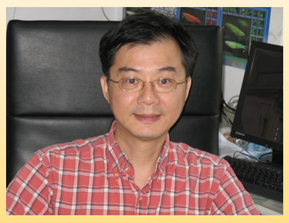
汪宏達教授、抗老化研究實驗室、生物科技研究所

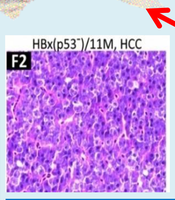


我們實驗室主要以抗老化分子遺傳研究為主軸，以**果蠅**為研究材料，找尋有較好抗壓能力的長壽(抗老化)突變株果蠅，藉此找出其作用標的基因，並且利用**線蟲**來驗證其長壽的功能，以確認其長壽的功能在不同物種間有共通保留的作用，進而找出其分子作用機轉，以助於未來成功地找出有益於人類健康地長壽之藥物開發。

老化常伴隨許多老化相關的疾病，如神經退化性疾病及癌症，最新的研究思維常利用抗老化研究所找出的標的基因，來檢現其對老化相關疾病的預防或治療，我們目前已成功地發現一個長壽基因對神經退化性疾病及癌症都有抑制的效果，結果已榮獲專利許可證號並發表論文，許多有趣的研究正在進行中，此外我們也與國衛院喻秋華老師利用斑馬魚癌症模式研究長壽基因的抗癌研究，以及抗癌藥物的篩選及精準醫療研究，歡迎有興趣共同找尋抗老化、抗神經退化及抗癌基因的同學加入研究團隊。 Email: hdwang@life.nthu.edu.tw 汪宏達老師

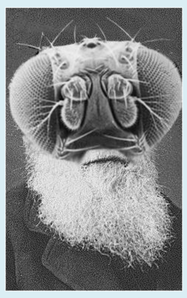
Control fish with normal liver

Transgenic fish with liver tumor



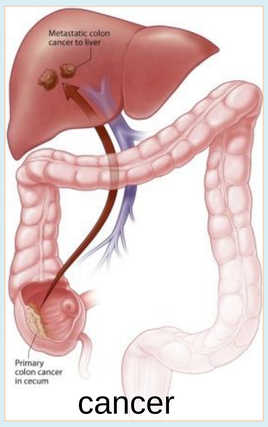
liver tumor staining

Cancer model and drug screen

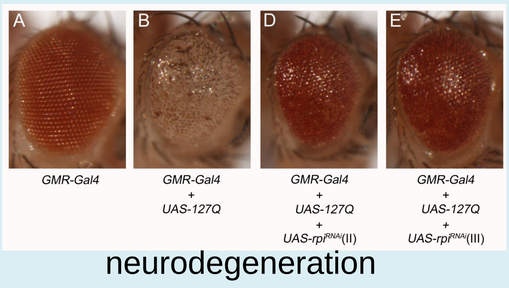


Longevity

Cellular signaling



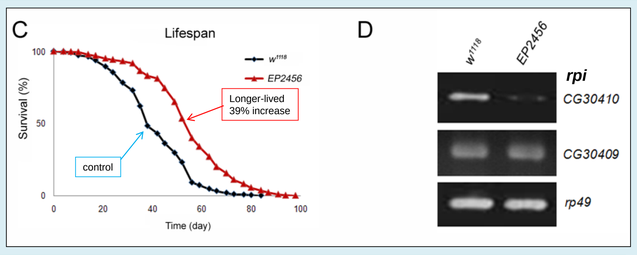
cancer



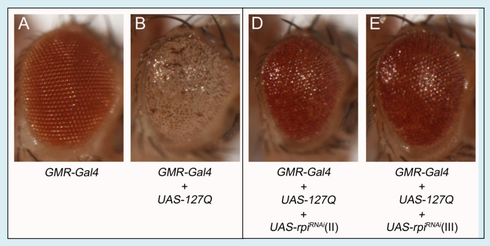
neurodegeneration

實驗室QR code

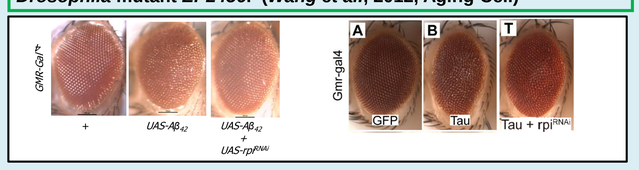
Example 1. Ribose-5-phosphate isomerase (*rpi*) gene expression in the regulation of lifespan, polyglutamine and $A\beta_{42}$/tau toxicity (neurodegereration), and cancer formation



