Mini Review
Volume 8:5, 2022

Oral Health Case Reports

ISSN: 2471-8726

Open Access

The Revisited Origin of Systemic Diseases: Leak Periodontal

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Abstract

Microorganisms enter your body through the oral cavity, where they spread to numerous distant organs in addition to the directly related digestive and respiratory tracts. In addition to affecting the gut microbiome profile, oral microbiota that travels to the end of the intestine and circulates in our bodies through blood vessels also contribute to a number of systemic disorders. In order to emphasise the significance of the oral cavity in systemic health, we propose the important role of "leaky gum," as an analogy to "leaky gut," by compiling facts accumulated from the era of focused infection theory to the age of revolution in microbiome research. which, because it has a poorer structural foundation than a desmosome, is more susceptible to microbial infiltration. Microbial biofilms in the GS can form and persist for a long time, in contrast to biofilms on the skin and intestinal mucosa, which naturally shed. Therefore, we stress that the GS and the JE are the weakest points for germs to enter the human body, making the leaky gum equally as significant as, if not more important than, the leaky gut.

Keywords: Biofilm • Gingival sulcus • Junctional epithelium • Leaky gum

Introduction

The mouth cavity is the primary route by which humans temporarily or permanently ingest the microbiota of this planet. The teeth, tongue, gingival sulcus, palate, saliva, buccal mucosa, and throat are just a few of the various unique habitats in the oral cavity that are home to the second most prevalent microorganisms after the gastrointestinal tract. At least 774 microbial species are currently included in the extended Human Oral Microbiome Database created during the Human Microbiome Project. The oral microbiota has been shown to be the main source of the bacterial microbiota in human organs, dispelling the conventional wisdom that the lungs and placenta are sterile. For starters, the lung microbiota is impacted by microaspiration during respiratory exercise, such as oral breathing. Additionally, the microbiome profile is dynamically influenced by dietary habits.

As a result, the "oral-gut-brain axis"—the link between the mouth and gut microbiota—has garnered considerable attention alongside the revolution in research on the human microbiome. In order to access the underlying immune system, the gut microbiota look for openings in the compromised gut mucosal barrier, which leads to "leaky gut" syndrome. The cellular connections between the intestinal epithelia allow for this type of leak to happen. In the oral cavity, microorganisms can quickly colonise on the surface of the tooth enamel's hard tissue to create biofilm and stay sclerotized until the right interventions are made. In addition to acting as a wedge to separate the tooth from the gingiva and increase the GS depth, the expanding body of the biofilm also deploys an ample number of microbes near the sulcus epithelium, enhancing the opportunity for microbial infiltration into the oral mucosa.

Literature Review

Because the majority of the human microbiota is found in the colon, gut bacteria have consumed the majority of research funding. The research on their functions in human immune systems has shed a lot of light. Compared to the mouth cavity or the skin, the human intestine is the biggest and longest space in touch with microbes. It features 400 m2 of luminal surface area and is over 10 metres long. Additionally, it facilitates the passage of around 60 tonnes of food throughout the course of a lifetime while processing digestion and absorption, which emphasises the significance of gut flora. Particularly, gut bacteria, which number roughly identically to human cells, digest food fibres to produce short-chain fatty acids, a crucial process that humans are unable to perform.

The ecosystem of the gut microbiome is perturbed in some ways by perturbation factors such stress, smoking, drinking alcohol, consuming processed food, and overusing antibiotics. However, chronic exposure to these risk factors would result in "dysbiosis," a persistent state of imbalance between the gut microbiota and their host. Normally, the intestinal ecosystem is able to adapt to the perturbation. For instance, when intestinal bacteria that convert primary bile acids into secondary bile acids, such as deoxycholate, lithocholate, ursodeoxycholate, hyodeoxycholate, and -muricholate, are depleted by antibiotics, the resistance to Clostridium difficile decreases, which causes pseudomembranous colitis and persistent diarrhoea, which claim the lives of tens of thousands of people in the US.

The phrase "leaky gut," which had previously been coined and used in the fields of alternative medicine and dietetics, was reintroduced during the "golden era" of gut microbiome research as a reasonable explanation for "increased intestinal permeability." The phrase refers to the simultaneous pathogenesis of intestinal and systemic diseases brought on by enteric bacterial infiltration and virulence factors into the gut mucosal membrane when the epithelial barrier function is compromised. The rise in bacterial endotoxin in the circulation, known as endotoxemia, or changes in the epithelium's tight junction proteins have frequently been observed in conjunction with intestinal hyperpermeability. Examples of people who frequently have increased permeability and epithelial barrier dysfunction include those with IBD, irritable bowel syndrome, liver disorders, pancreatitis, diabetes, chronic heart failure, depression, and other chronic diseases.

