mg	0.1
	30mg	0.2
	90mg	0.3
solution	15mg	1.1
	30mg	1.1
Phenytoin	250mg	1.1
Piperacillin + tazobactam	4.5g	9.4
Rifampicin	300mg	<0.5
	600mg	< 0.5
Sodium bicarbonate	1.26%	150/L
	4.2%	500/L
	8.4%	1000/L
Sodium chloride	0.9%	150/L
Sodium nitroprusside	50mg	0.34
Sodium valproate	400mg	2.41
Sotalol	40mg	0.5
Teicoplanin	200mg	<0.5
	400mg	<0.5
Terbutaline	500micrograms	0.15
Thiopental sodium	500mg	23.26
Ticarcillin + clavulanic acid	3.2g	16
Verapamil	5mg	0.3
Vitamins B and C		
Pabrinex <sup>®</sup> high-potency IV	1+2 ampoules	2.95
Pabrinex <sup>®</sup> high-potency IM	1+2 ampoules	2.92

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## Pathology ranges and interpretation (Table A2)

**Table A2** Pathology ranges and interpretation

	Levels ↑ by	Levels ↓ by	Comments
Sodium (Na <sup>+</sup> ) 135–145mmol/L	Water depletion, nephrogenic diabetes insipidus, (e.g. lithium toxicity), mineralocorticoid excess (e.g. Cushing's syndrome), corticosteroids, 2° aldosteronism (e.g. CCF), nephritic syndrome, hepatic cirrhosis, and uraemia <i>Symptoms:</i> dry skin, postural hypotension, oliguria. <i>Cerebral dehydration → thirst, confusion, and eventually coma</i>	Water excess, mineralocorticoid deficiency (e.g. Addison's, thyroid deficiency), thiazide and loop diuretics, burns, SIADH, excess sweating, diarrhoea, vomiting, aspiration, atypical pneumonia, haemodilution caused by cardiac, hepatic or renal failure, oedema, infection, and carcinoma <i>Symptoms:</i> headache, nausea, hypertension, cardiac failure, cramps, confusion, convulsions, and overhydration	Regulated by aldosterone (ADH)
Potassium (K <sup>+</sup> ) 3.5–5.0mmol/L	Mineralocorticoid deficiency (e.g. Addison's thyroid deficiency) ACE inhibitors, K <sup>+</sup> -sparing diuretics, renal failure, severe tissue damage (e.g. burns), hypoaldosteronism, diabetic ketoacidosis, excess K <sup>+</sup> therapy, NSAIDs, β-blockers, heparin infusions, and sodium depletion (very rare) <i>Symptoms:</i> muscle weakness and abnormal cardiac conduction (e.g. ventricular fibrillation, and asystole)	Thiazide and loop diuretics, vomiting, diarrhoea, ileostomy, fistula, steroids, glucose and insulin therapy, mineralocorticoid excess (e.g. Cushing's syndrome), β-agonists, aspiration and metabolic alkalosis <i>Symptoms:</i> hypotonia, cardiac arrhythmias, muscle weakness, and paralytic ileus	Regulated by aldosterone, insulin/glucose. For hypokalaemia, if on diuretics, then ↑ bicarbonate is the best indication that hypokalaemia is likely to be longstanding. Magnesium might be low and hypokalaemia is often difficult to correct until magnesium is normalized
Chloride (Cl <sup>-</sup> ) 95–105mol/L	Excess ingestion and dehydration <i>Symptoms:</i> non-specific	Vomiting, diarrhoea, diuretics, dehydration and nephropathy <i>Symptoms:</i> non-specific	Cl <sup>-</sup> follows Na <sup>+</sup> movement

