Association between mercury and cardio-ankle vascular index (CAVI) in the Amami Island population

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Background : Previous studies have suggested a link between mercury exposure, especially methylmercury (MeHg), and the risk of cardiovascular disease (CVD). The cardio-ankle vascular index (CAVI) is one measure of arteriosclerosis, with higher values indicating stiffer arteries; however, the relationship between mercury and CAVI remains unclear.

Purpose : To evaluate the association between mercury levels and CAVI values in the Amami Island population.

Methods : We randomly selected 273 male and 570 female participants who had enrolled in the Japan Multi-Institutional Collaborative Cohort study survey in Amami Island, Kagoshima Prefecture (2005-2012). Total mercury (THg) levels in red blood cells were measured by the cold vapour atomic absorption (CVAA) method. We conducted multiple linear regression analyses to examine the association between THg levels and CAVI values. THg levels were categorised into three groups (<0.015 ppm, 0.015-0.025 ppm, and >0.025 ppm). Models were adjusted for age, body mass index (BMI), smoking status, and medical histories of diabetes mellitus, hypertension, and hyperlipidemia.

Results : Log-transformed THg showed a weak positive correlation with CAVI in male participants (R=0.187), whereas no correlation was observed in females (R=0.051). Compared with the lowest group, males in the highest THg group had higher CAVI values (β = 0.261, p = 0.072), with a significant trend across groups (p for trend = 0.045). Meanwhile, an inverse association was observed among females, where the highest group of THg had a lower CAVI value (β = -0.160, p = 0.106), with no significant trend across groups (p for trend = 0.077).

Discussion : The positive association of mercury and CAVI in males may be explained by the effect of MeHg on arteriosclerosis, which is mediated through oxidative stress and inflammation. However, the underlying mechanism for the negative association among females is not fully understood.

On the rate of clinical AIDS on diagnosis: The mathematical interpretation for control of HIV/AIDS

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Background : The effective reproduction number R(t) is widely used to monitor the transmission dynamics. However, in the context of HIV/AIDS, its application is limited due to the slow progression of HIV infection, which obscures recent infection events. Instead, many high-income countries including Japan have routinely used the rate of clinical AIDS on diagnosis, Q(t), defined as the proportion of newly diagnosed AIDS cases among all new HIV diagnoses at a given calendar time. Whether this metric reflects effective HIV/AIDS control has remained unclear.

Objective : The present study aimed to clarify the epidemiological meaning of Q(t) by formulating it mathematically and linking it to the natural history of HIV infection and diagnosis.

Methods : The hazard rate of diagnosis among undiagnosed HIV-infected individuals, $\alpha(t)$, was calculated by taking the inverse of the odds of Q(t) and multiplying it by the inverse of the mean incubation period. We further investigated the relevance of $\alpha(t)$ to a target proportion of diagnosed HIV infection P0 among people living with HIV/AIDS.

Results and Discussion : The metric $\alpha(t)$ can be computed through a simple formula, offering a practical and interpretable tool for surveillance. While Q(t) has been used descriptively, $\alpha(t)$ allows for a more actionable understanding of diagnostic performance and can complement existing indicators for setting public health goals.

Sex differences in tuberculosis infection in 0-year-old infants in 2007-2022 in Japan

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Background : It was reported that the incidence rates of latent tuberculosis infection (LTBI) in male and female infants were increased after 2013 when the Bacillus Calmette Guerin (BCG) vaccination timing was changed, with a more prominent effect on female infants than male ones.

Method : By using LTBI incidence data of infants in 2007 to 2022 disclosed by the Japan Anti-Tuberculosis Association, LTBI incidence rates of male and female infants for each year were statistically compared with the relative risks, i.e., the male-to-female LTBI incidence rate ratios.

Results : In 2007 to 2014 except for 2009, all the differences between male and female infants are not statistically significant at the level of significance 0.05, whereas in 2015 to 2022 except for 2021, all the LTBI incidence rates of female infants were significantly greater than those of male ones.

