

Commemorating the Centenary of Fangzhou Gu

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Fangzhou Gu (1926–2019) (Figure 1) was a preeminent medical scientist, virologist, and medical educator in 20th-century China, and 2026 marks the 100th anniversary of his birth. In December 2025, to commemorate the outstanding contributions of the Chinese scientist Fangzhou Gu to global public health, the 43rd General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) formally adopted a resolution to include the centenary of his birth in its list of internationally observed annual events. Fangzhou Gu devoted 42 years of research to the prevention and control of poliomyelitis and was one of the pioneers of tissue culture-based oral live vaccines in China. In 1957, Fangzhou Gu voluntarily assumed responsibility for leading a research team in the critical fight against polioviruses. In the early 1960s, he successfully developed two forms of live vaccine — liquid oral and sugar-pill vaccines — saving hundreds of thousands of children from paralysis. He also proposed eliminating polio through live vaccine technology, immunization



FIGURE 1. Professor Fangzhou Gu (1926–2019).

programs, and strategies suited to China's national conditions.

A Public Health Awakening at Peking University and Advanced Studies in the Union of Soviet Socialist Republics (USSR)

In 1944, Fangzhou Gu was admitted to the Peking University School of Medicine. During his studies, the public health course taught by Jingqing Yan (1905–2005) left the deepest impression on him. Closely addressing the pressing realities of public health challenges in China, Yan's lectures deeply moved Fangzhou Gu and inspired him to devote himself to public health, determined to help the broader population live free from disease and in better health. In 1951, Fangzhou Gu pursued his studies in the USSR. He attended the Institute of Virology of the USSR Academy of Medical Sciences for his postgraduate education, which was one of the top institutions for medical scientific research and organizational management in the USSR at that time. Gu's supervisor was Professor E. N. Levkovich, a renowned expert in encephalitis virology in the USSR. This interdisciplinary knowledge base enabled him to combine basic scientific research with national epidemic prevention needs, a core prerequisite for China's localized polio control model.

Initiating China's National Polio Prevention Campaign

Polio emerged as a severe public health threat in China in the 1950s. The first local outbreak was recorded in Nantong in 1953, followed by a devastating nationwide epidemic in 1955, with an incidence rate of 32.1 per 100,000 people. In vulnerable children, the virus causes widespread paralysis and fatal respiratory failure, creating an urgent demand for localized prevention technologies and systematic control strategies. In response to the national epidemic crisis, Gu launched China's systematic polio etiology research and prevention

program in 1957, initiating a long-term polio elimination campaign. He said, "This was a mission entrusted to me by the government," and overcoming poliomyelitis became the work of his lifetime.

Fangzhou Gu's first major breakthrough in controlling poliomyelitis was the isolation and typing of polioviruses. In 1957, he led a research team at the Academy of Military Medical Sciences of the Chinese People's Liberation Army. After investigating fecal specimens from patients with poliomyelitis in several domestic regions, the team isolated and successfully typed poliovirus from the feces of patients from 12 locations, including Beijing, Shanghai, Tianjin, and Qingdao. In 1958, Fangzhou Gu et al. (1) reported *Isolation and Identification of Poliomyelitis Viruses in Shanghai* in the *Chinese Journal of Parasitic and Infectious Diseases*. This study was the first to report the isolation of poliovirus using rhesus monkey kidney tissue culture technology, and to confirm the predominance of type I poliovirus in epidemics through etiological and serological methods in China. Thus, it provided essential epidemiological data to prevent further transmission of poliomyelitis.

Gu's vaccine development strategy reflected the typical Chinese public health decision-making logic of prioritizing national affordability and practical applicability over imported technical standards. In 1959, he verified that an imported inactivated polio vaccine (IPV) was economically unaffordable for universal national vaccination under China's socioeconomic conditions. Accordingly, he strategically shifted his research focus to low-cost oral attenuated live vaccines (OPV) and launched independent domestic vaccine research. This adaptive technological choice laid the foundation for large-scale population immunization and became a classic model for the localized transformation of foreign public health technologies in China.

Groundbreaking Clinical Trials for OPV

Rigorous clinical verification constitutes another key experience in China's vaccine-driven epidemic control. Gu designed a standardized research system that integrates animal experiments and three-phase clinical trials. To validate vaccine safety for children, the core vaccination population, he conducted self-testing in Phase I trials and enrolled his newborn child as a trial participant, with team members volunteering their own children. These actions, undertaken in the specific context of the early 1960s, reflect the researchers' willingness to assume personal risk before promoting

broader vaccination. Large-scale population-based trials confirmed the public health value of OPV control models. In 1960, sequential Phase II and Phase III trials covering 2 million children nationwide systematically verified vaccine safety and real-world protective efficacy. Epidemiological surveillance has shown a sharp decline in polio incidence among vaccinated populations, providing solid evidence for the nationwide promotion of immunization (2). The momentum of the epidemic spread was significantly curbed, and Chinese children gained reliable immunological protection against poliomyelitis.

Development and Popularization of Sugar-pill Polio Vaccine

Sugar-pill vaccine innovation solved the bottleneck of grassroots epidemic prevention by optimizing China's rural disease control model. Early liquid OPV required strict low-temperature storage and had a short shelf life, which was incompatible with China's vast rural and remote mountainous areas with limited logistics and medical infrastructure. Gu et al. developed a solid sugar-pill OPV in 1962 (3) featuring a longer shelf life, convenient transportation and administration, and stable immunogenicity.

Its nationwide popularization in 1964 and subsequent trivalent vaccine optimization in 1986 further improved China's polio prevention system. The successful development of the trivalent sugar-pill vaccine not only resolved the supply issue of semi-finished poliovirus vaccine liquid but also improved production efficiency, reduced manufacturing costs, and made administration more convenient. The sustained iteration of vaccine technology and promotional strategies has driven a steady annual decline in national polio cases, forming a complete prevention system that covers etiological monitoring, vaccine research and development, and full-population immunization.

In October 2000, the Western Pacific Regional Certification Commission for the Eradication of Poliomyelitis of the World Health Organization (WHO) confirmed that the transmission of indigenous wild poliovirus in China was interrupted. This milestone achievement validates the effectiveness of China's localized polio prevention model, which integrates independent technological innovation, adaptive strategy adjustment, full-population coverage, and standardized grassroots implementation.

Scientific Spirit and Global Public Health Legacy

China's polio elimination practices, led by Fangzhou Gu, summarize three core public health experiences. First, precise epidemic research serves as the premise for scientific prevention and control. Second, localized technological innovation adapts public health tools to national grassroots conditions. Third, population-oriented full-coverage immunization strategies can eliminate epidemic transmission risks. These practices address the core challenges of infectious disease control in developing countries, including limited medical resources, unbalanced regional medical development, and large populations.

Gu's modest dedication and successful polio control model offer profound global public health lessons. Beyond protecting hundreds of millions of children, China's polio elimination experience provides a replicable paradigm for developing countries to respond to major childhood infectious diseases. UNESCO's global commemoration further highlights the international value of China's grassroots public health strategies, technological independence, and people-centered prevention concepts, offering lasting guidance for global infectious disease prevention and control cooperation.

Conflicts of interest: No conflicts of interest.

doi: [10.46234/ccdcw2026.141](https://doi.org/10.46234/ccdcw2026.141)

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Submitted: June 02, 2026

Accepted: July 02, 2026

Issued: July 10, 2026

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