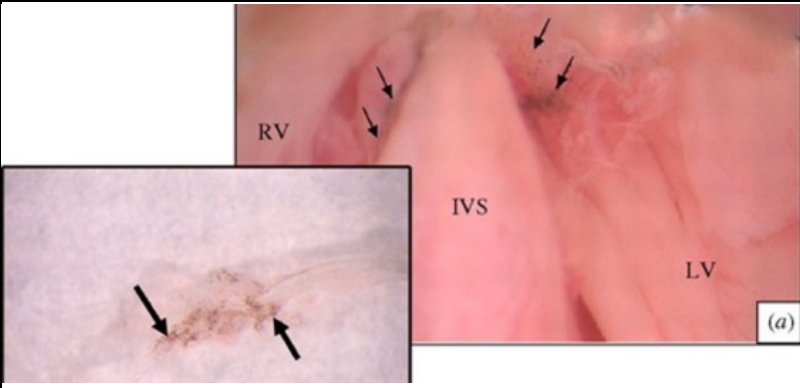


生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	色素提供強度 (Pigments provide strength)
生物系統 LIVING SYSTEM	老鼠 Muridae (Mice and rats)
功能類別 FUNCTIONS	#改變材料特性 #Modify material characteristic
作用機制標題	小鼠的黏彈性心臟瓣膜從黑色素獲得剛度 (The viscoelastic heart valves of mice gain stiffness from melanin pigments)
生物系統/作用機制 示意圖	
作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)	
文獻引用 (REFERENCES)	
<p>「鼠類心臟三尖瓣小葉的色素沉著 (pigmentation) 與黑色素細胞濃度有關，從而影響其剛度…這種機械特性沿著小葉會隨色素沉著的程度而變化。含有黑素細胞 (melanocyte) 的瓣膜小葉之色素區域展現出比非色素區域 (2.5-4 GPa) 更高的儲能模量 (7-10 GPa)。這些結果表明黑素細胞的存在會影響小鼠心臟房室瓣膜的黏彈性，並且對它們在生物體中的正常功能運轉至關重要…心臟瓣膜展示出複雜的生物力學特性，從而使它們能夠在心搏週期的定向血流中發揮功能…成熟的心臟房室 (atrioventricular, AV) 瓣膜 (二尖瓣和三尖瓣) 的小葉由細胞外基質 (extracellular matrix, ECM)、瓣膜間質細胞 (valvular interstitial cell) 和上覆內皮細胞 (overlying endothelial cell) 所組成。瓣膜在個體整個生命週期中對彈性、可壓縮性、剛度和強度以及耐用性的力學需求，主要是通過小葉的高度組織化和分隔的 ECM 成分而達成…」 (Balani et al., 2009: 1097)</p> <p>“Pigmentation of murine cardiac tricuspid valve leaflet is associated with melanocyte concentration, which affects its stiffness...The mechanical properties along the leaflet vary with the degree of pigmentation. Pigmented regions of the valve leaflet that contain melanocytes displayed higher storage modulus (7-10 GPa) than non-pigmented areas (2.5-4 GPa). These results suggest that the presence of melanocytes affects the viscoelastic properties of the mouse</p>	

atrioventricular valves and are important for their proper functioning in the organism...The cardiac valves display complex biomechanical properties that allow them to function in directed blood flow during the cardiac cycle...The mature atrioventricular (AV) valves (mitral and tricuspid) have leaflets composed of extracellular matrix (ECM), valvular interstitial cells and overlying endothelial cells. The mechanical requirements of the valve for elasticity, compressibility, stiffness and strength, as well as durability throughout the lifespan of an individual are achieved primarily by the highly organized and compartmentalized ECM composition of the leaflets...” (Balani et al. 2009: 1097)

參考文獻清單與連結 (REFERENCE LIST)

Balani, K. (2009). Melanocyte pigmentation stiffens murine cardiac tricuspid valve leaflet. *The Royal Society* 6: 40. (<https://royalsocietypublishing.org/doi/10.1098/rsif.2009.0174>)

延伸閱讀: Harvard 或 APA 格式

生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

<https://en.wikipedia.org/wiki/Muridae>

撰寫/翻譯/編修者與日期

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AskNature 原文連結

<https://asknature.org/strategy/pigments-provide-strength-2/>