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The possible link between insulin resistance and increased cardiovascular mortality

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Introduction: Hyperinsulinaemia and insulin resistance are considered as independent risk factors of ischemic heart disease. We sought whether hyperinsulinaemia per se is of significant influence on cardiac arrhythmia generation in conscious rabbits.

Methods: Chronically instrumented conscious rabbits were equipped with a right ventricular electrode catheter for pacing and recording the intracavitary electrogram as well as with arterial and venous catheters for blood sampling, blood pressure monitoring and for insulin and glucose infusions, respectively. Hyperinsulinaemia was produced by 2-step hyperinsulinaemic (35.7 ± 7.4 and 103.2 ± 10.5 µU/ml) euglycaemic (5.5 ± 0.5 µU/ml) glucose clamping. Programmed electrical stimulation (PES) was applied for ventricular effective refractory period (VERP) determination and arrhythmia generation.

Results: The VERP shortened from 110.4 ± 3.7 to 104.8 ± 2.9 ms, (p < 0.05) and from 109.3 ± 2.9 to 101.4 ± 1.7 ms (p < 0.05) in animals with 35 and 103 µU/ml clamped hyperinsulinaemic euglycaemia, respectively. The incidence of ventricular premature beats, non-sustained ventricular tachycardia and sustained ventricular tachycardia induced by PES increased from control 11, 0, 0% to 24 (p < 0.05), 5, 0%; and 56, 44 (p < 0.001 for each), 0% in animals with 35 and 103 µU/ml clamped hyperinsulinaemic euglycaemia, respectively.

Conclusion: The results provide evidence for the “sui generis” proarrhythmic effect of hyperinsulinaemia in otherwise healthy rabbits. The results also suggest that this is underpinned by a hyperinsulinaemia-induced reduction of VERP.