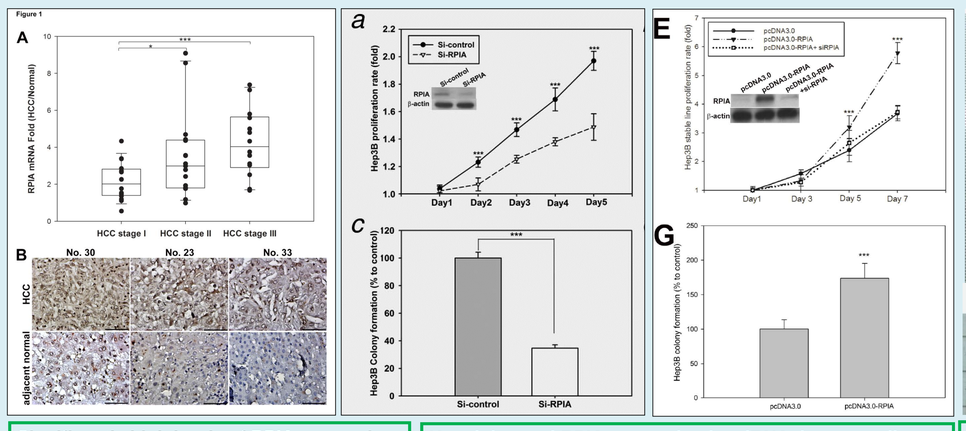
Reduced *rpi* (*CG30410*) gene expression extends lifespan in *Drosophila* mutant *EP2456*. (*Wang et al.*, 2012, Aging Cell)



Knockdown of *rpi expression* by RNAi rescues polyglutamine (127Q) toxicity in the *Drosophila* eye, implying its ability in the amelioration of Huntington's neurodegeneration. (*Wang et al.*, 2012, Aging Cell)

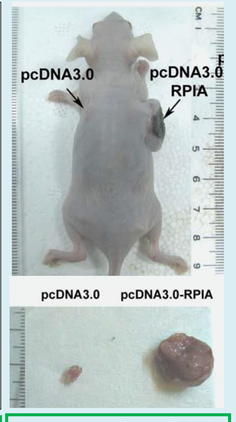


Knockdown of *rpi* by RNAi also attenuates $A\beta_{42}$ and tau toxicity in the *Drosophila* eye, suggesting that it may also ameliorate Alzheimer's neurodegeneration. (Hsiao et al., 2015, Jokull Journal)

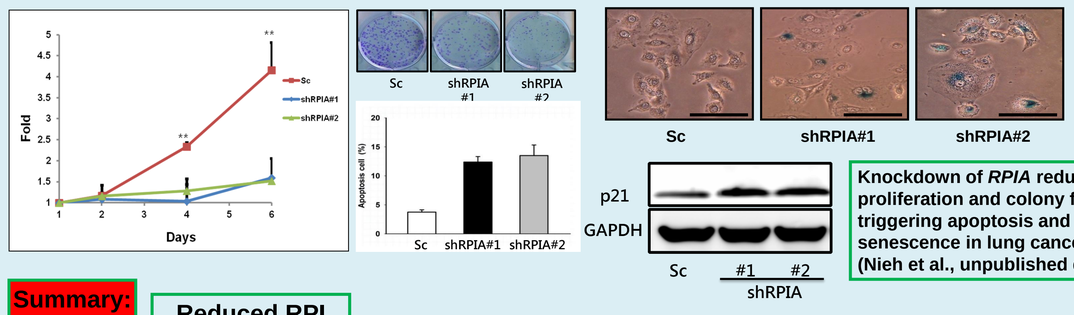


Significantly high levels of RPIA expression were detected in the liver cancer biopsy compared to the adjacent non-cancer biopsy, indicating RPIA plays a role in liver cancer formation. (Ciou et al., 2015, IJC)

Knockdown of *RPIA* expression by siRNA decreases liver cancer cell survival rate and colony formation ability, and overexpression of *RPIA* increases both, demonstrating that RPIA can modulate liver cancer cell proliferation. (Ciou et al., 2015, International Journal of Cancer)



Overexpression of RPIA enhances tumor growth in nude mice. (Ciou et al., 2015, IJC)



Knockdown of *RPIA* reduces cell proliferation and colony formation by triggering apoptosis and cellular senescence in lung cancer cells. (Nieh et al., unpublished data.)

Summary:

Reduced RPI expression → Extending longevity / Attenuating neurodegeneration / Preventing cancer formation

