

免開刀人工智慧尿酸結石預測系統

Non-surgical Artificial Intelligent Uric Acid Stone Prediction System

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技術內容 Technical Introduction

根據歐洲泌尿科醫學會指引，有15%結石疾病是尿酸成分結石，可吃藥溶解，不用開刀！但目前只能開刀取出結石分析才能知道結石是不是尿酸成分結石。過去我們發現有8項簡單臨床因子與尿酸結石高度相關，因此我們結合人工智慧與這8項簡單臨床因子在病人被診斷結石後，準確預測結石病人的結石是否為尿酸結石。

According to the guidelines of the European Association of Urology, 15% of cases of nephrolithiasis are caused by uric acid stones, which can be dissolved with medication and do not require surgery. However, currently, surgery is the only way to analyze and determine whether a stone is a uric acid stone. In the past, we found that there are eight simple clinical factors highly correlated with uric acid stones. Therefore, we have combined artificial intelligence with these eight clinical factors to accurately predict whether a patient's kidney stone is a uric acid stone after being diagnosed with nephrolithiasis.

圖1、iStone產品簡介



相關專利 Patent

- 中華民國專利(TW)：112103294
- 美國專利(US)：18/304,594

技術特色 Technical Advantages

其產品預期效益可共創3贏的局面：

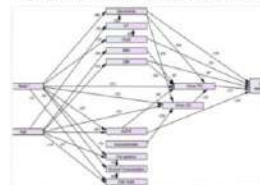
1. 病人端：找出15%尿酸結石的病人，讓結石病人有15%機會可以不開刀(尿酸結石可以不開刀，吃藥溶解結石即可)
2. 醫師端：快速找到85%非尿酸結石，幫助醫師可以說服這類的病人盡早開刀，減少延誤所需洗腎、敗血症、疼痛。增加醫病滿意度，減少醫師需開刀的病人流失，增加醫師及醫院的收入。
3. 健保端：因為15%尿酸結石可不開刀，每年全台灣省 $3 \times 15\% = 4500$ 萬新台幣花費。

The expected benefits of the product can create a situation of win-win-win for all parties involved:

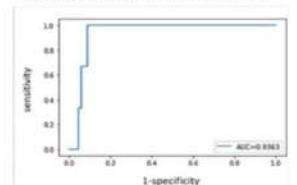
1. Patients: identify the 15% of patients with uric acid stones, allowing these patients to have a 15% chance of avoiding surgery (uric acid stones can be dissolved with medication instead of surgery).
2. Doctors: quickly identify the 85% of patients with non-uric acid stones, helping doctors persuade these patients to undergo surgery earlier, reducing the risk of delayed treatment, renal failure, sepsis, and severe flank pain. This increases patient satisfaction and reduces the number of patients who leave the doctor for surgery, increasing the revenue of the doctor and hospital.
3. Health insurance: Because 15% of uric acid stones can be treated without surgery, the health insurance system can save 3 billion NT dollars per year in Taiwan (15% of the total cost).

圖2、iStone核心技術

8個臨床資訊與尿酸成分有關



Ai準確率使用高醫病人驗證
AUC達93%(已發表SCI期刊)



1. Prediction of the Uric Acid Component in Nephrolithiasis Using Simple Clinical Information about Metabolic Disorder and Obesity: A Machine Learning-Based Model. *Nephrology* 2023; 14: 1829. <https://doi.org/10.3399/nr.14291829>

2. Mediators of the Effects of Gender on Uric Acid Nephrolithiasis: A Novel Application of Structural Equation Modeling. *Sci Rep* 2018 Apr 17; 8(1): 8077. [doi: 10.1038/s41598-018-24485-x](https://doi.org/10.1038/s41598-018-24485-x) PMID: 29568405; PMCID: PMC5904184

應用範圍 Application

泌尿道結石病患 (據統計全世界約有10%-20%人口患有結石疾病，台灣約10%人口患有結石疾病)