

## Forensic Aspects of Neuroglycopenia in Addison's Disease and Diabetes

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Diabetes complications of hypoglycaemia, hypoglycaemia unawareness and neuroglycopenia are often encountered by patients treated with insulin. It is feared by patients and families often leading to emotional and mental scars and can affect lifestyle and confidence. Hypoglycaemia can occur in premature babies, persons with hypopituitarism and Addison's Disease. Low blood glucose can affect athletes and the elderly leading to falls. Neuroglycopenia in Addison's Disease usually described as an Addesonian Crisis or Adrenalin Crisis requires immediate hydrocortisone injection and often hospitalisation to achieve endocrine hormone stabilisation. Cases are individual and often difficult for families, clinicians, lawyers and courts to understand. Temporary mental impairment and PTSD injury may occur requiring counselling to overcome hypoglycaemia and neuroglycopenia especially if the patient suffers convulsions and seizure often leading to mental health stigma with difficulty for patients and families to understand and requiring psychological counselling. Today many patients and families are using social media to describe event experience seek guidance and advice from other patients to share and help others and at the same time seek guidance in how to approach their General Practitioner or Healthcare Clinical Specialist to identify possible need for medication review or formal diagnosis. This is relevant in Addison's Disease where family stigma may arise.

Addison's Disease was discovered by English Physician Thomas Addison (1793-1860) where the deficiency of hydrocortisone in many cases prior to 1950 were fatal with patients experiencing fear of early death and paranoia. Hydrocortisone therapy taken split dose, am and pm, has led to many patients when diagnosed enjoying a full and rewarding life with regular specialist endocrinology monitoring and regular T3 and T4 assay. Addison's Disease is often genetically inherited with female predominance and can be undiagnosed until mid-life by which time temporary mental impairment with memory flashback especially to a catastrophic crisis event with Agoraphobia and avoidance a classical symptom in non-diagnosis or poor patient treatment management. The condition often runs in families where relationship difficulties may arise especially between fathers and daughters and sisters and brothers. A UK incidence increase from around 600 patients in

year 2000 to an estimated 8,000 patients with Addison's Disease in the UK in year 2020 exposes the NHS and healthcare providers to a significant Endocrinology increased patient care need along with a major NHS Mental Health requirement especially as we emerge from COVID-19 pandemic.

42 years T1D insulin treatment for diabetes and personal undiagnosed hypoglycaemia unawareness and life threatening neuroglycopenia event experience in 1994 following wrong insulin care 1987 - 94 led the author to research published reports. The first hypoglycaemic event was described by Banting, Best and Macleod at the time of insulin discovery as a treatment for diabetes in 1921-22. This review includes observations from 'Forensic Aspects of Hypoglycaemia' by Prof Vincent Marks, 629 case references, February 2019.

Complications affecting stable Blood Glucose levels include Otitis Externa, Osteomyelitis, Neuropathy pain, infection treatment by IV antibiotic delivery, periodontal dental link with gum disease, inflammation, chemical change reducing insulin effectiveness, calcium stones in the saliva duct, sodium, calcium, magnesium electrolyte imbalance, Omega 3 deficiency, night saliva duct cortisol secretion, and depression.

Use of insulin and C Peptide assay is beneficial in forensic investigations following unexplained death or insulin use as a weapon in alleged criminal matters which may be accidental or with wilful intent and can be challenging in legal interpretation for courts and the legal profession to understand and may lead to miscarriage of justice if wilful intent is not proven or courts fail to accept or request expert medical evidence of victims or perpetrators and may justify open verdict of accidental due to cause by prescribed NHS medication. If not correctly prescribed and educational guidance given to patients, carers and families can lead to prescribing clinicians facing allegations of wilful neglect in public office and possible criminal prosecution if facts are not carefully and independently examined and victims of negligence facing unlawful victims law misunderstood by the justice system and the police as lacuna or hollow law.

Society can learn from this research to provide improved Diabetes and Addison's Disease care for patients to achieve good health and long life despite the daily burden of managing a condition with no cure.

A duty of care exists to a person in a state of hypoglycaemia or neuroglycopenia by a witness to summons paramedic help when the person is unable to help themselves because of temporary mental hypoglycaemia impairment.