Bicarbonate ( $\text{HCO}_3^-$ ) 24–30mmol/L	Excessive antacid use, thiazide and loop diuretics, metabolic alkalosis, bicarb, hypokalaemia, vomiting, and Cushing's syndrome <i>Symptoms: vomiting</i>	Diarrhoea, renal failure, diabetes mellitus, metabolic acidosis, respiratory alkalosis, and hyperventilation <i>Symptoms: headache, drowsiness, and coma in severe acidosis</i>	Reflects renal, metabolic, and respiratory functions
Glucose 3.0–8.0mmol/L	Diabetes mellitus, severe stress, occasionally after CVA, corticosteroids, thiazides, relative insulin deficiency caused by $\uparrow$ growth hormone, $\uparrow$ glucocorticoids or placental lactogen during pregnancy (glucagonaemia) <i>Symptoms: polyuria, polydipsia and ketoacidosis</i>	Insulin overdose, sulphonylureas especially in the elderly, insulinoma, alcohol, and hepatic failure <i>Symptoms: dizziness, lethargy, sweating, tachycardia, agitation, and coma</i>	
Magnesium ( $\text{Mg}^{2+}$ ) 0.70–1.10mmol/L	Renal failure and excessive antacids <i>Symptoms: loss of muscle tone, lethargy and respiratory depression</i>	Severe diarrhoea, fistula, alcohol abuse, diuretics, diabetes mellitus, TPN, hyper-aldosteronism, hepatic cirrhosis, and mal-absorption <i>Symptoms: tetany, paraesthesiae, cramps, arrhythmias, neuro-muscular excitability, and hypoparathyroidism</i>	Deficiency can exacerbate digitalis toxicity and $\text{Mg}^{2+}$ is excreted by the kidneys
Zinc ( $\text{Zn}^{2+}$ ) 11–24 $\mu$	Zinc therapy	Cirrhosis, diarrhoea, alcoholism, drugs, parenteral nutrition, inadequate diet, steroids, diuretics, malabsorption syndrome, and rarely genetic <i>Symptoms: poor wound healing and growth, alopecia, infertility, and poor resistance to infection</i>	

(continued)

Table A2 (Contd.)

	Levels ↑ by	Levels ↓ by	Comments
Calcium ( $\text{Ca}^{2+}$ ) 2.20–2.60mmol/L (Beware to determine correct calcium level in hypoalbuminaemia and hyperalbuminaemia)	Paget's disease, vitamin A overdose, hyper-parathyroidism, vitamin D overdose, thiazides, oestrogen, lithium, tamoxifen, excess milk ingestion, excess calcium absorption, Hodgkin's disease, and myeloma <i>Symptoms: nausea, vomiting, constipation, abdominal pain, renal stones, cardiac arrhythmias, headache, depression, mental fatigue, and psychosis</i>	Thyroid surgery, hypoparathyroidism, alkalosis, renal failure, osteomalacia, vitamin D deficiency and acute pancreatitis <i>Symptoms: ↑ nervous excitability, tetany, convulsions, muscle cramps, spasms, tingling, numbness of fingers, and ECG changes</i>	Apparent hypocalcaemia might be caused by hypo-albuminaemia. Regulated by parathyroid hormone calcitonin (1,25-dihydroxychole-calciferol)
Phosphate ( $\text{PO}_4^{3-}$ ) 0.8–1.4mmol/L	Renal failure, hypoparathyroidism, diabetic ketoacidosis and ↑ vitamin D	Osteomalacia (starvation), hyperparathyroidism, alcohol abuse, ↓ vitamin D $\text{Al}(\text{OH})_3$ therapy, and septicaemia	$\text{Ca}^{2+}$ and $\text{PO}_4^{3-}$ metabolism closely linked
Urea 2.5–7.0mmol/L	Renal failure, elderly (caused by ↓ renal function), urinary tract obstruction, CCF, dehydration, cortico-steroids, high-protein diet, ↑ catabolism (e.g. starvation), sepsis, and GI bleed	↑ GFR, pregnancy, excessive IV infusion, low protein intake, anabolic states or synthesis, liver failure, diabetes insipidus, diuresis, and overhydration.	Derived from amino-acid metabolism in the liver; indicator of kidney function
Creatinine 20–110 $\mu\text{mol/L}$ (Cr/Cl) 80–139mL/min (not considered impaired unless <50mL/min)	Dehydration, renal failure, ↓ GFR, urinary tract obstruction, and ↑ meat/vitamin C	Pregnancy and chronic muscle wasting	Derived from muscle mass, determined by lean body mass, and indication of glomerular insufficiency