Conclusion : From April 2005 to March 2013, BCG vaccination was limited to infants between the ages of 3 to 6 months, and in April 2013, it was planned that the vaccination age was changed to “under 1 year old”, infants between the ages of 5 to 8 months as the standard target. However, according to vaccination-administration data in 2014-2022 in Japan, the new BCG vaccination timing program was not complete until 2015, and since then, BCG vaccination has been conducted after Haemophilus influenzae type b (Hib) vaccine and pneumococcal conjugate vaccine (PCV), diphtheria-pertussis-tetanus and inactivated polio vaccine (DPT-IPV). Thus, there is a possibility that some of these vaccinations and/or their timings may affect a more prominent increase of LTBI incidence rates in female infants than male ones. Monitoring the sex differences in tuberculosis infection is needed and studies on interactions or sequences of the vaccinations should be made to check the efficacy of BCG vaccination.

Laughter and oral health behaviors among Japanese university students in a cross-sectional study

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Laughter is a natural human behavior that has been shown to positively influence stress levels, immune function, and overall health. In the field of dentistry, numerous studies have examined the relationship between oral status and laughter, particularly among older adults. However, few studies have focused on younger populations. This cross-sectional study aimed to investigate the association between oral status, oral health behaviors, and laughter among Japanese university students. Data were collected from students at Okayama University who underwent oral health examinations between April and May 2024. The questionnaire assessed oral health behaviors, perceived general health, and frequency of laughter. Dentists performed oral examination and evaluated the number of teeth present, decayed, missing, and filled teeth (DMFT score), Community Periodontal Index, Oral Hygiene Index-Simplified, malocclusion, and the presence of orthodontic appliances. A backward stepwise logistic regression analysis was performed. P-value less-than 0.05 was considered statistically significant. Among the 1,295 students, 42 did not report laughing daily. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for factors associated with less-than-daily laughter were as follows: no use of dental floss (ORs = 2.048; 95% CI: 1.001-4.193; p = 0.005), brushing teeth twice a day (ORs = 0.391; 95% CI: 0.174-0.879; p = 0.023), brushing three times a day (ORs = 0.243; 95% CI: 0.071-0.831; p = 0.024), and bad perceived general health (ORs = 4.634; 95% CI: 1.730-12.414; p = 0.002). No significant associations were found between laughter and oral status. In conclusion, oral health behaviors, but not oral status, were significantly associated with laughter among Japanese university students.

Blood pressure and GrimAge-derived epigenetic age acceleration in Japanese adults

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Background and Objective : Epigenetic age, estimated from DNA methylation, is a biomarker of biological aging. Among epigenetic clocks, GrimAge has demonstrated superior predictive ability for morbidity and mortality, particularly cardiovascular outcomes. While hypertension is a known cardiovascular risk, evidence linking it to epigenetic age acceleration (EAA), especially GrimAge-derived EAA, remains limited in Japanese populations. This study aimed to evaluate the association between blood pressure and GrimAge-derived EAA in middle-aged Japanese adults.

Methods : We conducted a cross-sectional analysis of 867 Japanese adults aged 40–69 years who participated in the Saga J-MICC Study (2005 and 2007). The main outcome was GrimAge-derived EAA, calculated as the residuals from regressing GrimAge on chronological age. The main explanatory variables were systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) defined as $[(2 \times \mathrm{DBP}) + \mathrm{SBP}]/3$. Multiple linear regression analyses were adjusted for sex, principal components of control probe intensities, smoking, alcohol, physical activity, education, and sleep. EAA was also compared across SBP categories using analysis of variance (ANOVA).

Results : Higher blood pressure was significantly linked to increased EAA. In the basic model adjusting for sex and population structure, every 10 mmHg rose in SBP, DBP, and MAP was associated with a 0.11-year rose in EAA. After full adjustment, the estimates slightly decreased to 0.08 years but remained statistically significant. Mean EAA rose stepwise: normotension, elevated blood pressure, and hypertension.

Conclusion : The results that higher blood pressure, particularly SBP and MAP, is positively linked to GrimAge-based EAA in Japanese adults. These results suggest hypertension control may slow biological aging. Further interventional and longitudinal studies are warranted to elucidate the effects of antihypertensive treatment on epigenetic aging.