Potassium Channels Mediate Hydrogen Sulfide-Induced Cutaneous Vasodilation in Healthy Young Adults

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PURPOSE: Preclinical models of cardiovascular disease suggest that hydrogen sulfide (H_2S), produced endogenously via cystathionine-γ-lyase, is a gasotransmitter capable of modulating vascular function as an EDHF-through potassium (K^+) channels. We have demonstrated that exogenous H_2S donors elicit cutaneous vasodilation in young adults; however, the specific mechanism(s) underlying exogenous H_2S-induced cutaneous vasodilation remain unclear. The purpose of this study was to examine the specific K^+ channel(s) that mediate H_2S-induced vasodilation in the cutaneous circulation of healthy adults. **METHODS:** Five microdialysis fibers were placed in the ventral forearm skin of 5 healthy adults (24 ± 3 years) for the local delivery of Ringers solution (control), 5 mM glybenclamide (GLY: K_{ATP} channel inhibitor), 1 mM senicapoc (SENI: K_{Ca} intermediate channel inhibitor), 50 mM tetraethylammonium (TEA: non-specific K_{Ca} channel inhibitor) and GLY + SENI + TEA. Laser-Doppler flowmetry was used to continuously measure red blood cell flux. After a stable baseline, 5 mM Na_2S was perfused through all fibers to elicit exogenous H_2S-induced vasodilation. All data were expressed as a percentage increase from baseline and normalized to maximal cutaneous vascular conductance (%CVC_{max} = laser-Doppler flux/ mean arterial pressure; 28 mM sodium nitroprusside) **RESULTS:** Na_2S induced cutaneous vasodilation above baseline (Δ_{base} 28±9 %CVC_{max}; $P<0.05$). TEA (Δ_{base} 4±3 %CVC_{max}) and GLY + SENI + TEA (Δ_{base} 5±2 %CVC_{max}) blunted Na_2S-induced cutaneous vasodilation (both $P<0.05$), whereas GLY (Δ base18±8 %CVC_{max}) or SENI alone (Δ_{base} 22±8 %CVC_{max} from baseline) had no effect (both $P>0.05$). **CONCLUSION:** These preliminary data suggest that exogenous H_2S-induced cutaneous vasodilation is mediated by TEA-sensitive K_{Ca} channels, but not by K_{ATP} or intermediate K_{Ca} channels, in healthy humans.