Alkaline phosphatase <125IU/L	Renal failure, cholestasis, liver cell damage, osteomalacia and bone disease, hyper-parathyroidism (e.g. Paget's disease) and metastases. Also during third trimester of pregnancy, post menopause, carcinoma of liver/prostate, and drug-induced (e.g. chlorpromazine)	Hypothyroidism and growth retardation	~50% bone-related, ~50% hepatic fraction, and ~ 2–3% intestinal fraction
Creatine kinase 32–184IU/L	MI, skeletal muscle damage (even IM injection), muscular dystrophy, acute psychotic episodes, head injury, surgery, hypothyroidism, alcoholism, and neonates		Found in heart, skeletal and smooth muscle, and brain
Haemoglobin ♂: 13.5–18g/dL ♀: 11.5–16g/dL	Polycythaemia and dehydration	Sickle cell disease, thalassaemia, GI bleed, haemorrhage (acute/chronic) deficient RBC production, iron deficiency, marrow depression, renal failure, ↓ haemolysis and chronic liver disease	
White cell count 4.0–11.0x10 <sup>9</sup> /L	Drugs (e.g. steroids), infection, septicaemia, malignancy, sulphonamides bacterial infection, alcohol hepatitis, and cholecystitis	Drugs, bacterial infections, HIV, hypersensitivity reactions, surgery, trauma, burns, haemorrhage, leukaemia, radiation, cytotoxics, ↓ vitamin B <sub>12</sub> , and ↓ folate	Produced in bone marrow and stimulated by GSF
Haematocrit or packed cell volume ♂: 0.4–5.0 ♀: 0.37–0.47	Addison's thyroid deficiency, dehydration, polycythaemia and pregnancy	Anaemia and haemorrhage	Relative measure of cells in blood and packed cell volume

(continued)

**Table A2** (Contd.)

	Levels ↑ by	Levels ↓ by	Comments
Platelets 150–400x10 <sup>9</sup> /L	Inflammatory disorders, bleeding, malignancy, splenectomy, and polycythaemia	↓ production: bone-marrow failure/suppression, leukaemia, drugs (notably cytotoxic drugs), megaloblastic anaemia, SLE. Heparin. ↑ consumption: DIC, splenomegaly, furosemide, gold, idiopathic thrombocytopenia, and HIV drugs.	Derived from megakaryocytes in bone marrow and destroyed in spleen
Prothrombin time 10–14s INR—0.8–1.2	Severe liver damage, cholestasis causing malabsorption of vitamin K and warfarin		Used to monitor anticoagulant therapy and assess liver function
Thrombin time 12–15s	Heparin and DIC		
APPT	Heparin, haemophilia, and liver failure		Used to monitor heparin therapy
Fibrinogen 1.7–4.1g/L	Nephrotic syndrome, Hodgkin's and PE	DIC and massive blood transfusion	
Total protein 60–80g/L	Mineralocorticoid deficiency (e.g. Addison's thyroid deficiency) and myeloma	Catabolic states (e.g. septicaemia)	

