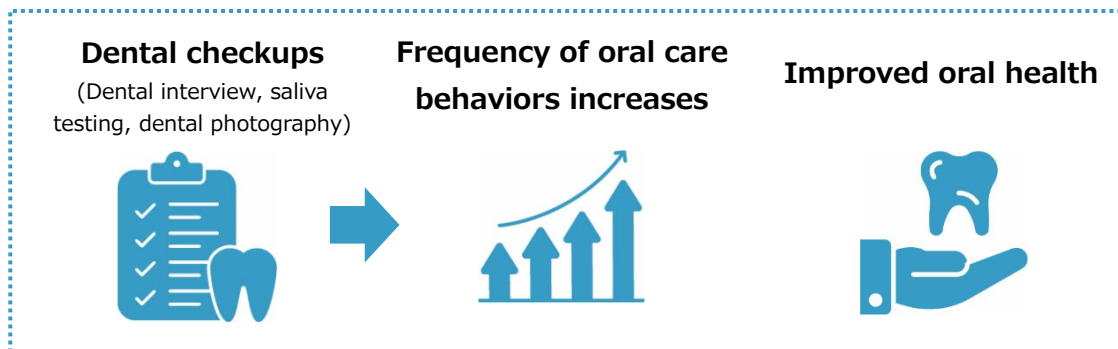


Making Dental Checkups More Accessible to More People **Hitachi and Lion Confirm that Workplace Dental Checkups Contribute to Oral and General Health**

Lion Corporation (President Masazumi Kikukawa) has partnered with Hitachi, Ltd. and Hitachi Health Care Center (Hitachi City, Ibaraki Prefecture) to conduct a study confirming the impact of introducing dental checkups in the workplace and the effect of such checkups on the oral and general health of employees. Over the period between October 2016 to March 2020, dental checkups were conducted for employees who underwent comprehensive physical checkups at Hitachi Health Care Center (approximately 13,000 people annually), and the data of these checkups was analyzed. As a result of introducing dental checkups, the frequency of employees engaging in oral care increased over time and it was clear that their oral health improved. In addition, a relationship was found between the saliva testing index^{*1} and general health indices,^{*2} confirming that good oral health is associated with good general health. A portion of the research results was jointly presented by Lion and Hitachi at the 51st Annual Meeting of Japan Society of Health Evaluation and Promotion, held on January 27 (Friday) and 28 (Saturday), 2023.

^{*1} Saliva testing index: An indicator of gum health calculated by measuring neutrophil elastase activity of white blood cells in saliva

^{*2} General health indices: CRP (increased levels of this protein indicate any presence of inflammation in the body), HbA1c (percentage of saccharified hemoglobin in red blood cells; reflects the blood glucose level in a one- to two-month period prior to testing, which is also used to diagnose diabetes)



■Research Background

In recent years, it has been found that gum disease may contribute to the worsening of various systemic disorders, including diabetes, demonstrating that initiatives aimed at improving and maintaining oral health are also vital to general health. Universal dental checkups for the purpose of general health maintenance were added to the Cabinet's Basic Policy guidelines announced in 2022 and, as one of the measures set out in these guidelines, workplace dental checkups conducted as part of corporate health checkups will gain attention. However, until recently, information on this topic was limited due to the scarcity of large-scale studies analyzing the impact of such checkups on oral and general health.

Lion has been advancing collaborative research with Hitachi Health Care Center—which conducts comprehensive physical checkups of over 10,000 employees every year—to elucidate the relationship between oral and general health. In fiscal 2016, the Center added workplace dental

checkups to its examination roster, and the research examined the impact of this addition on employees' oral and general health.

■Research Details

Target group: People who received dental checkups at the Hitachi Health Care Center, Hitachi Ltd.

Examination period: October 2016 to March 2020

Number of eligible people: 4,794 (fiscal 2016), 12,150 (fiscal 2017), 12,246 (fiscal 2018), 11,319 (fiscal 2019)

Dental checkup content: Examined oral care behavior (toothbrushing frequency, flossing rate, interdental brush use, etc.)

