

Lead-induced Nephropathy

W. Hunter Greis, BS¹ Anthony Donato, MD, MACP²

Drexel University College of Medicine at Tower Health, West Reading PA¹ The Reading Hospital and Medical Center, West Reading PA²

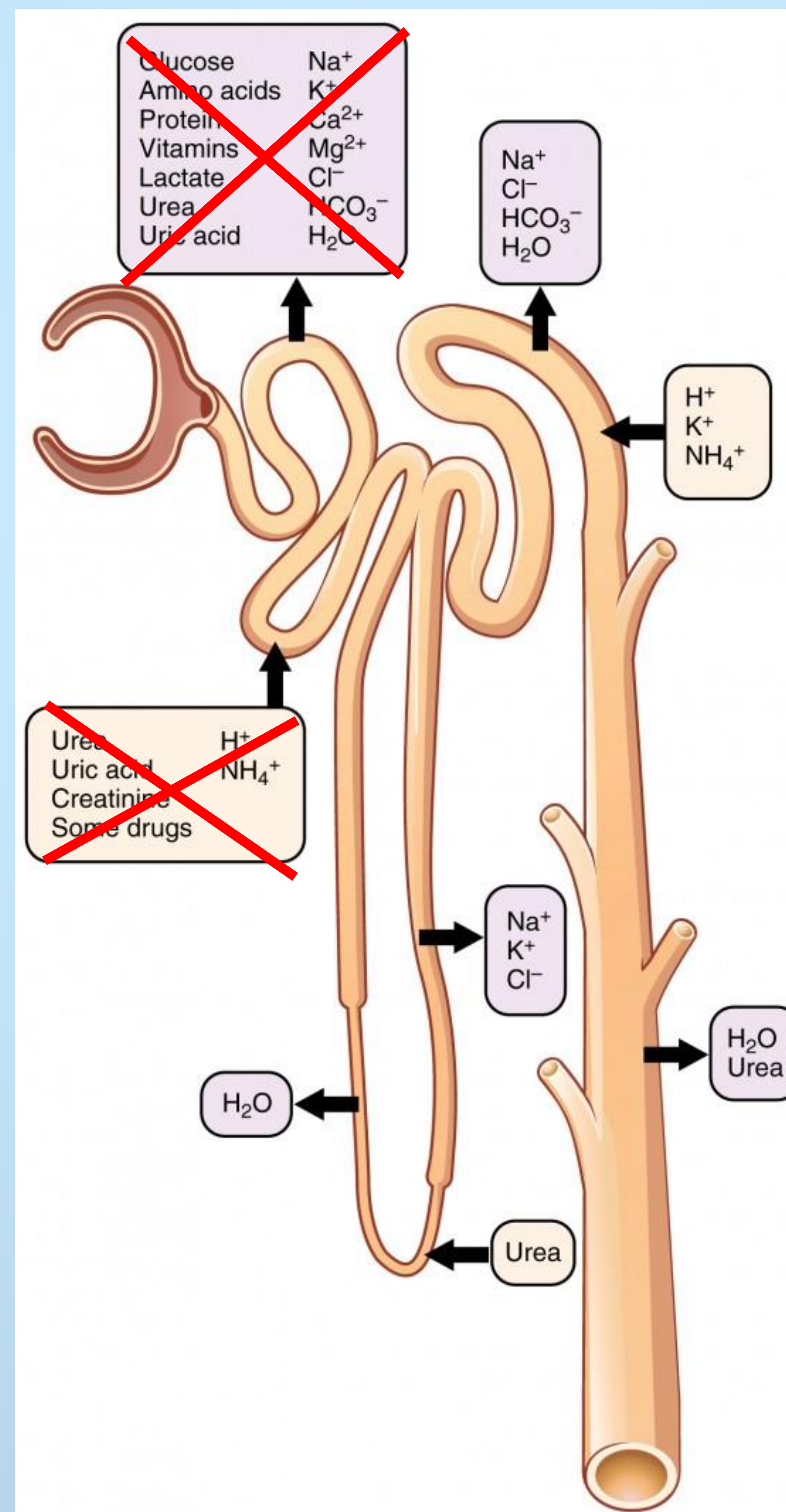
INTRODUCTION

- Public health measures have reduced exposure to lead in the US over the past two decades
- Prior exposure remains a threat later in life

CASE PRESENTATION

- 77-year-old male presenting with acute heart failure exacerbation while on subtherapeutic loop diuretic dosing
- Past medical history
 - Hypertension
 - Gout
 - Heart failure with recovered ejection fraction
 - Diabetes Mellitus Type II for the past 4 years
 - Stage 4 chronic kidney disease with massive proteinuria (9g/d)
 - Hypomagnesemia on daily supplementation
- Previously experienced tetanic contractions on therapeutic doses of loop diuretics, limiting therapeutic dosing
- Hypocalcemia noted in prior years with appropriate vigorous PTH response
- Fluctuating PTH with changing calcium levels with normal phosphorus
- Patient had extensive history of heavy metal exposure while creating car batteries between 1968 and 1974, necessitating work leave due to blood levels 4x upper limit
- No prior history of peripheral neuropathy
- UA: Glucose 70 mg/dL, protein >300 mg/dL, otherwise normal

Labs	5/8/23	11/6/23	11/27/24
Calcium	6.7 mg/dL	9.5 mg/dL	7.6 mg/dL
Ionized Calcium			0.96 mmol/L
PTH	360 pg/mL	56 pg/mL	347 pg/mL
Phosphorus	3.7 mg/dL	4.9 mg/dL	4.4 mg/dL
Glucose	171 mg/dL	232 mg/dL	178 mg/dL



OUTCOME

- Responded well to the addition of activated vitamin-D and aggressive calcium replacement
- Able to tolerate QOD loop diuretic and maintain euvolemia

DISCUSSION

- Lead exposure can have long-term effects of occupational lead exposure on the renal system
- Can develop Fanconi syndrome:
 - Aminoaciduria
 - Glucosuria
 - Renal loss of calcium and magnesium
- Low calcium can become symptomatic when using a loop diuretic
- Additionally, slowly progressive chronic kidney disease, hypertension, and gout are also common findings in chronic lead exposure

CONCLUSIONS

- Consider lead nephropathy in patients with tubular dysfunction and magnesium/glucose wasting, especially if prior lead exposure
- Identification of the abnormal presentations of this toxicity can reduce morbidity for those with occupational heavy metal exposures
- Glucosuria in the presence of serum glucose <250 mg/dL can be the first indicator of Fanconi Syndrome

BIBLIOGRAPHY

Image citation:
Lumen Learning. (n.d.). *Tubular reabsorption*. Retrieved September 24, 2024, from <https://courses.lumenlearning.com/suny-ap2/chapter/tubular-reabsorption-no-content/>