Albumin 35–50g/L $t_{1/2}$ = 20–26days	Dehydration and shock	Lost through skin (e.g. burns and psoriasis) liver disease, mal-nutrition, septicaemia, nephrotic syndrome, and late pregnancy <i>Symptoms: oedema and toxic effects of drugs normally bound to albumin (e.g. calcium, bilirubin and phenytoin)</i>	
Bilirubin—total <17 $\mu$ mol/L Bilirubin— conjugated (bound to albumin) <4 $\mu$ mol/L	Hepatocellular damage (e.g. viral hepatitis—inability to conjugate bilirubin), cholestasis (e.g. by phenothiazines and flucloxacillin) gallstones, inflammation, malignancy, Gilbert's syndrome, haemolysis, methyldopa, GI bleed, extensive bruising, and sulphonamides (displace bilirubin from albumin) <i>Symptoms: jaundice</i>		Derives from breakdown of red blood cells by monocyte macrophage system
$\gamma$ -glutamyl transpeptidase $\sigma$ : 11–51IU/L $\text{f}$ : 7–33IU/L	Cholestasis (e.g. carcinoma of pancreas or biliary tract), liver cell damage (e.g. hepatitis and cirrhosis). Enzyme inducers (e.g. alcohol, phenytoin, and phenobarbital) and alcoholism		Found in liver, kidneys, pancreas and prostate; released by tissue damage
Aspartate transaminase 5–35IU/L	Hepatocellular damage, cirrhosis, viral hepatitis, severe haemolytic anaemia, myocardial injury (e.g. MI), cholestasis, trauma, or surgery	Renal failure and vitamin B deficiency	Found in liver, heart, kidneys, skeletal muscle, and erythrocytes

(continued)

**Table A2** (Contd.)

	Levels ↑ by	Levels ↓ by	Comments
Amylase <180U/dL random urine <650IU/L	Acute pancreatitis, abdominal trauma, diabetic ketoacidosis, chronic renal failure, cholecystitis, intestinal obstruction, mumps, ruptured ectopic pregnancy, post-MI ruptured DU, and morphine	Hepatitis and pancreatic insufficiency	Found in paratoid glands and pancreas. Smaller amounts in ovaries, intestine, and skeletal muscle
Fibrin degradation products <10microgram/mL	DIC and adult respiratory distress syndrome		
Cholesterol 3.9–6mmol/L	Diabetes mellitus, familial hypercholesterolaemia excess alcohol, hypo-thyroidism, and hepatic and renal diseases	Severe illness, severe weight loss and MI (during first 2wks)	Treatment will depend on other risk factors
pH 7.35–7.45	Vomiting, K <sup>+</sup> loss, burns, hyper-ventilation, stroke, SAH, anxiety, hyperthyroidism, excess antacids, aspirin overdose, fever, and uncompensated alkalosis	Respiratory failure, hypoventilation, diarrhoea, renal failure, ketoacidosis, trauma, shock, high plasma lactate (e.g. liver failure), hypoxia, anaemia, and uncompensated acidosis	Reflects ratio of acid to base and not absolute concentration. ∴ it might mask a defect for which the body has compensated
PaO <sub>2</sub> >10.6kPa	Artificial over-ventilation with O <sub>2</sub>	COAD, respiratory failure, ARDS, and cardiogenic pulmonary oedema	
PaCO <sub>2</sub> 4.7–6.0kPa Total CO <sub>2</sub> 24–30mmol	COAD, hypo-ventilation, respiratory acidosis and ARDS-compensated metabolic alkalosis	Hyperventilation, respiratory alkalosis, CVA, anxiety, aspirin overdose, compensated metabolic acidosis, pulmonary embolism, and non-cardiogenic ARDS	Indicator of respiratory function

