

## INTRODUCTION

The Coronavirus-2 (SARS-CoV-2) originated in Wuhan, China in December of 2019. More than 225 million people have been infected worldwide, and more than 4.6 million people have died with the infection. To slow down the spread of the virus, several different types of vaccines have been developed in a short period of time (Chun et al., 2022).

Various oral manifestation have been reported post vaccination. These findings include desquamative epithelium, oral herpes zoster virus, Bell's Palsy, multiple ulcerative lesions with surrounding erythema, erythema with white lesions, fissured tongue and autoimmune blistering disease (oropharyngeal Pemphigus Vulgaris). The evidence of the COVID-19 vaccine is currently undergoing research, therefore there is still evolving data that correlates oral manifestations post vaccination.

## Oral Manifestations - Clinical Findings

Oral Manifestations Reported Post COVID-19 Vaccination

Table Created by Kayla Carmili, Lauren Kerendian and Alexis Livi

Vaccine Type	Oral Manifestation	Age	Latent Period Of Vaccine	Dose Reactivity	Affected Area	Citation
Moderna: mRNA-1273	Bell's Palsy	16-110 years	1-2 days	First dose	Right unilateral facial paralysis	Cirillo, 2021
Pfizer: BNT162b2	Auto-immune blistering disorders - Oropharyngeal Pemphigus Vulgaris	60 years	7 days	Second dose	Oropharyngeal and nasal bullous lesions (Figure 1 and 2)	Calabria et al., 2022
Pfizer: BNT162b2	Multiple Ulcerative Lesions with Surrounding Erythema	79 years	1 day	First dose	Right posterior hard palate (Figure 3)	Chun et al., 2022
Pfizer: BNT162b2	Oral Herpes Zoster	63 years	2 weeks	First dose	Left palate (Figure 4)	Fukuoka et al., 2021
Pfizer: BNT162b2	Fissured Tongue	85 years	3 days	Second dose	Pain of tongue	Chun et al., 2022
Johnson & Johnson: Ad26.COV2.S	Bell's Palsy	62 years	20 days	Single dose	Right unilateral facial paralysis (Figure 5)	Nishizawa et al., 2021
AstraZeneca: AZD1222	Generalized Desquamative Epithelium	38 years	1 week	First dose	Anterior mandibular alveolar mucosa (Figure 6)	Thongprasom et al. 2021
AstraZeneca: AZD1222	Erythema with White Lesions	60 years	1 day	First dose	Right buccal mucosa	Chun et al., 2022

Table 1

### Moderna:

Patients that had a history of cosmetic injections such as Botox can possibly present with Bell's Palsy after being vaccinated. It has been suggested that vaccination along with cosmetic injections has lead to Bell's Palsy (Cirillo, 2021).

### Pfizer:

A 60 year old female reported oropharyngeal Pemphigus Vulgaris, an autoimmune blistering disorder, following the Pfizer vaccine. The information was reported to the Department of Oral Medicine, University of Naples, Italy. One week following vaccination, lesions appeared. At first, the patient was treated with corticosteroids, however, it failed to establish disease control. Rituximab, a monoclonal antibody was prescribed to the patient which ultimately lead to improvement over time (Calabria et al., 2022). (Figures 1 and 2)

A 79 year old male reported multiple ulcerative lesions with surrounding erythema one day post Pfizer vaccination at the outpatient clinic of the Department of Oral Medicine. Prior medical history involved hypertension and prostatic disease. Over the course of two weeks, topical medication eased discomfort in the oral cavity (Chun et al., 2022). (Figure 3)

At a general dentist practice in Satsuma, Japan, a 63 year old female presented with oral herpes zoster two weeks after the administration of the Pfizer vaccine. The patient has a medical history of asthma. Ulcers were noted on the hard palate and on the mandible. (Figure 4)

An 85 year old female reported pain and discomfort in her tongue post Pfizer vaccination. Her medical history involved hypertension, osteoporosis, stroke, and hyperlipidemia. The patient was diagnosed almost three years prior with oral candidiasis and burning mouth syndrome, which were both resolved with topical clonazepam and fluconazole syrup. Furthermore, the same treatment was used to treat the fissured tongue developed post vaccination, which relieved the pain (Chun et al., 2021).

