All-in-One Microbial Test
Exotic Animal Report

Patient Name:		**Health Status:**		**Account #:**	
Owner's Name:		**Ordered by:**		**Sample ID:**	
Breed:	Rhesus Macaque	**Email:**		**Sample Type:**	Gingiva
Age:	1.4	**Hospital:**		**Received Date:**	
Species:	Monkey	**Location:**		**Report Date:**	

Potential Clinically Relevant Microbes Detected:

Listed are those bacteria and fungi detected in the specimen that are of potential clinical relevance. Results from this report should be considered together with additional clinical data gathered by the veterinarian (physical examination, medical history, cytology, etc.) as the microbes detected may or may not be the cause of the clinical condition. For a comprehensive list of all microorganisms detected in this specimen see page 3 of this report. Please consider that even commensals can become pathogenic in certain patients under certain circumstances. Further, novel or extremely rare pathogens may be found on page 3 for your consideration and clinical diagnosis.

1.Bacteria

Species Detected	AID*	Percentage (%)	Cells per Sample
Pseudopropionibacterium propionicum [1]	[Link]	7.69	30,000,000
Peptostreptococcus stomatis [2][3][4]	--	2.79	11,000,000
Fusobacterium nucleatum [5][6][7]	[Link]	2.54	10,000,000
Streptococcus cristatus [2][3][4]	--	2.40	9,500,000
Streptococcus downei [2][3][4]	--	1.89	7,500,000

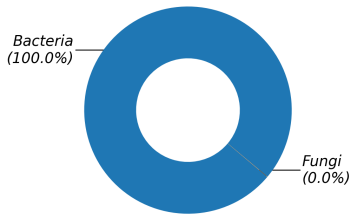
2.Fungi

Species Detected	AID*	Percentage (%)	Cells per Sample
Trichosporon sp. [2][3][8]	--	49.26	1,200
Hortaea werneckii [8]	[Link]	0.62	15
Acremonium sp. [9]	[Link]	0.49	12
Curvularia kusanoi-sorghina [9]	--	0.49	12
Candida tropicalis [2][3][8]	[Link]	0.29	7

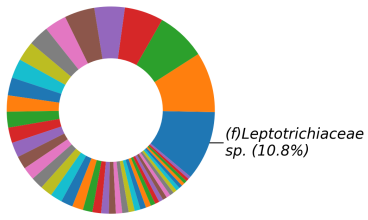
The number of cells per sample is subject to variations based on sampling technique applied to collect the sample. Following the sampling protocol closely is highly recommended. Less than 1000 cells of Bacteria or less than 10 cells of Fungi are often not clinically relevant unless poor sampling technique was applied, or lower sample volume was submitted.

* AID stands for Animal Infection Database. It is a resource center to provide more information for microbes in animal microbiome settings.

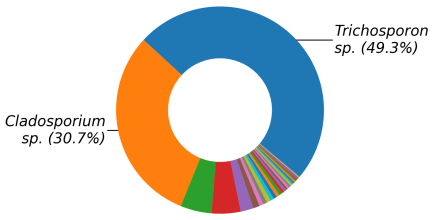
Microbial Overview:



Bacteria vs Fungi



Bacteria



Fungi

Bacteria vs Fungi: the relative abundance between Bacteria and Fungi. **Bacteria**: the percentage profile of bacterial species alone. **Fungi**: the percentage profile of fungi species alone. Each color represents a species. The larger the colored segment is, the more abundant the species is.

Antibiotic Resistance for Detected Clinically Relevant Microbes

The sample was screened for the presence of antibiotic resistance genes and intrinsic resistances of clinically relevant microorganisms. For this analysis more than 90 antibiotic resistance genes were screeened. The cautious use of any antibiotic drug is highly reccommended. Please follow the guidelines for antimicrobial stewardship in veterinary practice.

This table lists antibiotic sensitivities/resistances for the indicated bacteria based on detection of specific antibiotic resistance genes and naturally occurring, or intrinsic, resistance to specific antibiotics previously identified for that organism.