## Normal ranges (Table A3)

**Table A3** Normal ranges

Sodium	135–145mmol/L	White cell count	4.0–11×10 <sup>9</sup> /L
Potassium	3.5–5.0mmol/L	PCV/haematocrit	♂=0.4–0.54
Chloride	95–105mmol/L	PCV/haematocrit	♀=0.37–0.47
Bicarbonate	24–30mmol/L	Platelets	150–400×10 <sup>9</sup> /L
Glucose (fasting)	3.5–5.5mmol/L	INR	0.8–1.2
Magnesium	0.75–1.05mmol/L	KCR	0.8–1.2
Phosphate	0.8–1.4mmol/L	Thrombin time	Ratio <1.2
Zinc	11–24µmol/L	Fibrinogen	1.7–4.1g/L
Calcium	2.12–2.65mmol/L	Albumin	35–50g/L
FDP	<10microgram/mL	Total protein	60–80g/L
Urea	2.5–6.7mmol/L	Bilirubin(total)	3–17µmol/L
Creatinine	70–150µmol/L	Bilirubin-(conjugated)	<4µmol/L
Cr/Cl	80–139mL/min	GGT	♂: 11–40IU/L ♀: 7–33IU/L
Alk phos	<150IU/L	AST	5–35IU/L
Creatine kinase	♂: 25–195IU/L ♀: 25–170IU/L		
Haemoglobin	♂=13.5–18g/dL	Amylase	<180IU/L
Haemoglobin	♀=11.5–16g/dL	Amylase (random urine)	<650IU/L
Cholesterol	3.9–6mmol/L	PaO <sub>2</sub>	>10.6kPa
pH	7.35–7.45	PaCO <sub>2</sub>	4.7–6.0kPa

## Paediatric normal laboratory values

The values given in Tables A4 to A10 are a guide; local laboratories may differ. Check normal values with the laboratory you use.

**Table A4** Biochemistry

Alanine aminotransferase	Newborn–1 month		≤70IU/L
	Infants and children		15–55IU/L
Albumin	Preterm		25–45g/L
	Newborn (term)		25–50g/L
	1–3 months		30–42g/L
	3–12 months		27–50g/L
	1–15yrs		32–50g/L
Alkaline phosphatase	Newborn		150–600U/L
	6 months–9yrs		250–800U/L
Amylase			70–300IU/L
Aspartate amino-transferase			<45IU/L
Bilirubin	Full term	Day 1	<65µmol/L
		Day 2	<115µmol/L
		Days 3–5	<155µmol/L
		>1 month	<10µmol/L
Calcium	Preterm		1.5–2.5mmol/L
	Infants		2.25–2.75mmol/L
	>1yr		2.25–2.6mmol/L
Chloride			95–105mmol/L
Creatine kinase	Newborn		<600IU/L
	1month		<400IU/L
	1yr		<30IU/L
	Children	♂	<190IU/L
		♀	<130IU/L
Creatinine	0–2yrs		20–50µmol/L
	2–6yrs		25–60µmol/L
	6–12yrs		30–80µmol/L
	>12yrs	♂	65–120µmol/L
		♀	50–110µmol/L

**Table A4** (Contd.)

Creatinine clearance	<37wks gestation	<15mL/min/m <sup>2</sup>	
	Neonate	10–20mL/min/m <sup>2</sup>	
	1–2wks	20–35mL/min/m <sup>2</sup>	
	2–4 months	35–45mL/min/m <sup>2</sup>	
	6–125 months	45–60mL/min/m <sup>2</sup>	
	12 months to adult	50–85mL/min/m <sup>2</sup>	
C-reactive protein		<20mg/L	
γ-glutamyl transferase	Newborn	<200IU/L	
	1 month–1yr	<150IU/L	
	>1yr	<30IU/L	
Glucose	Newborn to 3 days	2–5mmol/L	
	>1wk	2.5–5mmol/L	
Lactate		0.7–1.8mmol/L	
Magnesium	Newborn	0.7–1.2mmol/L	
	Child	0.7–1mmol/L	
Phosphate	Pre-term first month	1.4–3.4mmol/L	
	Full-term newborn	1.2–2.9mmol/L	
	1yr	1.2–2.2mmol/L	
	2–10yrs	1–1.8mmol/L	
	>10yrs	0.7–1.6mmol/L	
Potassium	0–2wks	3.7–6mmol/L	
	2wks–3 months	3.7–5.7mmol/L	
	>3 months	3.5–5mmol/L	
Protein (total)	1 month	50–70g/L	
	1yr	60–80g/L	
	1–9yrs	60–81g/L	
Sodium		135–145mmol/L	
Urea	0–1yr	2.5–7.5mmol/L	
	1–7yrs	3.3–6.5mmol/L	
	7–16yrs	♂	2.6–6.7mmol/L
		♀	2.5–6mmol/L

