California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Melo-Jean C. Yap

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Nicotine Regulates PC2 Promoter Activity in GH3 Cells

Science Fair Use Only

S0330

Division
_ Junior (6-8) _X_ Senior (9-12)

Preferred Category (See page 5 for descriptions.)
3 - Biochemistry / Molecular Biology

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: This study will elucidate how nicotine becomes addictive at the molecular level by examining the interaction of nicotine with a pituitary cell line.
Materials and Methods: A somatotrope cell line called GH3 cells were transfected with the promoters of the prohormone convertase 2 (PC2), an enzyme found in neural and endocrine cells possessing a regulatory pathway in which the cell-specific hormone POMC can be processed. After the tranfection, nicotine was added at different dosages (10-4 M and 10-6 M) and time intervals (6 and 24 hours). The effect was measured by the luciferase activity assay.
Results: Samples treated with the higher dose (10-4 M) of nicotine exhibited significantly higher luciferase activity than those with the lower dose (10-6 M) of nicotine (T-test, $p < 0.05$). Longer (24 hours) incubation period also showed significantly higher luciferase activity than shorter (6 hours) incubation time (T-test, $p < 0.05$).
Conclusion: Nicotine regulates PC2 promoter activity in GH3 cells. Larger dosage (10-4 M) and shorter incubation time (6 hours) heightened the effect of nicotine in the samples. Higher level of luciferase activity corresponds to a higher rate of protein expression. These findings may explain how the body generates ACTH from POMC, stimulating the HPA-axis and producing a relaxing effect on the body, eventually causing smoking addiction.

Summary Statement (In one sentence, state what your project is about.)
This project elucidates that nicotine regulates the activity of PC2 promoters in GH3 cells.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Used lab equipment at Charles Drew University under the supervision of Dr. Friedman.