Drug Tiers*	Antibiotics	*Pseudopropionibacterium propionicum* (7.7 %)	*Peptostreptococcus stomatis* (2.8 %)	*Fusobacterium nucleatum* (2.5 %)	*Streptococcus cristatus* (2.4 %)	*Streptococcus downei* (1.9 %)
1st	Cefazolin	NRD	NRD	NRD	NRD	NRD
	Cephalothin	NRD	NRD	NRD	NRD	NRD
	Cephalexin	NRD	NRD	NRD	NRD	NRD
	Cefadroxil	NRD	NRD	NRD	NRD	NRD
	Cefoxitin	NRD	G	G	NRD	NRD
	Penicillin	NRD	G	G	NRD	NRD
	Penicillin G	NRD	G	G	NRD	NRD
	Oxacillin	NRD	NRD	NRD	NRD	NRD
	Ampicillin	NRD	G	G	NRD	NRD
	Amoxicillin	NRD	G	G	NRD	NRD
	Clavamox	NRD	G	G	NRD	NRD
	Gentamicin	NRD	NRD	NR	NR	NR
	Tobramycin	NRD	NRD	NR	NRD	NRD
	Neomycin	NRD	NRD	NR	NR	NR
	Clindamycin	NRD	G	NR	NR	NRD
	Lincomycin	NRD	NRD	NR	NR	NRD
	Doxycycline	NRD	NRD	NR	NR	NRD
	Minocycline	NRD	NRD	NR	NR	NRD
	Tetracycline	NRD	G	NR	NR	NRD
	Sulfonamide	NRD	NRD	NRD	NRD	NRD
	Trimethoprim-sulfamethoxazole	NRD	NRD	NRD	NRD	NRD
	Metronidazole	NRD	G	NRD	NRD	NRD
	Cefovecin	NRD	NRD	NRD	NRD	NRD
2nd	Cefpodoxime	NRD	NRD	NRD	NRD	NRD
	Ceftiofur	NRD	NRD	NRD	NRD	NRD
	Timentin	NRD	NRD	NRD	NRD	NRD
	Azithromycin	NRD	G	NR	NR	NRD
	Orbifloxacin	NRD	NRD	NRD	NRD	NRD
	Chloramphenicol	NRD	NRD	NRD	NR	NRD
	Florfenicol	NRD	NRD	NRD	NR	NRD
3rd	Amikacin	NRD	NRD	NR	NR	NR
	Rifampin	NRD	NRD	NRD	NRD	NRD
	Imipenem	NRD	G	G	NRD	NRD
	Levofloxacin	NRD	NRD	NRD	NRD	NRD
	Marbofloxacin	NRD	NRD	NRD	NRD	NRD
	Pradofloxacin§	NRD	NRD	NRD	NRD	NRD
	Enrofloxacin	NRD	NRD	NRD	NRD	NRD
	Ciprofloxacin¶	NRD	NRD	NRD	NRD	NRD
	Ceftazidime	NRD	NRD	NRD	NR	NR
	Mupirocin	NRD	NRD	NRD	NRD	NRD
	Nitrofurantoin	NRD	NRD	NRD	NRD	NRD
	Colistin	NRD	NRD	NRD	NR	NR
	Ticarcillin	NRD	NRD	NRD	NRD	NRD
	Piperacillin-Tazobactam	NRD	NRD	NRD	NRD	NRD

Abbreviation Keys:

NR	Not Recommended (Due to either Resistance Genes Detected, Intrinsic Resistance, or < 10% Effectiveness in Antibiogram Studies)
P	Poor Performance (< 50% Effectiveness in Antibiogram Studies)
F	Fair Performance (< 75% Effectiveness in Antibiogram Studies)
G	Good Performance (> 75% Effectiveness in Antibiogram Studies)
NRD	No Antibiotic Resistance Detected Based on the MiDOG Antibiotic Target Panel

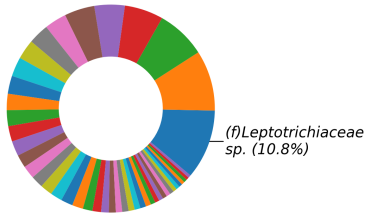
Symbols:

*	Reference: Antimicrobial Resistance and Stewardship Initiative University of Minnesota, Antibiotic Drug Tiers and Selection List for Companion Animals.
§	Variable bioavailability in animal patients.
¶	Contraindicated in animal patients.

