**The Effects of Roselle Calyx Extract on *P. gingivalis* Pathogenic Activities**

**Abstract:**

In recent times, the general public has shown a great interest in the “natural” movement when dealing with diet and personal health. This study also shows an interest in a natural plant compound called roselle calyx extract and its potential effects on the bacteria *Porphyromonas gingivalis*, a common pathogen associated with numerous health disorders, such as rheumatoid arthritis and infections in the respiratory tracts and digestive tract. The mechanisms of the bacteria are not complicated to understand, but scientists are always looking for a way to decrease the virulence factor of common pathogens. This subject has great implications in the world of science and more specifically medicine, because treatments for diseases can be developed and further experimentation can be carried out with the proper understanding of a bacteria’s characteristics.

**Introduction**

This study revolves around one microorganism called *Porphyromonas gingivalis* and the many factors which affect its virulence and pathogenicity. More specifically, experiments were carried out in Japan which questioned the various potential effects of a specific plant’s extract on the organism. *P. gingivalis* is an important bacteria to study because it is often found in the human body in potentially dangerous situations. For example, specific antibodies for *P. gingivalis* tend to be found in larger amounts in people who have been diagnosed with rheumatoid arthritis, linking the microorganism to this disease. Since the medical world continues to have many questions regarding rheumatoid arthritis, it is important to attempt to understand any bacterial species associated with the disease. In addition, *P. gingivalis* can cause numerous harmful diseases itself, making it a common pathogen to study. Examples of potential infected areas include the respiratory tract and both the colon and upper gastrointestinal tract.

Roselle is a hibiscus species which can be used in countless ways as food or herbal medicine. In this case, the calyx (a part of the plant) had extract removed to use as an herbal medicine. This material is known as roselle calyx extract (RCE).

**Recent Progress:**

 Interestingly enough, a major step forward in the accumulation of knowledge concerning *P. gingivalis* occurred about 6 months after the article in review was published by the *Journal of Microbiology, Biotechnology, and Food Science*. A group based in Australia published an article announcing the creation of a vaccine against

Periodontitis, an oral disease caused by colonization of *P. gingivalis*. This disease can progress even further and harm the patient even more, making a vaccination vital to progress in the modern medical world.

 In addition, scientists have acquired a more specific understanding of the ways *P. gingivalis* works against the human immune system. As a bacteria, *P. gingivalis* is extremely effective at sticking to and invading host cells with the help of a protease enzyme called gingipain. Gingipain is secreted by the organism in two different forms, Arg-gingipain (RGP) and Lys-gingipain (KGP). Gingipains (in this case, with different amino acids components) are the specific compound which makes it possible for the pathogens to attach to the host cell’s surface and eventually invade the cell (O’Brien). Also, the two types of gingipain proteases aid in the destruction of host tissue and antibodies. When an organism is infected by *P. gingivalis*, the natural cytokines circulated to promote inflammation are destroyed by gingipains as well. This has many implications further downstream because it will eventually render the immune system useless in that particular situation.

Figure 1

This table shows the five main methods of *P. gingivalis* as a pathogen

**Discussion**

The information and concepts expanded upon in this article are important to the medical world because many common diseases are involved. By knowing the specific mechanisms of attack utilized by *Porphyromonas gingivalis*, doctors have pathways to begin exploring to control *P. gingivalis*-caused diseases.

 Periodontitis can be caused by multiple bacterial species, but chronic periodontitis is mainly associated with *Porphyromonas gingivalis*. This does not even include the other body cavities the bacteria may be isolated from and the specific diseases which would arise.

 The gingipains produced by the bacteria are important not only for basic survival, but are also vital for the cell to thrive through acting as a pathogen. This study found that roselle calyx extract did in fact slow down the production of both main gingipain types (RGP and KGP) which in turn slows the effects of the bacteria destroying parts of the host cell. This is easily applied to medicine by making the assumption that using roselle calyx extract as a supplement for a patient suffering from periodontitis or a similar disease could aid the body in defeating an infection. More importantly, this concept can most likely be applied to more than just one disease (Sulisyani).

**References**

O'Brien, Neil M., James A. Holden, Jason C. Lenzo, Yan Tan, and Gail C. Brammar. "A Therapeutic *Porphyromonas Gingivalis*

Gingipain Vaccine Induces Neutralising IgG1 Antibodies That Protect against Experimental Periodontitis." Npj Vaccines 1 (2016): n. pag. Web.

Sulistyani, Herastuti, Mari Fujita, and Futoshi Nakazawa. "Effect of Roselle Calyx Extract on Gingipain Activity, Production Of Inflammatory Cytokines, and Oral Bacterial Morphology." *Journal of Microbiology, Biotechnology, and Food Sciences* 6.3 (2016): 960-66. JMBFS. Web.