

Letter to the Editors-in-Chief

Ligustrazini, allicin and shear-induced platelet aggregation

Fulong Liao^a and Ligong Jiao^b

^a *Institute of Chinese Materia Medica, China Academy of Traditional Chinese Medicine, Beijing, 100700, China*

^b *Beijing Institute for Drug Monitoring, Beijing, China*

Received 25 September 1999

Accepted 25 September 1999

Blood flow interacts with blood constituents and blood vessel under shear stress. Shear-induced platelet aggregation (SIPA) under high shear stress of stenosis has attracted research attention due to its involvement in vascular diseases, especially in life-threatening thrombosis. In SIPA, the calcium channel of platelet membrane can be activated by the interaction between plasma vWF and membrane GP Ib. As a consequence, SIPA occurs. SIPA has important implications because conventional anti-platelet drugs such as aspirin are of little use. The development of inhibitors of SIPA has been a pharmaceutical aim since the beginning of the 1990's [1]. Here we show two potential alternatives.

Ligustrazini hydrochloridi is an effective ingredient from *Rhizoma ligustici* Chuangxiong [2]. As a Chinese pharmaceutical product (in injection and oral form), it has been widely employed in vascular therapy since 1980. We have reported its effectiveness to inhibit SIPA [3]. Garlic is a spice for common cuisine as well as a herbal medicine. Allicin is mainly responsible for its pungent odor as well as its pharmacological benefit of anti-atherosclerotic effect [4].

Recently, we selected stenosis stress level of 52 dyn/cm² and shear duration of 120 s to demonstrate the efficacy of ligustrazini and allicin on SIPA of New Zealand rabbits. The results show that the 50% inhibition concentration (IC₅₀) of ligustrazine on SIPA was 0.52 mM. The IC₅₀ of allicin was 1.27 mM. We further studied the mechanism by using monoclonal antibody of GP Ib and Fluo-3/AM with laser confocal microscope. We found that both compounds inhibited calcium channel in the platelet membrane without involvement in activating GP Ib. Ligustrazini of 0.22–0.88 mmol/l and allicin of 0.42–1.68 mmol/l significantly inhibited SIPA ($P < 0.001$) and calcium inflow ($P < 0.01$). Moreover, we conducted a pilot trial of 10 cardiovascular patients to determine ligustrazini's effect on human SIPA, SIPA induced by stenosis level of stress was markedly inhibited by single dripping of ligustrazini of 80 mg, indicated by a decrease in SIPA of $12.0 \pm 6.95\%$ ($P < 0.001$).

Susceptibility to atherosclerosis and stenosis of arteries in the elderly leads to the abnormally high wall shear stress of blood flow. SIPA is likely to happen in the cerebrovascular domain due to its high flow volume and velocity. Our research is at the junction of bio-mechanism, geriatrics, antithrombosis,

herbal medicine and healthy diet. The long-term medical and practical impact of the research will depend on the depth of our further exploration and the degree of integration of these concerns. We shall have to decide on the following issues: Should we accept SIPA test as a routine medical check-ups, especially for the elderly? Should we eat more garlic for protection of our health? Should we take ligustrazini as a prevention of SIPA just as we take low-dose aspirin to combat thrombosis?

Acknowledgement

The project, 39670203, is supported by National Natural Science Foundation of China.

References

- [1] J.R. O'Brien, *Lancet* **335**(8691) (1990), 711–713.
- [2] F. Liao, *Complementary Medicine International* **3**(1) (1996), 36–40.
- [3] F. Liao and B. Li, *Hemorheology and Microcirculation* **17** (1997), 315–318.
- [4] M. Murray and J. Pizzorno, *Encyclopedia of Natural Medicine*, 2nd edn, Prima Health, USA, 1998, p. 335.