Bastu - Swab's Dental Health Report

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basepaws

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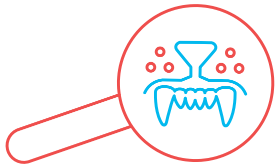
Dental Disease 101

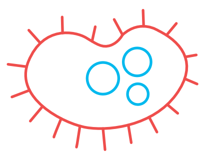


Did you know?

Dental disease affects 50-90% of cats over the age of four.

Fortunately, most dental diseases are preventable with a good dental care routine. They are also mostly treatable, if caught early. The microbes in a cat's mouth can inform us of developing dental issues, before they are advanced enough to be visible by a veterinarian during a routine checkup. The Basepaws Dental Health test looks for microbial signatures associated with three of the most common dental conditions in cats - Periodontal Disease, Tooth Resorption, Halitosis (bad breath).

The oral microbiome



Environmental factors and various food sources make the feline oral cavity a fascinating place, characterized by unique interactions between a cat's mouth and the microbes within it (the oral microbiome). The almost constant exposure to foreign microbial organisms has made the oral microbiome fiercely competitive. Once in a while, pathogenic microbes manage to colonize parts of the oral cavity which can be associated with dental problems.

The feline oral microbiome can reveal information about developing dental issues.

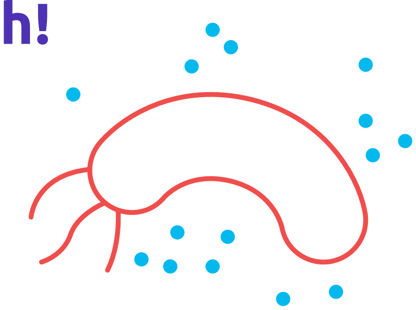
The oral microbiome also has implications for general health.

Can the oral microbiome change?

YES! The oral microbiome is not static.

Different factors such as diet (dry versus wet food), environment (indoor versus outdoor), supplement intake, medications (particularly antibiotics) and dental care routine can all influence the composition of the oral microbiome.

This is why testing early and testing often is key for optimal dental health!



Bastu - Swab's Dental health summary

How does this test work? We used our oral microbiome database containing healthy cats and cats suffering from periodontal disease, tooth resorption or halitosis to identify a set of predictive microbes whose compositional abundance is associated with each condition. Based on these results, we developed a 0 - 10 risk score system for each condition. The results below show Bastu - Swab's overall risk for each of the three conditions, as well as a breakdown of the predictive microbes whose compositional abundance is associated with high, medium or low risk for each dental condition. **The purple line and the number next to it indicate your cat's overall risk score for each condition.**

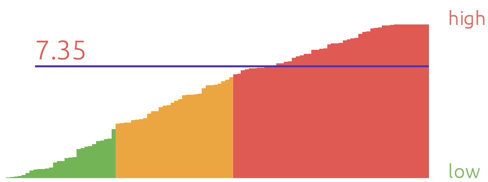
low risk: 0 - 3.3 medium risk: >3.3 - 6.6 high risk: >6.6 - 10

Risk for periodontal disease

Periodontal disease affects the tissues surrounding the teeth. Initial stages are classified as gingivitis, while advanced cases are known as periodontitis.

OVERALL RISK:

- ○ LOW
- ○ MEDIUM
- ● HIGH



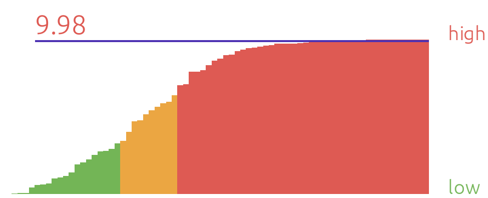
risk scores for 108 predictive microbes

Risk for tooth resorption

Tooth resorption is a relatively common condition characterized by progressive dentin erosion.

OVERALL RISK:

- ○ LOW
- ○ MEDIUM
- ● HIGH



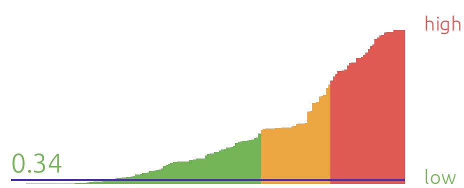
risk scores for 74 predictive microbes

Risk for bad breath (halitosis)

When bad breath is a persistent problem for a cat, this could be indicative of more serious general health issues.