Saliva testing (SMT, salivary multi test; results presented using radar charts)

dental photography

Analysis items: Changes over time in oral care behavior based on dental interviews

SMT (salivary multi test) oral health evaluations*³

Relationship between oral and general health (CRP, HbA1c)

*³ Indicates gum health by measuring white blood level in saliva (active measurement of neutrophil elastase)

■Research Results

(1) Increase in the frequency of employees engaging in oral care over the four-year period following the introduction of dental checkups (daily toothbrushing frequency, flossing rate, frequency of dentist appointments)

Analysis of the examination data on oral care behavior (daily toothbrushing frequency, flossing rate) over the 2016–2019 period showed that the frequency of such actions increased over time after the introduction of the health checkups (Figure 1A, B). In addition, the frequency of making dentist appointments increased (Figure 1C). Introducing regular dental checkups and visualizing one's oral condition using SMT and dental photography were found to help improve oral care behavior among employees.

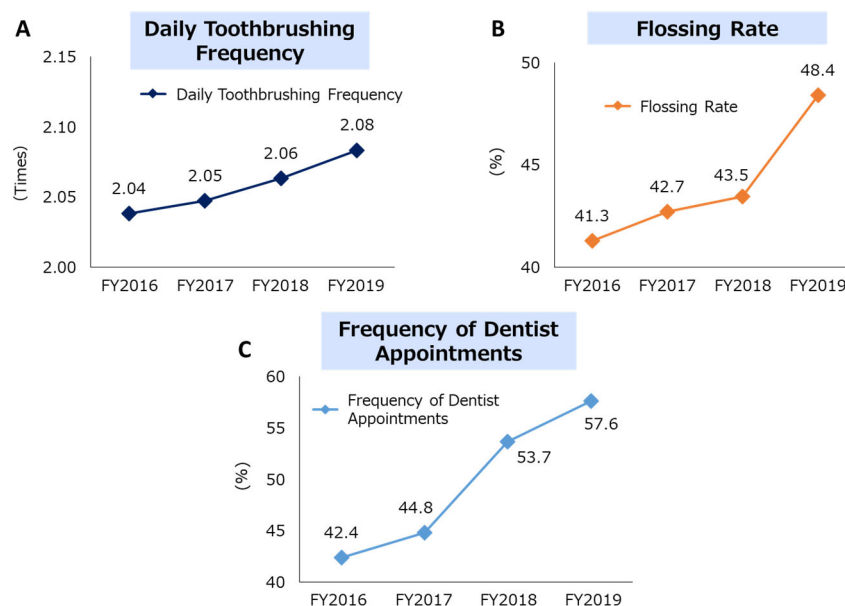


Figure 1. Oral Care Behavior Changes

(2) Employees' oral health (white blood level in saliva) improved over the four years following the introduction of dental checkups

Based on saliva testing carried out from fiscal 2016 to fiscal 2019, gum health (saliva white blood cell level) was analyzed as an indicator of health status. As a result, the proportion of people with poor gum health (those with higher white blood cell level) in fiscal 2019 had decreased by about 20% compared with the fiscal 2016 level when the dental checkups were introduced, while the proportion of employees with good gum health (those with lower white blood cell level) increased by 10% (Figure 2). We believe that this improvement in oral health status is the result of improved oral care habits.

