The innovation of traditional therapy: Plasma Cupping System

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Abstract: Cupping is one of most popular complementary treatment methods for several type of pain symptoms, including muscle pain. As development of new technology, many types of cupping were presented, but there were few scientific biological evidence for its clinical efficacy. Meanwhile, plasma is the 4th state of the matters, ionized gas which can control several biochemical reactions. Recently, Low-Temperature Atmospheric-pressure Plasma (LTAPP) or non-thermal plasma (NTP) has been introduced in the field of dermatology, expecting its curative roles on wound healing, pathogen-derived skin inflammatory diseases and skin cancers. Here, we developed an innovative cupping system by merging several medicinal properties to traditional cupping, and named it as plasma cupping (PC). Furthermore, this study elucidated the specific molecular mechanism of action of PC for treating inflammatory muscle pain.
Keywords: Plasma Cupping, Inflammatory Muscle pain, Angiogenesis, Anti-inflammation

1. Introduction

Despite a long history, the clinical efficacy of cupping therapy is still under debate. This is likely due to the lack of direct evidence for the biological actions of cupping. In this study, the traditional cupping was merged with non-thermal plasma and designated as 'plasma cupping' (PC). In our previous report, non-thermal argon plasma has several biological functions such as angiogenesis promoting, anti-inflammatory and skin rejuvenating activities [1-3]. Here, we tested whether the merging of the air plasma with cupping can add several biological functions of non-thermal plasma. For this, HaCaT human keratinocyte cell line and a mice model of inflammatory muscle pain were subjected to PC treatment..

2. Results

In our results, while the traditional cupping rarely affects the angiogenic factor vascular-endothelial growth factor (VEGF)-A, the PC treatment on HaCaT human keratinocytes significantly induced the expression of VEGF-A (Fig. 1).

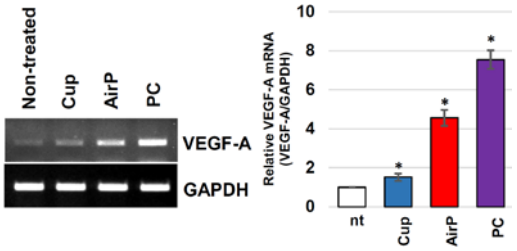

Fig. 1. PC significantly increases the expression of VEGF-A gene from HaCaT cells.

The increased expression of the VEGF-A gene after the PC treatment was expected to be a result of PC-mediated ERK protein activation. The PC-mediated activation of ERK was essential for the activity of hypoxia inducible factor (HIF) 1 alpha, which is responsible for the PC-mediated expression of VEGF-A (Fig. 2). Interestingly, the PC-mediated activation of ERK-HIF-1-and VEGF-A was blocked by NAC, a scavenger of reactive oxygen species, although elevated NO was detected in the media after PC treatment.

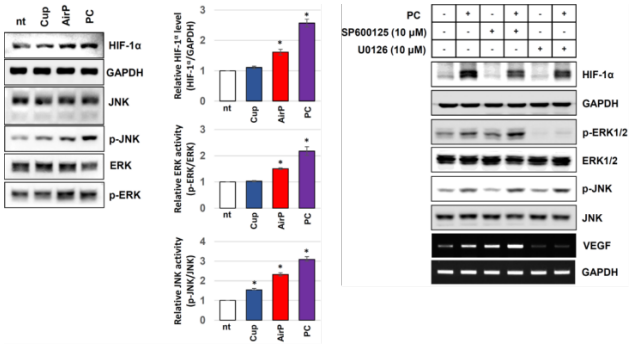

Fig. 2. The PC-mediated activation of ERK and HIF-1 is important for VEGF-A expression.

In addition to the angiogenesis-promoting action of PC, it also showed anti-inflammatory activity by reducing TNF-α-mediated IL-1β and IL-6 expression from HaCaT cells (Fig. 3).

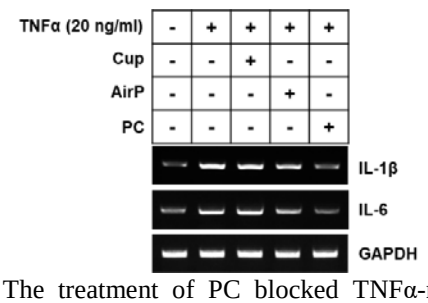

Fig. 3. The treatment of PC blocked TNFα-mediated expressions of IL-1β and IL-6 genes.

Furthermore, PC treatment on the mice model of inflammatory muscle pain reduced the accumulation of immune cells effectively (Fig. 4).

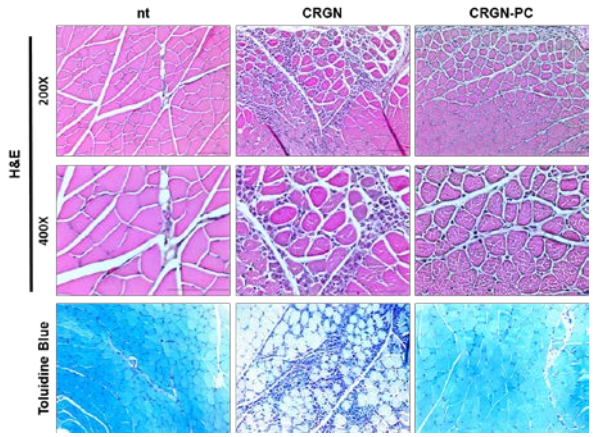

Fig. 4. The effect of PC treatment on the muscle tissues of carrageenan (CRGN)-induced inflammatory muscle pain mice model

3. Conclusion

The results of this study suggest that the plasma generating efficacy was increased under the cupping condition (vacuum). Furthermore, the angiogenesis promoting and anti-inflammatory activity of the plasma was successfully combined to cupping on this condition. Since the results from animal model for inflammatory muscle pain shows the beneficial effects of PC, based on the results of this study, an innovated form of cupping system was developed (Fig. 5).

Fig. 5. Plasma Cupping (PC) system

This system is now preparing clinical trials. We hope that this device can be helpful for treating patients suffering with inflammatory muscle pain.

References

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