**Table A5** Haematology

Age	Hb (g/dL) Mean (range)	MCV (fl) Mean (range)	WBC ( $\times 10^9/L$ ) range	Reticulocyte (%) range
Birth	18.5 (14.5–21.5)	108 (95–116)	5–26	3–7
1 month	14 (10–16.5)	104 (85–108)	6–15	0–1
6 months	11 (8.5–13.5)	88 (80–96)	6–15	0–1
1yr	12 (10.5–13.5)	78 (70–86)	6–15	0–1
6yrs	12.5 (11.5–14)	81 (75–88)	6–15	0–1
12yrs	13.5 (11.5–14.5)	86 (77–94)	5–15	0–1

Note: an artefactual high neonate WBC may be reported because automatic cell counters may wrongly include in the WBC the many normoblasts (red cell precursors) in the neonate.

**Table A6** Respiratory rate

Newborn	30–60 breaths/min	Heart rate is usually four times the respiratory rate
6 months	30–45 breaths/min	
1–2yrs	25–35 breaths/min	
3–6yrs	20–30 breaths/min	
>7yrs	20–25 breaths/min	

**Table A7** Blood pressure

	Mean (mmHg)	
	Systolic BP	Diastolic BP
Newborn to 2yrs	95	55
3–6yrs	100	65
7–10yrs	105	70
11–15yrs	115	70

**Table A8** Urinary output

	mL/day
Infant	250–600
Child	500–1000
Adolescents	500–1500
Adult	500–2000

**Table A9** Hypoglycaemia

	Serum glucose
Pre-term	<1.4mmol/L
Term	<2.0mmol/L
Child	<2.5mmol/L

**Table A10** Electrolyte requirements

Na <sup>+</sup>	2–4mmol/kg body weight/24h
K <sup>+</sup>	1–3mmol/kg body weight/24h
Cl <sup>-</sup>	3–5mmol/kg body weight/24h
Ca <sup>2+</sup>	1mmol/kg body weight/24h
Mg <sup>2+</sup>	0.15mmol/kg body weight/24h

## Drug interference with laboratory tests

Drugs interfere with laboratory diagnostics (Table A11), which can lead to wrong diagnoses or treatments and unnecessary further tests.

**Table A11** Drug–laboratory interferences are usually overlooked

Drug	Laboratory test	↑/↓	Mechanism of action
Acetazolamide		Leads to spurious ↑ of theophylline levels	Interferes with certain HPLC assays for theophylline
Amiloride	Creatinine	Leads to falsely high measurements of serum creatinine and ↓ creatinine clearance	Does not alter renal function, but blocks tubular secretion of creatinine
Amiodarone	T <sub>4</sub>		Amiodarone inhibits peripheral conversion to T <sub>3</sub>
Ascorbic acid	Urine sugar	(false + and –)	Clinitest
Oestrogens	Dexamethasone suppression	(false +)	Caused by ↑ corticosteroid binding globulin
Ketamine	Alk phos, GGT, ALT		Mechanism unknown
Levodopa	Urinary glucose Urinary ketones	False + False +	
Lithium	Serum lithium levels		Inadvertent use of lithium–heparin collection tube leads to spuriously high serum lithium determination
Oral contraceptives	Glucose		Alters glucose tolerance test
Spironolactone	Digoxin assay	↓ true level, i.e. can mask test confirmation of digoxin toxicity	Interferes with certain specific digoxin assays Refer to biochemistry department for type of assay used locally
	Plasma cortisol levels (Synacthen <sup>®</sup> test)	Erroneously ↑ cortisol levels	Metabolites of spironolactone fluoresce, which interferes when fluorometric analysis is used for tests