Supplemental Data

Total Bacteria Composition

Charts below depict the relative abundance of all detected bacterial species. Each color represents a different bacterial species. The larger the colored segment is, the more abundant that species is in the specimen.



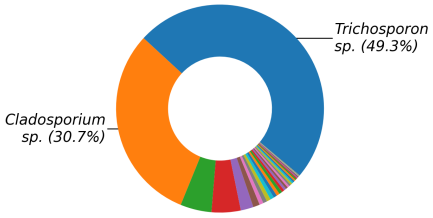
Your Sample

The table below lists top 8 bacterial species detected within the limit of detection. The absolute and relative abundances of each species is shown. Potential clinically relevant microbes are highlighted in red.

Species Detected	AID*	Percentage (%)	Cells per Sample
(f)Leptotrichiaceae sp.	--	10.80	43,000,000
Leptotrichia sp.	--	9.40	37,000,000
Pseudopropionibacterium propionicum [1]	[Link]	7.69	30,000,000
Actinomyces johnsonii	--	6.03	24,000,000
Treponema denticola	--	4.72	19,000,000
Corynebacterium sp.	--	4.68	19,000,000
(c)Bacteroidia sp.	--	3.42	14,000,000
Porphyromonas sp.	--	3.19	13,000,000

Total Fungal Composition

Charts below depict the relative abundance of all detected fungal species. Each color represents a different fungal species. The larger the colored segment is, the more abundant that species is in the specimen.



Your Sample

The table below lists top 8 fungal species detected within the limit of detection. The absolute and relative abundances of each species is shown. Potential clinically relevant microbes are highlighted in red.

Species Detected	AID*	Percentage (%)	Cells per Sample
Trichosporon sp. [2][3][8]	--	49.26	1,200
Cladosporium halotolerans-sphaerospermum	--	30.68	750
(k)Fungi sp.	--	4.86	120
Cutaneotrichosporon sp.	--	4.53	110
Apiotrichum domesticum-montevideense	--	1.98	48
(f)Cladosporiaceae sp.	--	1.03	25
Hortaea werneckii [8]	[Link]	0.62	15
(f)Trichosporonaceae sp.	--	0.62	15

* AID stands for Animal Infection Database. It is a resource center to provide more information for microbes in animal microbiome settings.

Antimicrobial Resistance Genes Detected

The table below lists antimicrobial resistance genes that are detected in this sample. For antibiotics usage guidance, please first refer to the "Antibiotic Resistance" table shown in Page 2. Use this table only as an additioanl resource when needed. Inferring antibiomicrobial resistance from the resistance genes detected should be cautious, espeically in a mixed microbial population.

