

Information Sheet

Document G_90_Info_10_A Effective: 01/09/22 Author: J Ferguson Authorised: S Mabone Review date: 01/09/25 (amended 1/5/25)

Common Positive Blood Culture Gram Stain Appearances and Implications

Gram stain appearance	Microbiological implication	Clinical implications of blood isolate
Gram negative rods (GNR)	Enteric (Enterobacterales family) or so-called	In general, Gram negative sepsis is rapidly fatal if
Bar Alt	'coliform' bacterial species – e.g. E. coli, Klebsiella,	untreated and requires early empirical treatment
All NY SY SY A	Salmonella species etc (upper left image)	with a rapidly acting antibiotic – an aminoglycoside is
		used in combination with a broad spectrum beta
1.7 1 1	Pseudomonas aeruginosa and related species	lactam (usually a cephalosporin like ceftriaxone).
6.43 M. A.	(morphology – thinner rods) – will generally only	
14	grow in the aerobic bottle) (upper right)	Community onset infections associated with Gram
		negative sepsis include UTI, biliary sepsis (often with
A CASE OF A CASE	Acinetobacter species and related species (short	obstruction), GIT infection (e.g. typhoid), intra-
ALL AND DECK AND A DECK	rods or coccobacilli) (bottom left); Haemophilus	abdominal infection and less frequently pneumonia
	<i>influenzae</i> has similar appearance (not shown)	(Acinetobacter, Haemophilus, Klebsiella).
ACTO IN THE REAL PROPERTY OF	Burkholderia pseudomallei (Mellioidosis agent -	Hospital onset infections include UTI, post
	GNR with bipolar staining) (not shown)	abdominal surgery, central line infections, ventilator-
		associated pneumonia.
	Anaerobic Gram negatives – Bacteroides and	
	related species- will generally only grow in	These species are almost never contaminants when
	anaerobic bottle (bottom right image). Currently	isolated from blood.
	anaerobic plate cultures are not performed in	
	PNG, so these organisms cannot be cultured.	

Gram stain appearance	Microbiological implication	Clinical implications of blood isolate
Gram negative diplococci	Neisseria meningitidis (left image) Neisseria gonorrhoeae (not shown) Moraxella catarrhalis and related species (right)	 Meningococcal disease usually presents from the community as severe sepsis or acute meningitis or on occasions both conditions. Skin changes may take 12 hours to appear after onset of symptoms. Gonococcus - rarely associated with bacteraemia in patients with acute septic polyarthritis. Moraxella is almost always a contaminant.
Gram positive coccus (resembling Staph.)	Staphylococcus aureus – signified by a positive tube coagulase performed from the positive blood culture broth or from agar subculture. Accurate determination of whether it is methicillin- resistant (MRSA) or methicillin-susceptible (MSSA) is critical. Coagulase Negative Staphylococcal species (CoNS)- e.g. Staph. epidermidis, S. capitis etc Micrococcus species	 Staphylococcus aureus (coagulase positive Staph.) is a major pathogen associated with a wide range of both community and hospital infections (frequently associated with an intravascular or other device). Infections without an apparent focus may occur. CoNS and <i>Micrococcus</i> are usually contaminants. Patients with central iv lines may develop infection. Confirm by repeat detection in a separately collected sample. If in doubt, remove/replace the line.
GPC in chains (resembling Streptococcus)	Group A strep= <i>Streptococcus pyogenes</i> , other beta-haemolytic strep. (BHS) species (groups B, C or G) (left image) <i>Streptococcus pneumoniae</i> (right image) – the halo effect is caused by a polysaccharide capsule (not all isolates) – usually diplococci – pairs Other alpha-haemolytic streptococcal species (so called "Viridans" streptococci). The word viridans refers to the green appearance of partially (alpha) haemolysed blood agar.	In large part, BHS are responsible for community onset rather than hospital infections. BHS species are all susceptible to benzylpenicillin or ampicillin which is the mainstay of treatment. Penicillin is the mainstay for pneumococcal pneumonia. Viridans streptococci are often contaminants, especially if isolated in a single blood sample. NB. A cause of subacute endocarditis.

Gram stain appearance		Microbiological implication	Clinical implications of blood isolate
		Enterococcus faecalis and other related species	Enterococcus is associated with UTIs, intra-abdominal
			or biliary infection and sometimes endocarditis. E.
			<i>faecalis</i> is susceptible to PEN, resistant to cephalosp.
Gram Positive Rod (GPR)		Bacillus cereus and other species (left upper image	GPR with the exception of <i>Listeria</i> are usually
		 – large +/- spores) 	considered contaminants. These positive Gram stain
			results from blood culture do not require immediate
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	0 00	Clastridium spacies (right upper large + (spares)	Pare patients with gas gangrone will be basteraomic
		clostitutum species (light upper-large +/- spores)	with Clostridium perfringens. Severe sensis due to
	-		Clostridium senticum may occur in association with
14. × (1945.			gastrointestinal cancer.
The state of the state		Corynebacterium species (left lower; 'chinese'	
· · · · ·	1- 1	characters)	
5 y all A	1	Listeria monocytogenes (right lower – small GPR)	Listeria infection is rare – patients may present with
3 T 3 3	2.1		gastroenteritis, sepsis or meningitis, especially at the
ster a	1 - 1		extremes of age and in pregnant women.
		<i>Cutibacterium (Propionibacterium)</i> sp. (not shown)	
Candida (yeast) Crypto	ococcus	Candida albicans and related species	Fungaemic infections are usually detected in
		(morphology- large oval cells staining as Gram	hospitalised patients and are associated with either
	Sec. 1	positive). Generally 2-3 days required before	central venous lines or instrumentation of the urinary
	A	system detects growth.	tract (including indwelling catheters).
	5		Treatment of candidaemia requires remove of any
		Cryptococcus neoformans / gattii (occasionally	associated device and antifungal therapy – generally
129 29		present in blood) (morphology - visible	fluconazole or amphotericin for 2 weeks.
0000000		polysaccharide capsule creates a halo effect)	Treatment of cryptococcal infection is complex – see
			guidelines.
		Filamentous moulds (e.g. Aspergillus species) are	
		rarely detected in blood cultures (not snown).	