### Johnson & Johnson

A 62 year old woman reported unilateral facial paralysis post Johnson and Johnson vaccination. She had a medical history of type 2 diabetes, hypertension, and hyperlipidemia (Fukuoka et al., 2021). (Figure 5)

### AstraZeneca

A 38 year old woman reported painful oral lesions after the AstraZeneca vaccine that lasted more than eight weeks. The information was reported at The Oral Medicine Clinic at the Faculty of Dentistry in Chulalongkorn University, Bangkok. The patient has a history of anemia, and hypothyroidism. The prescribed treatments were iron supplements, vitamin C, and clorazepate antidepressants. The patient presented with generalized desquamative epithelium, and erythematous areas along the marginal gingiva and alveolar mucosa (Thongprasom et al., 2021). (Figure 6)

A 60 year old female reported discomfort in the right buccal mucosa, post AstraZeneca vaccination, at the outpatient clinic of the Department of Oral Medicine in Bangkok. Prior medical history involved osteoporosis, and lichen planus. Dexamethasone mouth rinse was prescribed to treat oral lesions (Chun et al., 2022).



Figure 1



Figure 2



Figure 3

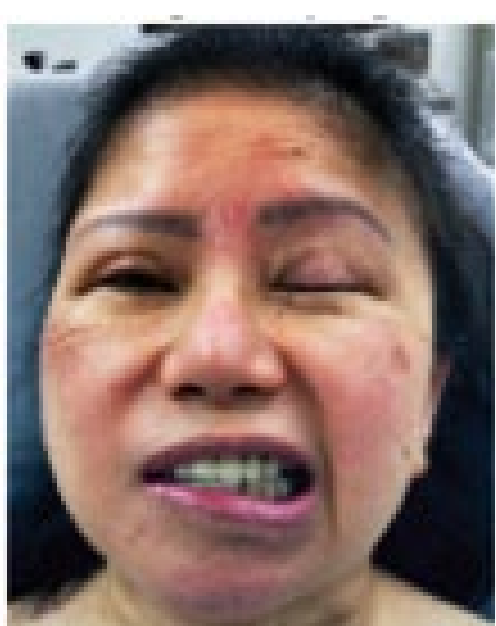


Figure 4



Figure 5

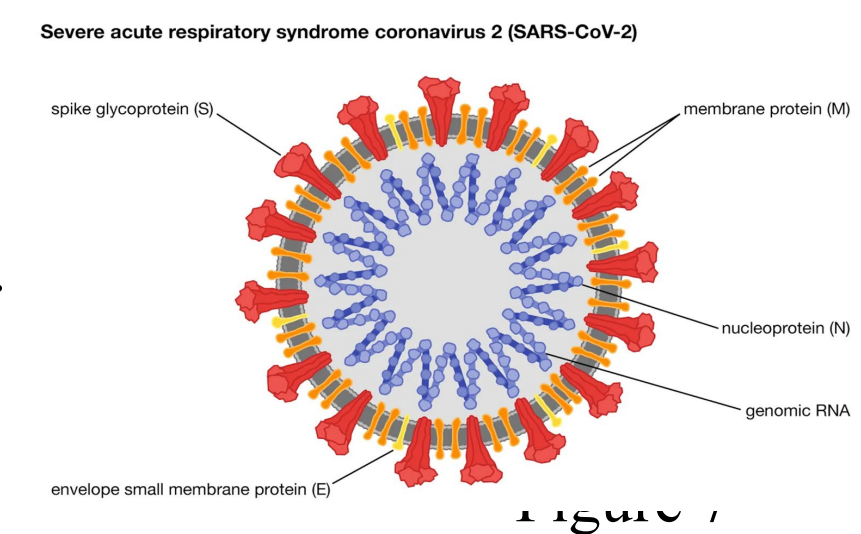


Figure 6

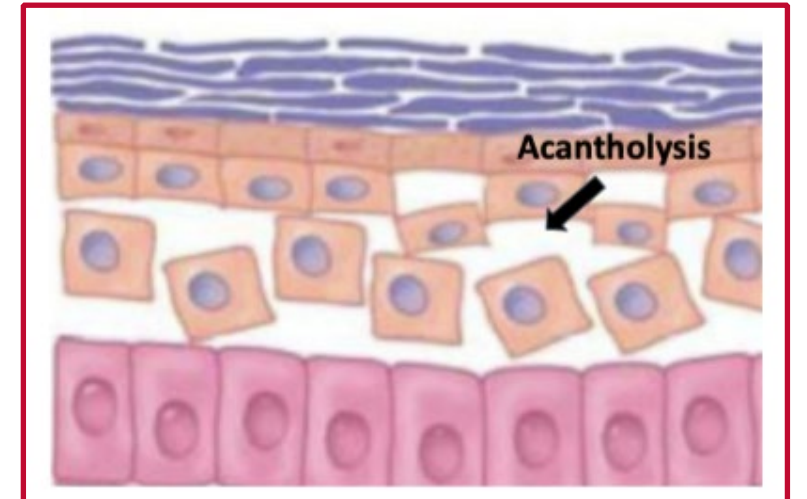
## What Triggers the Host Response After Administration of the Vaccine?

Studies have shown that the COVID-19 vaccination may trigger multiple oral manifestations. Further investigation of the correlation between the vaccine and oral manifestations is currently in progress.

When the vaccine is administered, there is a specific immune response producing antibodies directed to combat COVID-19. The vaccine leads to antibody production, which battles the COVID-19 spike protein. (Figure 7) The specific immune response and antibody production leads to the production specific oral manifestations (Azzi et al., 2021).