OVERALL RISK:

- ● LOW
- ○ MEDIUM
- ○ HIGH



risk scores for 182 predictive microbes

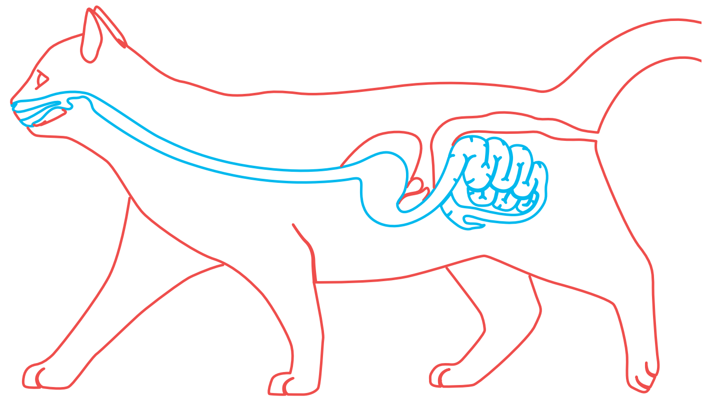
What's next?

- You are strongly advised to adopt a daily dental care routine for Bastu - Swab
- Consider supplementing Bastu - Swab's routine with products accepted by the Veterinary Oral Health Council (VOHC)
- Schedule an appointment with your veterinarian in the next month

Next recommended dental health test in:

3-6 months

What are Bastu - Swab's health implications?



Implications of having elevated periodontal disease risk:

Your cat's elevated risk for periodontal disease could potentially have negative implications for their general health. Periodontal disease can sometimes be associated with a viral infection (feline leukemia virus, feline immunodeficiency virus, feline calicivirus), although it is most commonly caused by buildup of plaque and tartar on the teeth's surface - a great breeding ground for pathogenic microbes. With the progression of this dental disease, pathogenic microbes can enter the bloodstream and travel to other organs.

This is why, periodontal disease is sometimes associated with a higher incidence of chronic kidney disease, cardiovascular problems, diabetes mellitus and some autoimmune diseases.

Implications of having elevated tooth resorption risk:

Unfortunately, not much is currently known about the effect of tooth resorption (FORL) on general health. Sometimes, FORL is observed in cats who also suffer from periodontal disease.

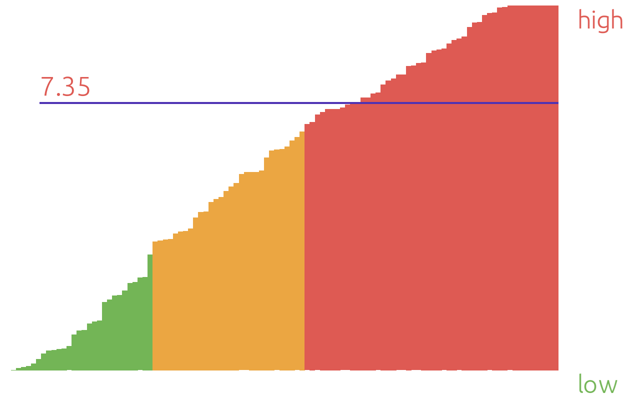
Therefore, FORL can potentially be associated with a higher likelihood of developing diabetes, viral, renal, autoimmune and cardiovascular problems due to pathogenic microbes entering the bloodstream and traveling from the mouth to other organs.

What can you do?

- It is important to regularly assess a cat's dental health in order to address any emerging issues early on and minimize chances of them negatively impacting general health.
- Adopting a thorough and consistent dental care routine at home can significantly reduce the chance of developing dental diseases. This will in turn reduce your cat's likelihood of developing more serious general health problems.

Periodontal Disease

Periodontal disease (PD) is a group of inflammatory disorders affecting the tissues surrounding the teeth. Periodontal disease is initiated by the build-up of plaque on the tooth surface resulting in the gingiva becoming inflamed (gingivitis). Without an effective oral care regime, inflammation can begin to destroy the structures that support the tooth (periodontitis). Periodontal disease affects up to 80% of the adult feline population. Below you will see how your cat's oral microbiome compares to a healthy population when it comes to microbial signatures of periodontal disease.



We analyzed Bastu - Swab's oral microbiome to establish the compositional abundance of 108 microbes predictive of periodontal disease. We ranked each microbe's abundance on a scale from 1 to 5, where 1 represents abundance levels close to a healthy control population and 5 represents abundance levels close to cats with periodontal disease. Below are Bastu - Swab's TOP 3 most significant microbes associated with high, medium, and low risk, respectively.

Currently, Bastu - Swab's compositional abundance levels for 50 out of 108 microbes are consistent with having periodontal disease (46%).