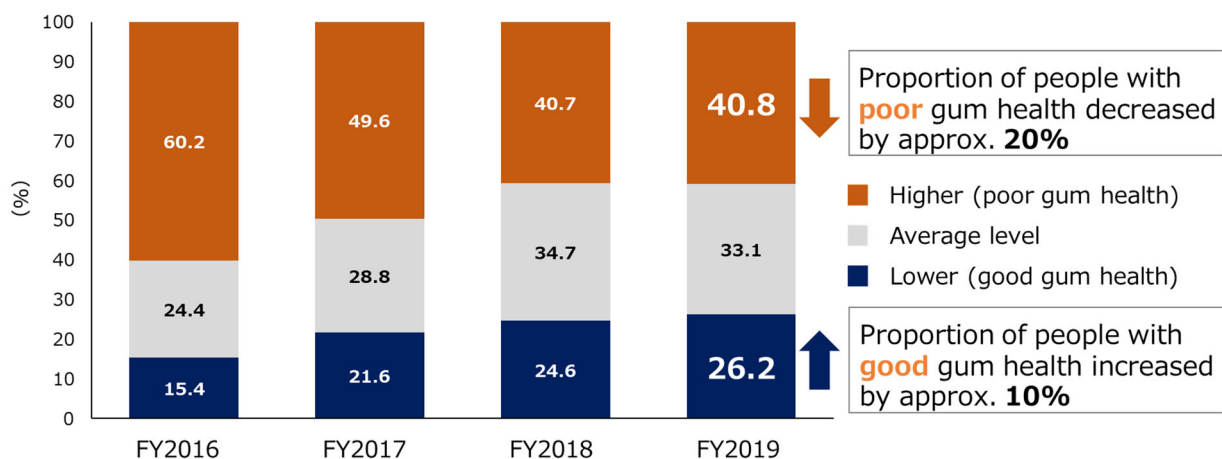


Figure 2. Changes in Gum Health (White Blood Cell Level)

(3) Significantly reduced worsening of general health indicators (CRP, a value that increases with any presence of inflammation in the body; and HbA1c, a value that reflects blood glucose levels in a one- to two-month period prior to testing) in the group with improved saliva testing scores

At the first dental checkups, the relationship between gum health (white blood cell level in saliva) and general health indicators (CRP, HbA1c levels) was analyzed. CRP levels, which indicate general inflammation, and HbA1c levels, which reflect blood glucose levels in a one- to two-month period prior to testing, were significantly higher in the group with poor gum health (those higher white blood cell level) (Figure 3A, B). This allowed the identification of a potential relationship between oral health and the general health of the body. Among the group with higher saliva white blood cell levels at the first visit, those who showed improved saliva white blood cell levels at the second checkup showed significantly reduced deterioration of CRP and HbA1c levels, compared with those whose saliva white blood cell levels did not improve. (Figure 3C, D). This suggests that changes in oral health are associated with changes in general health.