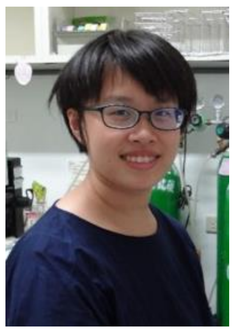
林彥宏

江美儀

王嫻築

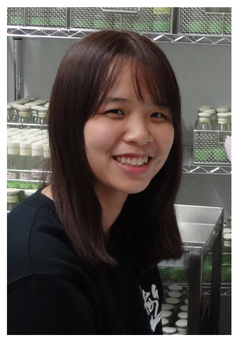
陳品妤

沈文琦



黃榆薰

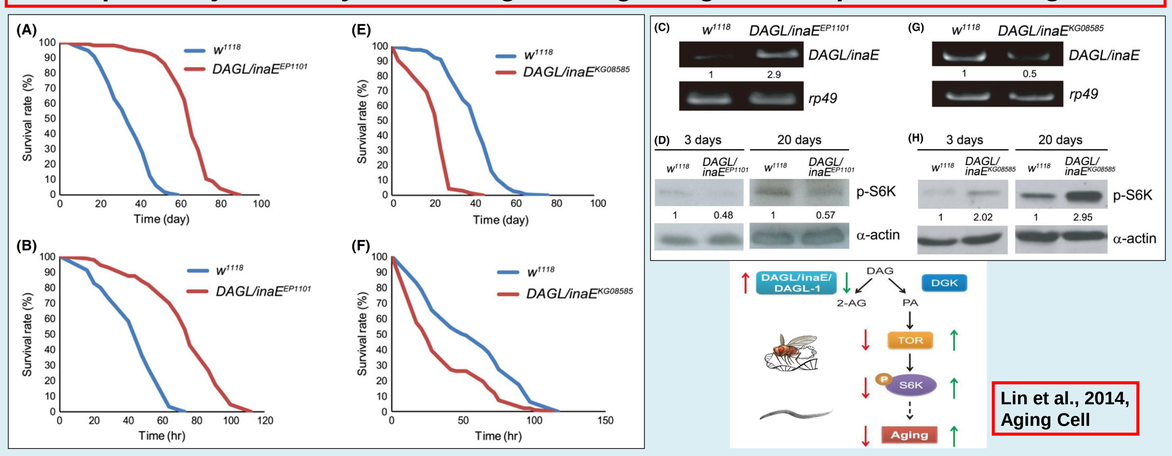
林欣儀



李宇宸

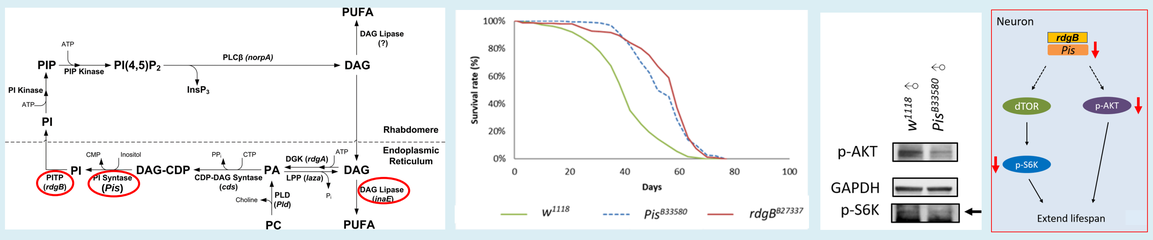
張廷莉

Example 2. *Diacylglycerol lipase* (*DAGL*) regulates lifespan and oxidative stress response by inversely modulating TOR signaling in *Drosophila* and *C. elegans*

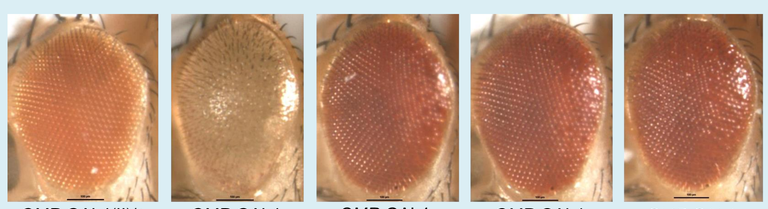


Lin et al., 2014, Aging Cell

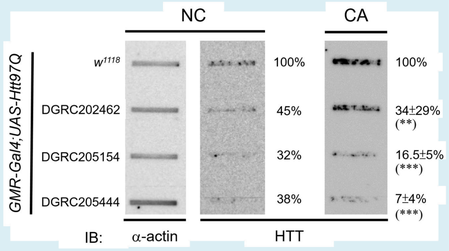
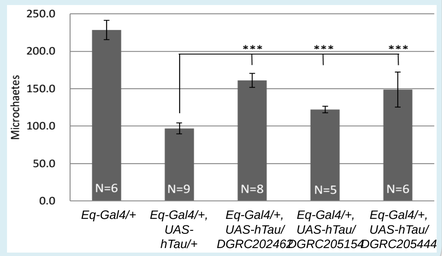
Example 3. Reduced expression of *rdgB* and *Pis* both extend lifespan by inhibiting TOR and insulin signaling in *Drosophila* (in progress)



Example 4. A screen for neurodegeneration suppressors in *Drosophila* (in progress)



GMR-GAL4(II)/+ | *GMR*-GAL4, UAS-108Q/+ | *GMR*-GAL4, UAS-108Q/+; DGRC202462/+ | *GMR*-GAL4, UAS-108Q/+; DGRC205154/+ | *GMR*-GAL4, UAS-108Q/+; DGRC205444/+



Eq-Gal4/+ | Eq-Gal4/+, UAS-hTau/+ | Eq-Gal4/+, UAS-hTau/DGRC202462 | Eq-Gal4/+, UAS-hTau/DGRC205154 | Eq-Gal4/+, UAS-hTau/DGRC205444