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**Useful websites**

<b>Description</b>	<b>Web address (URL)</b>
American Society of Clinical Oncology (ASCO)	<a href="http://www.asco.org">http://www.asco.org</a>
American Society of Hematology (ASH)	<a href="http://www.hematology.org">http://www.hematology.org</a>
American Society of Health-System Pharmacists	<a href="http://www.ashp.org">http://www.ashp.org</a>
Annals of Internal Medicine	<a href="http://www.annals.org">http://www.annals.org</a>
Australian Therapeutic Goods Administration	<a href="http://www.tga.gov.au">http://www.tga.gov.au</a>
Bandolier 'Evidence-based thinking about healthcare'	<a href="http://www.medicine.ox.ac.uk/bandolier/">http://www.medicine.ox.ac.uk/bandolier/</a>
BNF	<a href="http://www.bnf.org">http://www.bnf.org</a>
British Committee for Standards in Haematology (BCSH) guidelines	<a href="http://www.bcsghguidelines.com">http://www.bcsghguidelines.com</a>
British Medical Journal (BMJ)	<a href="http://www.bmj.com">http://www.bmj.com</a>
British Oncology Pharmacy Association (BOPA)	<a href="http://www.bopawebsite.org">http://www.bopawebsite.org</a>
British Society for Haematology (BSH)	<a href="http://www.b-s-h.org.uk">http://www.b-s-h.org.uk</a>
Canadian Health Technology Assessment Programme	<a href="http://www.nlm.nih.gov/hsrinfo/evidence_based_practice.html">http://www.nlm.nih.gov/hsrinfo/evidence_based_practice.html</a>
Cancer Improvement	<a href="http://www.improvement.nhs.uk/cancer">http://www.improvement.nhs.uk/cancer</a>
Cancer Research UK	<a href="http://www.cancerresearchuk.org">http://www.cancerresearchuk.org</a>
Cancerline UK	<a href="http://www.cancerlineuk.net">http://www.cancerlineuk.net</a>
COREC	<a href="http://www.corec.org.uk">http://www.corec.org.uk</a>
Counterfeit drugs	<a href="http://www.pharmacistscombatcounterfeiting.org">http://www.pharmacistscombatcounterfeiting.org</a>
CPD for Pharmacists	<a href="http://www.uptodate.org.uk">http://www.uptodate.org.uk</a>
Cytotoxic guidelines	<a href="http://www.marchguidelines.com">http://www.marchguidelines.com</a>
Department of Health	<a href="http://www.dh.gov.uk">http://www.dh.gov.uk</a>
Drugs in breast milk	<a href="http://www.ukmicentral.nhs.uk">http://www.ukmicentral.nhs.uk</a>
Drugs of porcine origin-downloadable booklet	<a href="http://www.mcb.org.uk/uploads/PBEnglish.pdf">http://www.mcb.org.uk/uploads/PBEnglish.pdf</a>
Electronic Medicines Compendium	<a href="http://www.medicines.org.uk/emc">http://www.medicines.org.uk/emc</a>

