

# LACTIC ACIDOSIS THERAPY ASSOCIATED WITH LETHAL LEVELS OF METFORMIN

Petr Radovič | B. Braun Avitum | Litoměřice | Czech Republic

## INTRODUCTION

The most serious, but rare side effect during metformin treatment is lactic acidosis. Our dialysis centre recently treated a patient with this rare complication of oral antidiabetic therapy.

Lactic acidosis is characterised by an increase in blood lactate concentration, which is associated with a decrease in blood pH. It is a dangerous complication of therapy with certain drugs, typically containing the metformin compound. The metformin compound is used to treat type 2 diabetes mellitus (DM) and is included in a range of drugs (Metformin, Glucophage, Siofor, etc.). It increases the sensitivity of tissues to insulin and, in addition, it reduces the production of glucose by the liver. Metformin is excreted by the kidneys (through glomerular filtration and tubular secretion); renal impairment significantly reduces its excretion and increases the risk of lactic acidosis. The shift of potassium from the cells into the extracellular space leads to hyperkalaemia that is reversible, resolving after pH normalisation. Severe acidosis can lead to renal hypoperfusion and subsequent anuria. The condition manifests as general malaise, apathy and vomiting followed by a disturbance to consciousness and the disruption of homeostasis, which without treatment ends with coma and death. A typical symptom is accelerated and deep breathing (so-called Kussmaul's breathing), though which the body, in response to hyperacidity, attempts to breath out as much carbon dioxide as possible. In the therapy, it is necessary to treat the cause and to ensure functional blood circulation. Lactate and metformin can be eliminated by haemodialysis.

## AIM

The aim of this paper is to present the results of the successful therapy of a critical medical condition with the use of haemodialysis.

## CASE REPORT

A sick 67-year-old woman was brought to the hospital in December 2016 due to worsening breathing and the tightness of her chest. The previous day, the patient was not feeling well and vomited. She was examined by her GP, had been given some medication, however she did not remember what medication she took. The patient suffered from type 2 diabetes mellitus, treated with PADs (Metformin 500mg 1-1-1). Upon admission, she was conscious, immediately started haemodialysis treatment and the patient was intubated. Gradually, the condition rapidly deteriorated and in the evening hours, the patient developed shock.

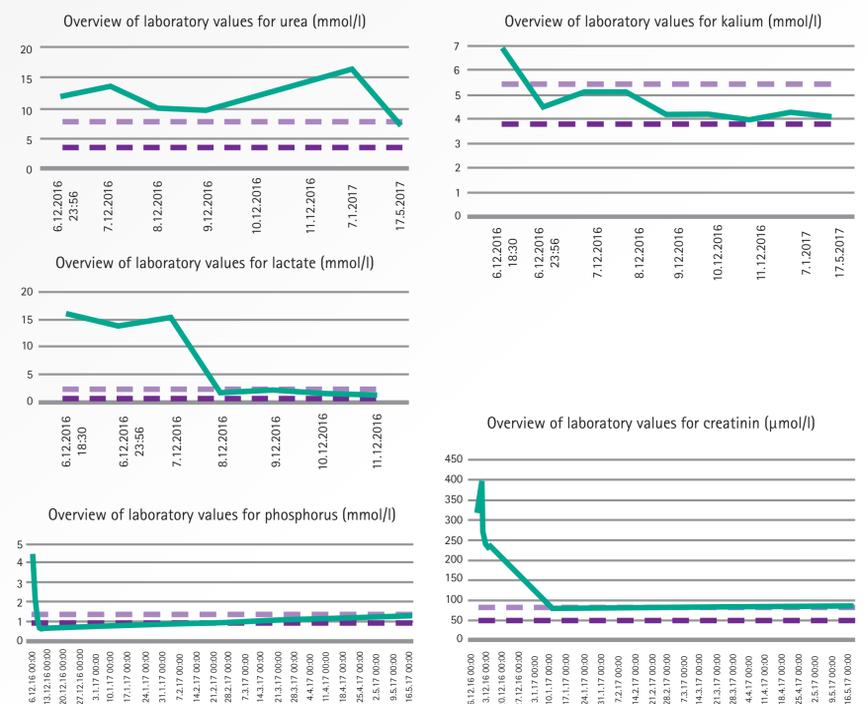
Laboratory results found lethal levels of metformin (66 µg/ml) and significantly elevated levels of lactate 16.0 mmol/l (standard range 0.5–2.2 mmol/l), phosphorus 4.45 mmol/l (standard range 0.9–1.32 mmol/l), potassium 6.9 mmol/l (standard range 3.8–5.4 mmol/l) and creatinine 318 µmol/l (standard range 49–84 µmol/l). Severe metabolic acidosis with a pH of 6.616 was also observed.

Her health status was evaluated as multi-organ failure, shock, acute renal failure with hyperkalaemia based on severe lactate acidosis associated with metformin therapy (MALA).

## COURSE OF TREATMENT

- December 2016 - Treatment with acute haemodialysis (AHD) (blood flow rate 200 ml/min) and ultrafiltration (1500 ml) was initiated. At the time of the initiation of AHD, the patient had anuria and was conscious. Due to her aggressively worsening health condition and anxiety due to dyspnoea, the patient was put into artificial sleep and switched to mechanical lung ventilation.
- AHD (treatment time 9 hours) was performed during the first 24 hours. Additionally, 6 AHDs were performed once daily for 5 hours, followed by 5 AHDs every other day. Treatment with haemodialysis was completed after 16 days. Starting on the 12th day, diuresis has been restored.
- On day 37 of hospitalisation, the patient was transferred to a standard ward. The patient was conscious with spontaneous breathing, communicating, walking during physiotherapy sessions, without any symptoms and eating well.
- February 2017 - laboratory results of the patient were within normal limits; the patient was feeling good and undergoing physiotherapy.
- May 2017 – medical check at the out-patient nephrology department, the laboratory results were standard without a pathological finding. Physiotherapy with walking continued, dietary measures in place, DM on therapy with Onglyza (Saxagliptin hydrochloride).
- The next medical check at our out-patient nephrology department is planned for October 2017.

## LABORATORY RESULTS - COURSE:



## CONCLUSION

Due to the prompt initiation of acute haemodialysis and excellent cooperation with the interdisciplinary intensive care unit, we managed to reverse the very unfavourable development of the

disease. A baseline lethal dose of metformin with a level of 66 µg/ml, detected by the Toxicology Centre in Prague, was the highest level ever recorded (normal level of up to approximately 0.1 µg/ml).

Thanks to the readiness of the highly professional staff, prompt provision of adequate care and use of state-of-the-art technology, we are now able to treat such severe health conditions.

References:  
MUDr. Jiří Štefánek | <http://www.stefajir.cz/?q=laktatova-acidoza>  
<http://www.stefajir.cz/?q=laktatova-acidoza>