Top 3 high risk microbes

Moraxella bovoculi

Corynebacterium sp. ATCC 6931

Actinomyces howellii

Top 3 medium risk microbes

Actinobacillus indolicus

Bacteroides fragilis

Desulfobulbus oralis

Top 3 low risk microbes

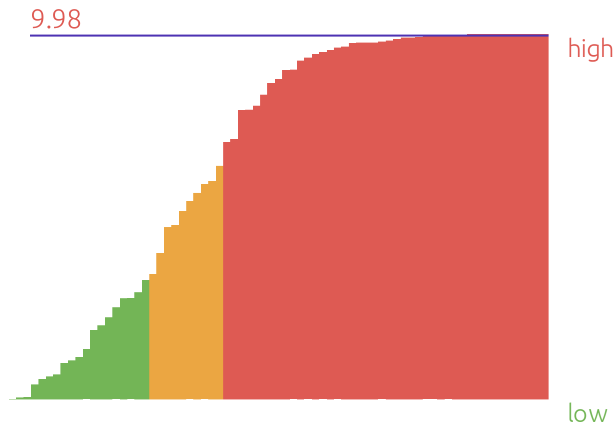
Roseburia hominis

Avibacterium paragallinarum

Lysobacter oculi

Tooth Resorption

Every tooth is composed of a root canal (containing nerves, blood and lymphatic vessels) and bony substances called dentin and enamel. When a cat suffers from tooth resorption, the dentin of the affected tooth starts to progressively erode. Unfortunately, tooth resorption is relatively common, affecting 20-60% of all cats and over 70% of cats over the age of five. Below, you can see how your cat compares to the healthy feline population with regards to abundance of microbes associated with tooth resorption.



We analyzed Bastu - Swab's oral microbiome to establish the compositional abundance of 74 microbes predictive of tooth resorption. We ranked each microbe's abundance on a scale from 1 to 5, where 1 represents abundance levels close to a healthy control population and 5 represents abundance levels close to cats with tooth resorption. Below are Bastu - Swab's TOP 3 most significant microbes associated with high, medium, and low risk, respectively.

Currently, Bastu - Swab's compositional abundance levels for 44 out of 74 microbes are consistent with having tooth resorption (59%).

Top 3 high risk microbes

Corynebacterium xerosis

Parabacteroides distasonis

Moraxella bovoculi

Top 3 medium risk microbes

Alloprevotella sp. E39

Actinobacillus indolicus

Bacteroides sp. HF-5287

Top 3 low risk microbes

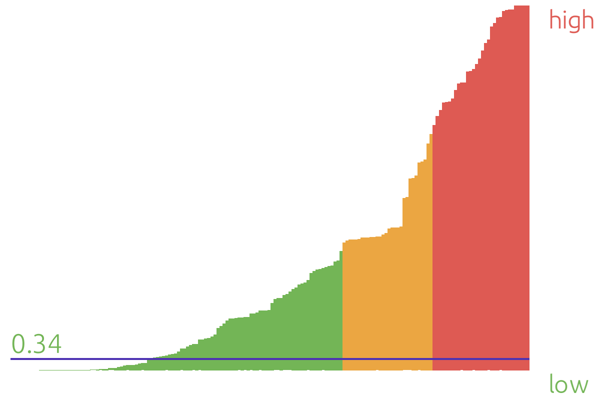
Aggregatibacter aphrophilus

Gemella sp. oral taxon 928

Avibacterium paragallinarum

Bad Breath

Occasional bad breath is usually not something you should worry about. When bad breath is a persistent problem, this could be indicative of more serious issues. The most common cause of bad breath is periodontal disease. Different types of bad breath can also indicate general health problems, such as kidney disease, diabetes and some liver disorders. Here is how your cat's oral microbiome compares to the general healthy population when it comes to halitosis.



We analyzed Bastu - Swab's oral microbiome to establish the compositional abundance of 182 microbes predictive of bad breath. We ranked each microbe's abundance on a scale from 1 to 5, where 1 represents abundance levels close to a healthy control population and 5 represents abundance levels close to cats with bad breath. Below are Bastu - Swab's TOP 3 most significant microbes associated with high, medium, and low risk, respectively.

Currently, Bastu - Swab's compositional abundance levels for 32 out of 182 microbes are consistent with having bad breath (18%).

Top 3 high risk microbes

Acidovorax sp. JS42

Diaphorobacter sp. JS3050

Cardiobacterium hominis

Top 3 medium risk microbes

Neisseria bacilliformis

Parvimonas micra

P. propionicum

Top 3 low risk microbes

Aeromonas caviae

Gemella sp. oral taxon 928

P. goodfellowii

What's next for Bastu - Swab?

At home care

To improve your cat's oral health, you are strongly advised to adopt a daily dental care routine, if you don't already have one. If you already have a routine, consider modifying it or supplementing it by implementing some of the suggestions below.