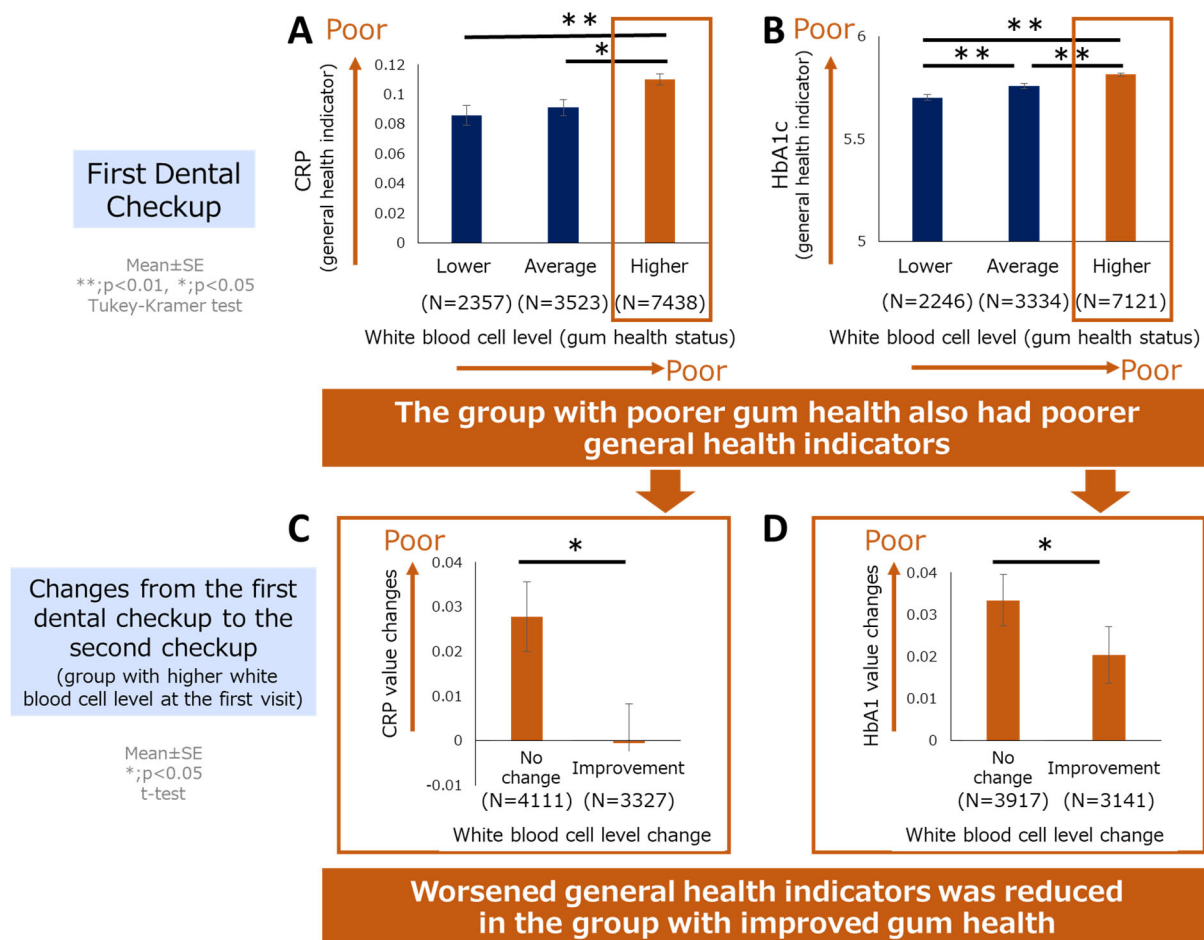


Figure 3. Relationship Between Oral and General health Indices

The research results (1) and (2) were presented as below.

The 51st Annual Meeting of Japan Society of Health Evaluation and Promotion (January 27 (Friday) and 28 (Saturday), 2023)

“The relationship between the oral environment and general health through the introduction of dental checkups”

Kotaro Ishizuka¹, Yuya Watanabe¹, Shuichiro Yamamoto¹, Toru Nakagawa¹

Mitsuo Kimura², Yu Yamamoto², Takashi Chikazawa², Yukio Yamamoto²

Shinya Murakami³

¹Hitachi Health Care Center, Hitachi Ltd., Ibaraki Japan

²LION Corporation, Tokyo Japan

³Department of Periodontology, Osaka University, Graduate School of Dentistry, Osaka Japan

■Future Plans

Lion is moving forward with its corporate activities based on the basic approach to the oral health field set out in the Lion Oral Health Initiative.*⁴ As part of the Lion Oral Health Initiative, this research initiative aims to help extend healthy life expectancy from the mouth outward.

*4 The collective name for activities in the oral health field aimed at realizing the Company's long-term strategic framework, Vision2030.

For an overview, please see the announcement published on August 8, 2022.

https://doc.lion.co.jp/uploads/tmg_block_page_image/file/8265/20220808a.pdf

■Reference Information

Lion provides services to corporations, including their employees, to support the development of better oral care habits through saliva testing and education seminars.

▼Details

“Okuchi Plus You” Corporate Well-Being Support Service

https://doc.lion.co.jp/uploads/tmg_block_page_image/file/8267/20220808c.pdf



■Hitachi Health Care Center

The Center is one of four facilities*⁵ under Hitachi, Ltd.'s Corporate Hospital Group, and provides comprehensive physical checkups for employees of its operating sites, mainly in the Ibaraki area. The Center actively works to improve its employees' health through measures such as the Harasuma Diet,*⁶ which helps improve metabolic syndrome.

*⁵ Hitachi general Hospital, Hitachinaka general Hospital, Hitachi Health Care Center and Tsuchiura Medical & Health Care Center

*⁶ Registered trademark of Nisseicom, Limited