Using nicotine to improve cancer patient outcomes in New Mexico

PI: Giancarlo López Martínez Department of Biology

Aim 1



- Low doses of nicotine elevate cellular defenses
 - test doses biochemically for potential protective effect
 - boost activity
 - longevity
 - outcome
 - nicotine protection





Aim 2



- Effect of nicotine hormesis on postirradiation free radical stress
 - use identified doses of nicotine in Aim 1
 - to look at cellular damage after irradiation
 - lipids, proteins, DNA/RNA
 - explore the extent of the effect
 - activity, longevity, reproduction
 - outcome
 - nicotine radioprotection



Benoit and Lopez-Martinez 2012





Aim 2



Big picture experiment:

Transcriptomics, proteomics, and transgenerational effects

- genes involved
- explore
 transgenerational
 protective effects
 - grandfly babies



Significance

- Majority of radiotherapy side effects are due to free radicals
 - damage lipid, proteins, and DNA
 - long after irradiation event is over



- Conventional therapies are not efficacious
- Hormesis <u>is</u> effective at
 - heart attack recovery
 - reducing symptoms of Alzheimer's disease
 - neuroprotection
 - improved recovery from surgery



Significance

- already approved therapy for addiction
 - with multiple delivery methods
 - nicotine gum
 - patches
 - lozenges
 - nasal spray
 - inhalers
 - novel therapeutic purposes (post-irradiation recovery)



Innovation

- Nicotinic receptors (cholinergic receptors)
 - attention
 - cognition
 - focus
- Nicotine improves
 - fine motor movements
 - response time
 - alertness
 - memory





Innovation

 Nicotine protects against motor deficit in a Drosophila Parkinson's model





Innovation



• cheap development of a new therapy

• nicotine therapy available *over the counter*

• dosage and side effects have been extensively studied in *100s of animals*, including humans

• yield a *novel* treatment for radiotherapy

Summary

• exploring the hormetic potential of nicotine

• radiotherapy recovery treatment

results in a novel use