While tooth brushing is the most effective at home treatment (when done properly), we understand that every cat is unique and might have different tolerance levels for this method. We teamed up with some of the world's top veterinary dentistry professionals to provide you with support and innovative solutions on how to best approach brushing your cat's teeth and other tips and tricks for optimal dental hygiene.

Watch the video to learn how to tailor your routine to your cat's personality and comfort level.

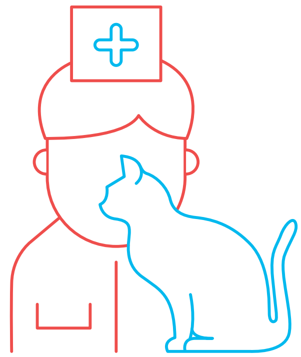
Learn More

You can also read about some effective, off-the-beaten-path ways to maximize the effect of your cat's dental care routine in this article.

Since, your cat's report results indicate that there is a high likelihood that dental disease is already present, it is important that you learn how to routinely perform 'flip the lip' exams at home. These exams will help you identify any visible changes in your cat's teeth and gums. You should alert your veterinarian if you see any worrying signs such as ulcers, red or swollen gums, discolored teeth or anything else out of the ordinary. In addition to this, pay attention to your cat's behavior - pawing at the mouth, drooling and problems eating are strong indicators that your cat is experiencing mouth pain and needs medical attention.

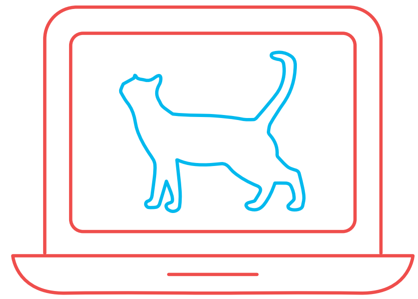
Finally, you can consider incorporating some of the products recommended by the Veterinary Oral Health Council (VOHC) in your cat's dental care routine. These products have demonstrated efficacy in fighting plaque and tartar buildup, which are the root cause of many dental problems. However, in more advanced stages of dental disease, these products will do a good job in slowing down disease progression, but will not reverse it. In such instances, VOHC recommended products are a great complement to routine dental care provided and prescribed by your cat's veterinarian.

Veterinary oral exam



Have a question for Basepaws?

If you have a question about any part of this report, you can send us an email at: meow@basepaws.com



We have identified some signs of dental disease in your cat's mouth.

We recommend scheduling an appointment with your veterinarian for an in-person general and dental health assessment within the next month.

Want to discuss your results with other cat parents? Join our facebook group!

Would you like to tell us more about your cat's dental and general health? Contribute to feline dental health research by filling out this survey.

Next dental health test recommended in:

3 - 6 months

Appendix

Sequencing and analysis methodology

Most direct-to-consumer microbiome tests use a technique called '16S rRNA gene sequencing'. This technique can only provide information about the bacteria present in the microbiome.

However, it is well-known that the microbiome is composed of viruses, protozoa, fungi and archaea species, in addition to bacteria. This means that the 16S approach zooms in on just one part of the microbiome, ignoring the rest. Additionally, 16S sequencing does not provide sufficient resolution to reliably and consistently go beyond the genus level of bacterial classification. Therefore, in most cases, we don't know the exact species of bacteria in the microbiome, making analysis somewhat vague and relying on approximation.

To address these problems, Basepaws uses metagenomic sequencing instead of 16S sequencing. Our method allows us to capture organisms across all domains of life, not restricting us to just bacteria. In addition, we can reliably identify organisms to the species or even strain level, making our analysis more accurate and improving our confidence in the results. These results paint a much richer and unbiased picture of your feline companion's mouth. We used pairwise log ratio transformation to estimate the compositional abundance of microbial species and Gaussian mixture modeling to determine your cat's risk for periodontal disease, tooth resorption and bad breath.

Limitations

The Basepaws oral microbiome report is based on our ability to identify thousands of microbial species with each test.

Our large oral microbiome reference database allows us to identify a multitude of novel associations between microbes found in the mouth and a variety of diseases, as well as confirm previously reported findings. However, the field of feline oral microbiome science is extremely young and understudied, which is why we report only on conditions and microbes where previous knowledge exists and/or we see a particularly strong signal coming through in our data.

As we accumulate more data and conduct more analyses, we will aim to continuously enrich this report, providing even more helpful insights. We want to emphasize that the identification of a certain microbial signature associated with a dental disease does not constitute a diagnosis. Conversely, not detecting a particular microbial signature does not exclude the possibility of an unknown disease-causing pathogen being present or dental disease being caused by something other than pathogenic microbes. This report does not aim to substitute a diagnosis by a professional.

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