A biopsy taken from a blistering area of the mandibular gingiva post vaccination histologically showed a partially ulcerated mucosa covered with layers of keratinocytes aligned along the basement membrane. The non-keratinizing squamous cell epithelium showed severe acantholysis (Calabria et al., 2022). Acantholysis is the loss of coherence between epidermal cells due to the breakdown of intercellular bridges. (Figure 8) It is an important pathogenetic mechanism underlying various bullous disorders, particularly the pemphigus group, as well as many autoimmune blistering disorders (Seshadri et al., 2013).



Chun's research proposed that vaccine related infection caused oral mucositis and ulcerations. The area and characteristics of the lesion could be related to the key protein ACE2 receptor, which is involved in host cell entry. This functional receptor can be found in many parts of the human body and is commonly seen on epithelial cells of the tongue and salivary glands (Chun et al., 2022). If the vaccine causes an infection in the patient, the function of the ACE2 receptors can become compromised (Chun et al., 2022).

## Role of the Dental Hygienist

Dental hygienists along with other dental professionals have a vital role in reviewing each patient's health history prior to treatment. A thorough intra and extraoral examination allows the clinician to identify various manifestations that a patient may present with. Dental hygienists should educate patients on any oral manifestations present, and discuss a possible link to the vaccine. The etiology of oral manifestations could stem from systemic diseases or environmental factors. Therefore, it is important for dental hygienists to be educated on the oral effects of systemic diseases. Using team approach is crucial. Interprofessional communication between dentists, hygienists, and physicians is a vital component of comprehensive patient treatment.

Since all mutated COVID-19 viruses and vaccines are relatively new, the research is still in progress. Therefore, hygienists must stay current with evolving research.

