• 計畫中文名稱	以動態磁振造影評估股骨頭骨髓壞死之過程---實驗雞		
• 計畫英文名稱	Dynamic MRI in Femoral Head Osteonecrosis---Chicken Model		
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• 研究人員	陳榮邦,郭宗甫,江清泉		
• 中文關鍵字	實驗動物；骨髓；雞；類固醇；股骨頭；磁振造影；骨髓壞死		
• 英文關鍵字	Animal Model；Bone Marrow；Chicken；Corticosteroid；Femoral Head；MR Imaging；Osteonecrosis		
• 中文摘要	儘管非創傷性股骨頭骨髓壞死（osteonecrosis of the femoral head; ONFH）的病因成謎，骨髓內循環的改變可能是相關的因子。因此，股骨上端的骨髓內灌流現象，可能是臨床 ONFH 病人篩檢或選擇治療方式的關鍵。我們曾以動態增強 MRI 篩檢 ONFH 病人的股骨頭，發現骨髓內血液的滯留可能與 ONFH 相關，與 Ficat 的假設相同。 過去曾以類固醇來誘發各種實驗動物產生 ONFH，但直到 1997 年 Gui et al.才建立「來亨雞」的理想實驗模式。本研究預計使用 100 隻 25 週齡雌性來亨雞，隨機分爲 3 組。實驗組（A、B）於每天進行類固醇注射及秤重，對照組（C）則不注射類固醇。A 組作爲測試減壓手術的成效；B 組用來觀察接受類固醇注射後，雞隻產生 ONFH 之自然史；C 組用來測試雞隻之髓內壓（IMP）正常值。爲減少雞隻的老化對研究的偏差，各組將以年齡配對方式飼養。 A 組（40 隻雞）分爲兩小組各 20 隻雞，分別於第 12 週（A1）及 18 週（A2）接受 IMP 測量及減壓手術，A1 組於第 18 週及 24 週進行動態增強 MRI 檢查，並於第 24 週 MRI 檢查後撲殺；A2 組將於第 24 週及 30 週進行 MRI 檢查，並於第 30 週 MRI 檢查後撲殺。B 組（40 隻雞）分爲 4 小組各 10 隻雞，分別於第 12 週（B1）、18 週（B2）、24 週（B3）及 30 週（B4）進行動態增強 MRI 後撲殺。C 組（20 隻雞）分爲兩小組各 10 隻雞，分別於第 12 週（C1）及 18 週（C2）接受 IMP 測量，將於第 18 週（C1）及 24 週（C2）接受 MRI 檢查後撲殺。 所有雞隻均接受第 0 週之 MRI 檢查做基礎值，MRI 掃描時快速注射 Gadopentetate dimeglumine，並採用 T1 加權波序（300/12，TR/TE）12 秒一張連續掃描 7 分鐘。 動態 MRI 訊號資料將進行統計分析並同時比對病理切片，即可觀察瞭解兩者的關連，並可進一步掌握施打類固醇藥物對實驗動物骨頭血液循環產生之變化。研究結果將可協助臨床工作者瞭解類固醇誘發的 ONFH 疾病進程與致		

	病機轉，並可觀察與減壓治療的病理變化。
• 英文摘要	Osteonecrosis of the femoral head (ONFH) was thought to occur as the result of increased intramedullary pressure (IMP) and reduction in blood flow. Ficat [1] postulate that disturbance osseous microcirculation with intramedullary stasis can be a common pathway to initial the ischemic process of the disease. Accordingly, assessment of intramedullary perfusion of the proximal femur may be a key to understand the hemodynamic changes of ONFH. Many investigators have tried to induce ONFH in various animal models but failure. Recently, Cui and colleagues [2] successfully induced ONFH in a chicken model by injection of high-dose corticosteroids. Accordingly, we have successfully reproduced this experimental model in our pilot study. In this project, we aim to understand the course of steroid-induced ONFH in relation to IMP and correlate these results with dynamic contrast-enhanced MR imaging (DCE-MRI) and histological findings; and to compare the homodynamic changes relating to the outcome of ONFH treated without and with core decompression monitoring by DCE-MRI. A total of 100 White female Leghorn chickens (age, 25 weeks) will be adopted in our experiment (1st year, n=30; 2nd year, n=40; 3rd year, n=30). All chickens will be divided into three age-matched groups. Chickens in groups A and B will receive methylprednisolone 3mg/kg IM daily. Group A chickens will be employed to test the outcome of core decompression. Group B chickens will be used for observation in pathophysiologic changes of ONFH in steroid-induced chickens in a natural course. Group C will act as a control for IMP measurement. In Group A (n=40), each subgroup of 20 chickens will receive IMP measurement and core decompression at week 12 (subgroup A1) and week 18 (A2) after daily steroid injection, respectively, at one time point. Follow-up DCE-MRI will be performed in week 18 and week 24 (sacrificed) for subgroup A1, and week 24 and week 30 (sacrificed) for B1. In Group B (n=40), each subgroup of 10 chickens will receive DCE-MRI at week 12 (B1), 18 (B2), 24 (B3), and week 30 (B4), respectively, after daily steroid injection. Chicken in each group will be sacrificed after MRI study. In Group C (n=20), no steroid-treated injection will be performed; each subgroup of 10 chickens will receive IMP measurement at week 12 (C1) and 18 (C2), respectively. After the IMP measurement, chickens in subgroup C1 and C2 will be sacrificed at week 18 and week 24, respectively. All groups of chickens will receive baseline (week-0) and follow-up DCE-MRI studies. DCE-MRI T1-weighted images, 300/12 (TR/TE), will be obtained at 12-sec intervals for 7minutes synchronously after intravenous bolus injection of gadopentetate dimeglumine on a coronal plane. We expect that DCE-MRI will be able to assess the course of intramedullary hemodynamic changes of ONFH in relation to IMP treated without and with core decompression.