The Role of Corin in Regulating Sweat Excretion in Eccrine Sweat Glands

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Abstract

In humans, sweating via the eccrine sweat glands is essential in thermoregulation that prevents the body from overheating. Corin is a serine protease highly expressed in the heart, where it activates atrial natriuretic peptide (ANP), a hormone that promotes renal sodium and water excretion. Previous studies reported corin expression in mouse dermal papilla, where it regulated coat color in an agouti-dependent mechanism. Constantly, we also detected corin expression in human hair follicles. However, there is no evidence to indicate that corin regulates hair color in humans. Unexpectedly, we found corin expression in secretory and ductal epithelial cells of human eccrine sweat glands by immune staining. In the secretory coil, corin was expressed in the luminal epithelial cells but not the peripheral myoepithelial cells. Similar expression patterns of ANP and natriuretic peptide receptor-A (NPR-A) were also found in human eccrine sweat glands. We confirmed the expression of corin, ANP and NPR-A in the eccrine sweat glands in mouse footpads. These data suggest that corin and ANP may act in the eccrine sweat glands to promote sodium excretion, thereby regulating electrolyte homeostasis in thermoregulation. We tested this hypothesis in wild-type (WT) and corin knockout (KO) mice in a sweat assay. Paws from anesthetized mice were wiped clean and coated with a layer of iodine/starch mixture. Pilocarpine, a sweat-stimulant, was injected in the paw. Photos were taken before and after (2 and 5 min) the injection. Sweat responses were indicated by the number and size of black dots, which were quantified by image software. The results showed that compared to WT mice, corin KO mice had a markedly reduced sweat response, as indicated by less black staining in footpads. In controls, we found no apparent differences in sweat gland numbers and morphology between WT and corin KO mice. These results indicate that sodium and water excretion is reduced in the sweat glands in corin KO mice, suggesting a physiological role of corin in promoting sweat secretion. Together, our findings have uncovered a novel function of corin in regulating sodium and water excretion in the eccrine sweat glands that are essential in thermoregulation.

Keywords

Corin, Sweat Glands, Sweat Secretion