# Factors affecting blink number and incomplete blink rate in the population-based Hirado-Takushima study

The quantity and quality of blinking are key determinants of homeostasis at the ocular surface. However, few epidemiological studies have examined the characteristics of blinking. We therefore determined the number of blinks (BN) and incomplete blink rate (IBR) according to sex and age in a population-based study (Hirado-Takushima study). We also investigated factors related to the ocular surface or lifestyle that might influence these parameters.

The study subjects were residents of Takushima Island, Nagasaki Prefecture, Japan, who gave informed consent and for whom BN and IBR were measurable with a LipiView interferometer (Johnson&Johnson). Generalized additive model (GAM) analysis was performed separately according to age and sex. Systemic illness (hypertension, diabetes, dyslipidemia, collagen disease, depression), lifestyle-related factors (BMI, visual display terminal [VDT] time, TV time, time spent outside, use of eye makeup or contact lenses, having a pet, sleep time), ocular symptoms, and tear film– and meibomian gland–related parameters (15 items) were evaluated, and factors potentially affecting BN and IBR were examined with a mixed-effects model.

A total of 356 subjects (133 men and 223 women; mean age ±SD, 55.5 ± 22.4 years) and 701 eyes were enrolled in the study. BN was 3.17 ± 1.72 over 20 s and decreased with age in both men and women ($p=0.017$). Individuals with dyslipidemia had a reduced BN ($p=0.015$). The fluorescein staining score ($p=0.044$) and meiboscore ($p=0.027$) were positively and the thickness of the lipid layer of the tear film ($p<0.0001$) was negatively related to BN. Mean IBR was 41.1% for all ages. IBR decreased with age ($p=0.015$). VDT time ($p=0.017$) and eye makeup use ($p=0.006$) were positively and time spent outside ($p=0.036$) and TV time ($p=0.022$) were negatively related to IBR.

BN may increase to compensate for disturbance of the ocular surface, including when the lipid layer of the tear film is deficient as a result of meibomian gland dysfunction, whereas IBR may be susceptible to lifestyle factors such as eye makeup use and VDT time.