

# CLONAL DISSEMINATION OF *EMM12* AND *EMM1* GROUP A *STREPTOCOCCUS* STRAINS CAUSING SCARLET FEVER DURING 2011-2015 IN SHANGHAI, CHINA

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Since 2011, epidemics of scarlet fever have resurged in several countries, including China, where *emm12* group A *Streptococcus* (GAS) was responsible for the 2011 large outbreaks. Afterwards, scarlet fever outbreak occurred annually. To date, factors driving the outbreaks have not been well elucidated. Epidemiological data of scarlet fever in Shanghai during 2011-2015 were obtained from the National Notifiable Infectious Disease Surveillance System. Throat swabs of patients with scarlet fever from the Sentinel Hospital, from which 50% of scarlet fever cases in Shanghai were reported, were cultured. GAS carriage surveillance was performed in schools located in three districts. A total of 1,568 GAS isolates were collected for analysis, including 1,451 isolates from patients and 117 from carriers. This continuous study showed that the annual incidence of culture-confirmed scarlet fever was 7.5-19.4/100,000-person-year in Shanghai during 2011-2015, with an average GAS carriage rate being 7.6% in school-aged children. Twelve *emm* types were identified with co-predominance of *emm12* (61.8%) and *emm1* (35.9%), which harboured different super-antigen profiles. The proportion of *emm1* GAS strains increased from 3.8% in 2011 to 48.6% in 2014. Two predominant clones identified by pulsed-field gel electrophoresis, SH001-*emm12* and SH002-*emm1*, were discovered in 66.9% of scarlet fever cases and 50% of carriers, respectively. The frequencies of resistance to macrolides and tetracycline among GAS isolates were both over 95%, which was mediated by *ermB* and *tetM*, respectively. GAS population is changing, and ongoing surveillance is warranted to monitor the dynamic changes of GAS *emm* type, predominant clone, and superantigen profile.

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