生物策略表

類別	生物策略 (Strategy)
生物策略 STRATEGY	心臟生長 (Heart grows)
生物系統 LIVING SYSTEM	印度蟒 *Python molurus* (Indian python)
功能類別 FUNCTIONS	#改變大小/形狀/質量/體積 #調節細胞代謝過程 #Modify size/shape/mass/volume #Regulate cellular processes
作用機制標題	印度蟒在進食後，心臟因為血漿中的脂肪酸發生反應而急速生長 (Heart of Indian python incurs dramatic growth after a meal by reacting to fatty acids in the snake's plasma)
生物系統/作用機制示意圖	

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

「印度蟒常常好幾個月不進食，然後要進食的時候則是以暴食的方式，有時甚至是吃下一整隻的鹿。為了容納突如其來的糖分、油脂跟蛋白質，牠的身體會超速運轉。牠的新陳代謝速率增加大約 40 倍，然後很多的器官，包括牠長長的消化道會變為原本的兩倍大。牠的心臟也會增大 40%，想必為了輸入更大體積的血液到全身。」(Strain 2011)

研究人員推測牠的心臟組織藉由燃燒三種不同的養分，其中包含肉豆蔻酸 (myristic acid)，一種動物脂肪和爬蟲類的食物中常見的成分，以供身體所需。

"The Indian python…frequently goes months without eating and then gorges, sometimes downing an entire deer. To accommodate the sudden rush of sugars, fats, and proteins, its body goes into overdrive. Its metabolism speeds up nearly 40 times, and many of its organs, including its long digestive tract, double in size. Its heart also expands by 40%, presumably to pump greater volumes of blood throughout its body." (Strain 2011)

Researchers suspect that the cardiac tissue fuels its expansion by burning through three types of nutrients including myristic acid, a common ingredient in many animal fats and other reptile foods.

文獻引用 (REFERENCES)

「印度蟒展現了一種大量進食後心藏質量會顯著增加的現象。為了應用此知識到哺乳類動物的心臟，我們調查了這種生理性心臟生長的分子機制。並發現蟒蛇心臟成長的特色是在缺少細胞增生和藉由活化生理訊號傳遞通道的狀況下，心肌細胞因營養過剩而生長。雖然有高效率的脂質循環，進食後的蟒蛇心臟並沒有積累三酸甘油脂或脂肪酸。取而代之的是脂肪酸轉運和氧化途徑的活化被激活，同時超氧化物歧化酶 (superoxide dismutase)，一種心臟的保護酶，的表達和活性增加。我們還鑑定了蟒蛇血漿中的脂肪酸組合，當注射到蟒蛇或小鼠中時，能促進生理性的心臟生長。」

"Indian pythons display a marked increase in heart mass after a large meal. We investigated the molecular mechanisms of this physiological heart growth with the goal of applying this knowledge to the mammalian heart. We found that heart growth in pythons is characterized by myocyte hypertrophy in the absence of cell proliferation and by activation of physiological signal transduction pathways. Despite high levels of circulating lipids, the postprandial python heart does not accumulate triglycerides or fatty acids. Instead, there is robust activation of pathways of fatty acid transport and oxidation combined with increased expression and activity of superoxide dismutase, a cardioprotective enzyme. We also identified a combination of fatty acids in python plasma that promotes physiological heart growth when injected into either pythons or mice." (Riquelme 2011: 528)

參考文獻清單與連結 (REFERENCE LIST)

Strain, D. (October 27, 2011). The incredibly expanding snake heart. *Science*. Retrieved from: https://www.sciencemag.org/news/2011/10/incredibly-expanding-snake-heart

Riquelme, C. A., J. A. Magida, B. C. Harrison, C. E. Wall, T. G. Marr,S. M. Secor, andL. A. Leinwand. (2011). Fatty acids identified in the Burmese python promote beneficial cardiac growth. *Science* 334: 528-531.

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/Python_molurus

撰寫/翻譯/編修者與日期
胡宇傑翻譯 (2020/04/02) ；譚國鎏編修 (2020/06/01) ；許秋容編修 (2020/06/29)
AskNature 原文連結
https://asknature.org/strategy/heart-grows/