Discussion

The digestive tract's lumen, a twisting hollow tube that runs from the mouth cavity to the anus, is constantly clogged with debris from the outside world. The mouth and intestinal mucosa, which cover the inner surface of our bodies and provide protection, should therefore act as a physical and

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Received: 02 September, 2022, Manuscript No. OHCR- 23-85915; **Editor Assigned:** 05 September, 2022, PreQC No. P-85915; **Reviewed:** 16 September, 2022, QC No. Q-85915; **Revised:** 22 September, 2022, Manuscript No. R-85915; **Published:** 27 September, 2022, DOI: 10.37421/2471-8726.2022.8.62

physiological barrier just as human skin does. The mucosal membrane's primary purpose, however, consists of a number of physiological barriers, as opposed to the skin, whose primary function is the construction of a physical barrier. For instance, the epithelium's saliva and mucus include antibacterial compounds such lactoferrin, lysozyme, commensal flora, and antibacterial peptides that prevent pathogen colonisation.

The gastrointestinal system, mouth cavity, and the surface layers of the skin all have both comparable and dissimilar structures and functions. The epidermis is made up of numerous cellular layers that are firmly connected by intercellular connections, and the stratum corneum covers their surface. Strong intercellular connections connect the cells that make up the intestinal epithelial layer to one another. Contrarily, the luminal side of the intestinal epithelial layer is a thinner monolayer supported only by the connective tissue beneath and lacks a stratum corneum overlying the layer. Accordingly, from an anatomical perspective, the intestinal mucosa is less resilient to environmental changes such the dysbiosis of a microbial population, which results in bacteremia or endotoxemia through the increased intestinal permeability.

At around six months of life, humans' main teeth emerge from the inner alveolar bone through the mucous membrane, creating distinct structures at the point where the exposed teeth meet the surrounding tissues. For animals that require the mastication of ingested food, the GS and the JE beneath it are crucial interface structures. The healthy GS depth for individuals with permanent teeth can be as deep as 3 mm. This means that beneath the GS, there should be a sealing layer that connects the soft tissue, particularly the JE, with the surface layer of the hard tissue (enamel and cementum), shielding the tissues from outside threats.

The crucial roles of the GS and the JE were emphasised in a groundbreaking study that involved 417 patients at 11 Japanese nursing homes. In this study, elderly patients who received dental treatment had decreased rates of pneumonia, fever episodes, and pneumonia-related deaths, as well as better metrics for activities of daily living and cognitive abilities assessed by the Mini-Mental State Examination. In contrast, the dentate group had a higher total mortality rate than the edentate group. With oral care, the mortality rates of the dentate and edentate groups were comparable, but without it, the dentate group's mortality rate was greater than the edentate group's, despite the edentate group's significantly lower ADL and MMSE scores at the time [1-5].

Conclusion

The human microbiome turns out to be present even in bodily areas previously thought to be sterile thanks to advancements in gene sequencing technology, nanotechnology, and information technology. It's interesting to note that the oral cavity serves as the primary source of the microbiome found inside the human body, echoing the focused infection notion supported by more recent scientific evidence. In fact, the oral cavity has special mucosal structures like the PP and the JE that are innately vulnerable and allow oral pathogens to colonise for life and leak into blood vessels to circulate throughout the body, resulting in a variety of systemic disorders in distant locations. Despite the fact that just a small number of molecules have been identified as oral pathogen-induced harmful compounds thus far, we must identify several additional causal candidates generated from oral pathogens to strengthen the attribution of leaky gum to various types of systemic diseases.We need to concentrate on how to give a leaky gum a protective shell composed of biological, not physicochemical, knowledge, while simultaneously anticipating further causative data from well-designed empirical studies. By achieving this balance between the oral microbiota and its host, we can look forward to the realisation of more prevalent tailored treatment for systemic health.

Acknowledgement

None.

Conflict of Interest

There are no conflicts of interest by author.

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How to cite this article: Lee, Dahye. "The Revisited Origin of Systemic Diseases: Leak Periodontal." *Oral Heath Case Rep* 8 (2022): 62.