## Get the Shot or Not?

**In conclusion**, clinicians should be able to recognize and understand possible oral complications following COVID-19 vaccinations for accurate diagnosis and timely treatment. Although the COVID-19 vaccines have possible orofacial side effects such as the following: desquamative epithelium, oral herpes zoster virus, Bell's Palsy, multiple ulcerative lesion with surrounding erythema, erythema with white lesions, fissured tongue and autoimmune blistering disease (oropharyngeal Pemphigus Vulgaris), the data remains inconclusive that they are vaccine related (Cirillo, 2021). The FDA concluded that all information was insufficient to determine a causal relationship with the vaccine because the cases in the vaccine group did not differ from the frequency that is expected in the general population (Cirillo, 2021). It is vital that patients who experience any effects after the vaccine report it to their healthcare provider, as researchers are still collecting data. Awareness of these orofacial manifestations will increase recognition, management and reporting of possible vaccine side effects. **To date, the CDC states that the benefits outweigh the risks of being vaccinated for COVID-19 (CDC, 2022).**

## References

### Articles

- Azzi, L., Toia, M., Stevanello, N., Maggi, F., & Forlani, G. (2021). An episode of oral mucositis after the first administration of the ChAdOx1 COVID-19 vaccine. *Oral diseases*. <https://doi.org/10.1111/odi.13874>
- Calabria, E., Canfora, F., Mascolo, M., Varricchio, S., Mignogna, M. D., & Adamo, D. (2022). Autoimmune Mucocutaneous blistering diseases after SARS-Cov-2 vaccination: A Case report of Pemphigus Vulgaris and a literature review. *Pathology, research and practice*, 232, 153834. <https://doi.org/10.1016/j.prp.2022.153834>
- Centers for Disease Control and Prevention (2022, June 6). *Safety of covid-19 vaccines*. Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/safety-of-vaccines.html>
- Chun, Y., Jang, J., Jo, J.H. et al. (2022). Various painful oral adverse reactions following COVID-19 vaccination: a case series. *BMC Oral Health*, 22(64). <https://doi.org/10.1186/s12903-022-02100-w>
- Cirillo, Nicola. (2021). Reported orofacial adverse effects of COVID-19 vaccines: The knowns and the unknowns. *Oral Pathology & Medicine*, 50(4), 424-427. <https://doi.org/10.1111/jopp.13165>
- Fukuoka, H., Fukuoka, N., Kibe, T., Tubbs, R. S., & Iwanaga, J. (2021). Oral Herpes Zoster Infection Following COVID-19 Vaccination. A Report of Five Cases. *Cureus*, 13(11). <https://doi.org/10.7759/cureus.19433>
- Nishizawa, Y., Hoshina, Y., Baker, V. (2021). Bell's palsy following the Ad26.COV2.S COVID-19 vaccination. *QJM: An International Journal of Medicine*, 114(9), 657-658.
- Seshadri, D., Kumaran, M. S., & Kanwar, A. J. (2013). Acantholysis: back to basics. *Indian journal of dermatology, venereology and leprology*, 79(1), 120-126. <https://doi.org/10.4103/0378-6323.104688>
- Thongprasom, K., Pengpis, N., Phattaratatip, E., & Samaranayake, L. (2021). Oral pemphigus after COVID-19 vaccination. *Oral diseases*, 10.1111/odi.14034. Advance online publication. <https://doi.org/10.1111/odi.14034>
- Wan, E., Chui, C., Lai, F., Chan, E., Li, X., Yan, Y., Gao, L., Yu, Q., Lam, I., Chun, R., Cowling, B. J., Feng, W. C., Lau, A., Mok, V., Chan, F., Lee, C. K., Chan, L., Lo, D., Lau, K. K., Hung, I., ... Wong, I. (2022). Bell's palsy following vaccination with mRNA (BNT162b2) and inactivated (CoronaVac) SARS-CoV-2 vaccines: a case series and nested case-control study. *The Lancet. Infectious diseases*, 22(1), 64-72. [https://doi.org/10.1016/S1473-3099\(21\)00451-5](https://doi.org/10.1016/S1473-3099(21)00451-5)

### Photos

Soden, K. (2021, September). *Pandemic Update* [PowerPoint presentation]. Encyclopedia Britannica

Acantholysis. 네이버 블로그 | homo ad mortem errat. (n.d.). Retrieved June 12, 2022, from <https://m.blog.naver.com/jesus24968/22120783829>