<b>Description</b>	<b>Web address (URL)</b>
European Society for Medical Oncology (ESMO)	<a href="http://www.esmo.org">http://www.esmo.org</a>
Evidence in Health and Social Care	<a href="http://www.evidence.nhs.uk">http://www.evidence.nhs.uk</a>
Gene Therapy Advisory Committee (GTAC)	<a href="http://www.dh.gov.uk/ab/GTAC/index.htm?ssSourceSiteId=en">http://www.dh.gov.uk/ab/GTAC/index.htm?ssSourceSiteId=en</a>
General Pharmaceutical Council	<a href="http://www.pharmacyregulation.org">http://www.pharmacyregulation.org</a>
Health and Safety Executive (HSE)	<a href="http://www.hse.gov.uk/">http://www.hse.gov.uk/</a>
Herbal medicines—includes evidence for efficacy, ADRs and drug interactions	<a href="http://www.herbmed.org">http://www.herbmed.org</a>
International Society of Oncology Pharmacy Practitioners (ISOPP)	<a href="http://www.isopp.org">http://www.isopp.org</a>
Journal of Clinical Oncology (JCO)	<a href="http://www.jco.org">http://www.jco.org</a>
Journal of the American Medical Association (JAMA)	<a href="http://www.jama.ama-assn.org">http://www.jama.ama-assn.org</a>
Lancet	<a href="http://www.thelancet.com">http://www.thelancet.com</a>
Macmillan Cancer Information	<a href="http://www.macmillan.org.uk">http://www.macmillan.org.uk</a>
Malaria advice (no prophylaxis advice)	<a href="http://www.malariahotspots.co.uk">http://www.malariahotspots.co.uk</a>
Medicines information	<a href="http://www.ukmi.nhs.uk">http://www.ukmi.nhs.uk</a>
Medicines management and pharmaceutical care	<a href="http://www.pharmalife.co.uk">http://www.pharmalife.co.uk</a>
Merck manual full-text online	<a href="http://www.merck.com/mmpe/index.html">http://www.merck.com/mmpe/index.html</a>
MHRA	<a href="http://www.mhra.gov.uk">http://www.mhra.gov.uk</a>
MI tutorials and extemporaneous formulations	<a href="http://www.pharminfotech.co.nz">http://www.pharminfotech.co.nz</a>
National Electronic Library for Health	<a href="http://www.library.nhs.uk">http://www.library.nhs.uk</a>
National Institute for Health and Clinical Excellence (NICE)	<a href="http://www.nice.org.uk">http://www.nice.org.uk</a>
National Prescribing Centre	<a href="http://www.npc.co.uk">http://www.npc.co.uk</a>
National Treatment Centre for Substance Misuse	<a href="http://www.nta.nhs.uk">http://www.nta.nhs.uk</a>
New England Journal of Medicine	<a href="http://www.nejm.org">http://www.nejm.org</a>
Oxford Handbook of Clinical Medicine	<a href="http://ohcm.oxfordmedicine.com">http://ohcm.oxfordmedicine.com</a>

(continued)

<b>Description</b>	<b>Web address (URL)</b>
Palliative care	<a href="http://www.palliativedrugs.com">http://www.palliativedrugs.com</a>
Paracetamol Information Centre (includes guidelines on treatment of overdose)	<a href="http://www.pharmweb.net/paracetamol.html">http://www.pharmweb.net/paracetamol.html</a>
Patient-group directions	<a href="http://www.nelm.nhs.uk/en/Communities/NeLM/PGDs">http://www.nelm.nhs.uk/en/Communities/NeLM/PGDs</a>
Pharmaceutical Journal	<a href="http://www.pjonline.com">http://www.pjonline.com</a>
Renal Association	<a href="http://www.renal.org/home.aspx">http://www.renal.org/home.aspx</a>
RPSGB	<a href="http://www.rpharms.com">http://www.rpharms.com</a>
Scottish Intercollegiate Guideline Network (SIGN)	<a href="http://www.sign.ac.uk">http://www.sign.ac.uk</a>
TB information in various languages	<a href="http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_116689">http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_116689</a>
Travel advice, specific to destination—includes vaccinations and malaria prophylaxis	<a href="http://www.fitfortravel.scot.nhs.uk">http://www.fitfortravel.scot.nhs.uk</a>
Travel shop, includes travel health information and medical supplies	<a href="http://www.nomadtravel.co.uk">http://www.nomadtravel.co.uk</a>
Travel—health information (subscription required, free NHS Scotland)	<a href="http://www.travax.scot.nhs.uk">http://www.travax.scot.nhs.uk</a>
WHO Action Programme on Essential Drugs	<a href="http://www.who.int/dap">http://www.who.int/dap</a>

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