

PORTICOOL PCS

PROTECTING THOSE WHO PROTECT OTHERS

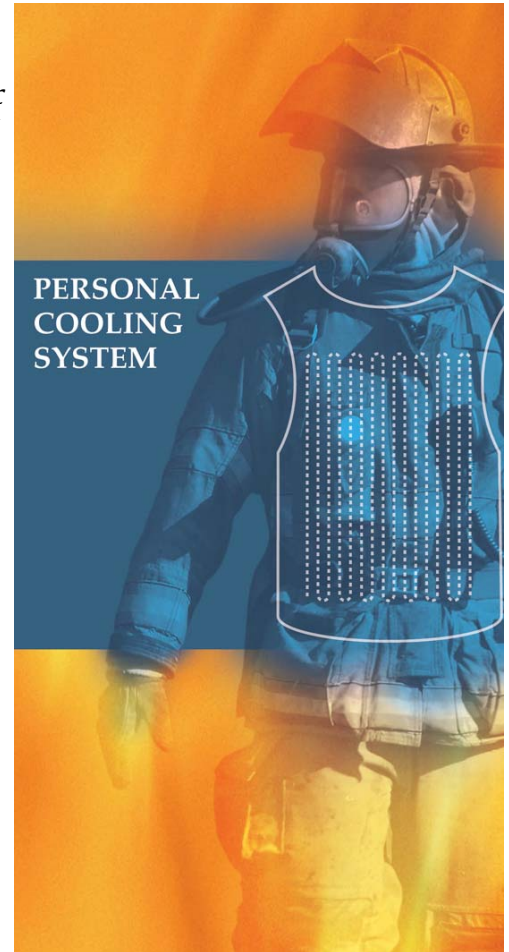
The human body comprises a surpassingly effective cooling system, capable of rejecting copious amounts of heat to the ambient environment through evaporative cooling. When the system is overtaxed, mental and physical impairment will occur.

Emergency responders (Fire Fighters, HAZMAT and related Military Personnel) are especially vulnerable to this scenario for three reasons:

1. Protective gear can be heavy or cumbersome; requiring increased physical exertion to perform a task. As such, the rate of internal heat generation increases.
2. Protective garments act as a barrier to evaporation. The body's natural cooling system becomes incapable of rejecting heat.
3. Emergency responders frequently work in dangerous environments. The physiological danger-response results in a temporarily accelerated metabolism.

The emergency-responder's mission is to safeguard lives and property. Due to the nature of the mission and the hazardous environment, even the initial stages of heat-exhaustion can have dire consequences. Impaired performance and judgment can endanger the execution of the mission and jeopardize lives.

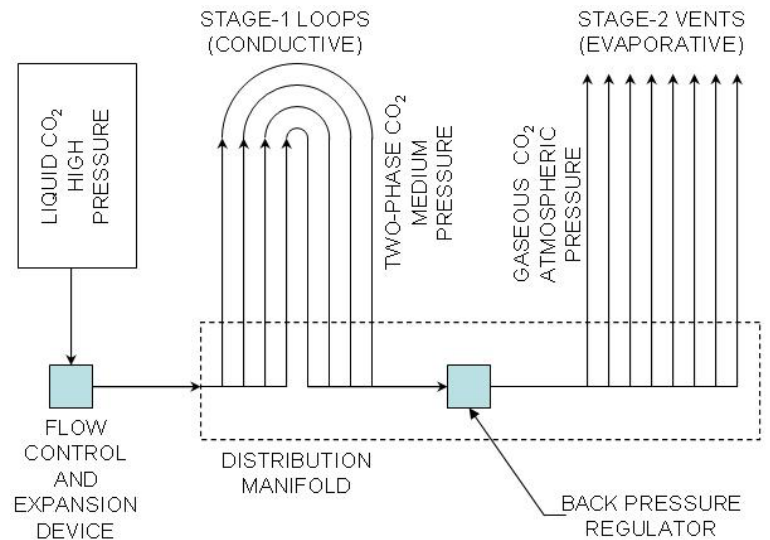
Porticos was awarded a SBIR Phase I grant thru the Department of Homeland Security to develop a new technology to address this challenge. The result was a completely new and innovative solution that met or exceeded all program goals.



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Porticos developed an active cooling garment based on the endothermic expansion of liquid CO₂ for which it received two US Patents. The design takes advantage of both conductive and evaporative cooling. The conductive occurs as the liquid CO₂ converts to a gas while traversing miniature tubing in the vest. The evaporative occurs as the gaseous CO₂ is redirected throughout the vest and expelled via porous tubing. The dry gaseous CO₂ helps to evaporate the body's sweat and as such supports the body's natural cooling mechanism. Porticos developed extremely thin (<1/8"), extremely flexible custom tubing for the liquid CO₂, a miniature manifold distribution system and an expansion solution capable of regulating the flow rate of the liquid CO₂.



"Our findings suggest that this novel cooling device would effectively attenuate heat strain and increase work productivity for personnel working in a hot and humid environment." **Yang Zhang, University of Alabama**

Independent testing conducted at the University of Alabama and published in the Journal of Environmental and Occupational Health confirmed the superior performance of the Porticool PCS; extending the average work duration by 32%!

While other cooling solutions (ice vests, cooled air vests and liquid circulated garments) tested have shown favorable responses, none provide the flexibility and mobility afforded by the Porticool PCS. Nor could they compete with the light weight and thin garment size that the Porticool PCS achieved.

