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MEETING ABSTRACT

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Hypoglycaemia-induced alterations in vascular reactivity

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Background: Hypoglycaemia is a life-threatening condition characterized by low blood glucose levels and it is capable to induce failure of organ function and their damage. Vascular tone is regulated by several mediators and hypoglycaemia alters their effects on the vascular wall. Altered vascular reactivity could cause inadequate blood and oxygen supply and thus propagate organ injury.

Objectives: To study the effects of hypoglycaemia on vascular reactivity to physiological mediators in different blood vessels in *ex vivo* experimental models.

Methods: Aortic and femoral artery rings were prepared from CD-1 male mice. The effects of hypoglycaemia on the vascular reactivity were assessed in vessel rings 30 min after subsequent incubation in Krebs-Henseleit buffer solutions containing 5.5, 2.2 and 5.5 mM glucose. The response to vasoconstrictors (angiotensin II, endothelin-1, phenylephrine and serotonin) was tested at the end of incubation with each buffer solution. The response to vasodilators (acetylcholine, adenosine, bradykinin and histamine) was also tested after incubation with each buffer solution in blood vessel rings pre-contracted with phenylephrine to a submaximal level.

Results: Incubation of aortic rings in buffer solution with 5.5 mM glucose after hypoglycaemia enhanced phenylephrine-induced vasoconstriction by 30%. Fluctuations in glucose concentration did not alter vascular reactivity of aortic rings to serotonin and angiotensin II. In addition, after hypoglycaemia the response to all tested vasoconstrictors was not changed in femoral artery rings. Hypoglycaemia decreased acetylcholine-induced vasorelaxation in aortic rings and femoral artery rings. Decreased response to acetylcholine was present also after incubation of vessel rings of both vessels for 30 min in buffer solution with 5.5 mM glucose. Moreover, exposure of femoral artery rings to hypoglycaemia slightly impaired the relaxation response to adenosine and bradykinin.

Conclusions: The obtained results demonstrate that hypoglycaemia and fluctuations in glucose concentrations impair acetylcholine-induced vasorelaxation and enhance phenylephrine-induced vascular constriction in conductance arteries. Hypoglycaemia-induced alterations in vascular reactivity can contribute to the development of hypoxic organ injury.

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Keywords: hypoglycaemia – vascular reactivity – aorta – femoral artery

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