AMR_Gene_Detected	Resistance_Against	Function
APH(3'')-Ib	aminoglycoside	aminoglycoside phosphotransferase
AAC(6')-Ie-APH(2'')-Ia	aminoglycoside	aminoglycoside acetyltransferase
AAC(3)-Ia	aminoglycoside	aminoglycoside acetyltransferase
ANT(4')-Ib	aminoglycoside	Kanamycin nucleotidyltransferase
APH(3')-IIIa	aminoglycoside	aminoglycoside phosphotransferase
APH(3')-Ia	aminoglycoside	aminoglycoside phosphotransferase
APH(6)-Id	aminoglycoside	aminoglycoside phosphotransferase
ANT(6)-Ia	aminoglycoside	aminoglycoside nucleotidyltransferase
GES	carbapenem, cephalosporin, penam	class A beta-lactamase
lnuA	lincosamide	lincosamide nucleotidyltransferase
ermA	lincosamide, macrolide, streptogramin	23S rRNA methyltransferase
mphC	macrolide	macrolide phosphotransferase
mphD	macrolide	macrolide phosphotransferase
mecA	monobactam, carbapenem, cephalosporin, cephamycin, penam, penem	penicillin-binding protein 2a
cmx	phenicol	chloramphenicol exporter
ermX	streptogramin, macrolide, lincosamide	ribosomal RNA methyltransferase
ermC	streptogramin, macrolide, lincosamide	23S rRNA methyltransferase
ermB	streptogramin, macrolide, lincosamide	ribosomal methylase
msrD	streptogramin, tetracycline,phenicol, macrolide, lincosamide	ABC-F ribosomal protection protein
sul2	sulfonamide	dihydropteroate synthase
sul1	sulfonamide	dihydropteroate synthase
tetL	tetracycline	tetracycline efflux pump
tetWNW	tetracycline	ribosomal protection protein
tetK	tetracycline	tetracycline efflux pump

References

1. Suzuki, H., Arshava, E. V., Ford, B., & Nauseef, W. M. (2019). Don't Let Its Name Fool You: Relapsing Thoracic Actinomycosis Caused by Pseudopropionibacterium propionicum (Formerly Propionibacterium propionicum). The American journal of case reports, 20, 1961.
2. Carpenter, James W., and Chris Marion. Exotic Animal Formulary-E-Book. Elsevier Health Sciences, 2017.
3. Wallach, Joel D., and William J. Boever. Diseases of exotic animals. Medical and surgical management. WB Saunders Co., 1983.
4. Ballard, Bonnie, and Ryan Cheek, eds. Exotic animal medicine for the veterinary technician. John Wiley & Sons, 2016.
5. Bennett, John E., Raphael Dolin, and Martin J. Blaser. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases E-Book. Elsevier health sciences, 2019.
6. Sykes, Jane E., and Craig E. Greene. Infectious Diseases of the Dog and Cat-E-Book. Elsevier Health Sciences, 2013.
7. Williams, Elizabeth S., and Ian K. Barker, eds. Infectious diseases of wild mammals. John Wiley & Sons, 2008.
8. Greene, Craig E. Infectious Diseases of the Dog and Cat-E-Book. Elsevier Health Sciences, 2013.
9. Muller and Kirk's small animal Dermatology, 7th edition Elsevier

Methods

The MiDOG® All-in-One Microbial Test is a targeted, Next-generation DNA sequencing testing service able to identify molecular signatures unique to the identity and character of a specific microorganism. This test relies on safeguarded preservation and transport of collected samples, thorough extraction of DNA from all microbes present in the specimen, select amplification of microbial DNA followed by Next-generation DNA sequencing using the latest technologies from Illumina (Illumina, Inc., San Diego, CA). Data handling is done via curated microbial databases to accurately align DNA sequences to ensure precise and accurate (species-level) identification of all bacteria and fungi present in the specimen.

When no Bacterial or Fungal Species are Detected:

When no bacterial or fungal species are detected in this test, this result may be due to a very low microbial load and/or low concentration of microbial DNA in the sample provided. In this case, we recommend re-sampling the area of interest and re-submitting specimen for analysis.

Phylogenetic Rank Abbreviations

If the detected bacterial or fungal taxon could not be identified down to the genus level, the closest phylogenetic rank identified is provided. An abbreviation indicating the level of the rank is displayed aside. The meaning of the abbreviations is shown as:(p) Phylum level, (c) Class level, (o) Order level, and (f) Family level.

Disclaimer

The information contained in this MiDOG® report is intended only to be factor for use in a diagnosis and treatment regime for the animal patient. As with any diagnosis or treatment regime, you should use clinical discretion with each animal patient based on a complete evaluation of the animal patient, including history, physical presentation and complete laboratory data, including confirmatory tests. All test results should be evaluated in the context of the patients individual clinical presentation. The information in the MiDOG ® report has not been evaluated by the FDA.

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