



## *In Vitro* Synergistic Effect of Baicalin in Combination with Ciprofloxacin Against Methicillin-Resistant *Staphylococcus aureus*

Guinian WANG <sup>1\*</sup>, Chuande WANG <sup>2</sup>, Longzi WANG <sup>3</sup>,  
Guangbo TIAN <sup>1</sup>, Juan WU <sup>1</sup> & Qinglu WANG <sup>4</sup>

<sup>1</sup> Department of Laboratory Medicine, the First Hospital of Zibo City, Zibo, 255200, China

<sup>2</sup> Department of Traditional Chinese Medicine, the First Hospital of Zibo City, Zibo, 255200, China

<sup>3</sup> Department of Pharmacology, Zibo Vocational Institute, Zibo, 255314, China

<sup>4</sup> Key Laboratory of Biomedical Engineering & Technology of Shandong High School,  
Shandong Wanjie Medical College, Zibo, 255213, China

**SUMMARY.** The aim of this study was to evaluate the *in vitro* synergistic effect of baicalin, a kind of flavone extracted from *Radix Scutellariae*, in combinations with ciprofloxacin on the growth of methicillin-resistant *Staphylococcus aureus* (MRSA). The MICs of drug were determined according to the Clinical and Laboratory Standards Institute (CLSI) and the combination effect of antimicrobial agents were evaluated by the broth microdilution method to obtain a fractional inhibitory concentration index (FICI). Synergistic activity (FICI  $\leq$  0.5) was observed for combinations of baicalin with ciprofloxacin against 8 strains tested, whereas the combination of baicalin and ciprofloxacin showed the strongest synergistic effect (FICI = 0.20). Based on the above results, we conclude that baicalin acts synergistically with ciprofloxacin, enhancing its antimicrobial activity against MRSA.

**RESUMEN.** El objetivo de este estudio fue evaluar el efecto sinérgico *in vitro* de baicalina, una especie de flavona extraída de *Radix Scutellariae*, en combinaciones con ciprofloxacina en el crecimiento de estafilococos resistentes a *Staphylococcus aureus* (MRSA). Los valores de MICs de la droga se determinaron de acuerdo con las pautas del Clinical and Laboratory Standards Institute (CLSI) y el efecto de la combinación de agentes antimicrobianos fue evaluado por el método de microdilución en caldo para obtener un índice de concentración inhibitoria fraccional (FICI). Se observó actividad sinérgica (FICI  $\leq$  0.5) para las combinaciones de baicalina con ciprofloxacina contra 8 cepas ensayadas, mientras que la combinación de baicalina y ciprofloxacina mostró el efecto sinérgico más fuerte (FICI = 0,20). Sobre la base de los resultados anteriores, se concluye que la baicalina actúa sinérgicamente con la ciprofloxacina, la mejora de su actividad antimicrobiana contra MRSA.

**KEY WORDS:** Baicalin, Ciprofloxacin, Methicillin-resistant *Staphylococcus aureus* (MRSA), Synergy.

\* Author to whom correspondence should be addressed. *E-mail:* wguinian@163.com