Rev Med Hosp Gen Méx. 2015;78(1):21–26

REVISTA MÉDICA DEL
HOSPITAL GENERAL
DE MÉXICO
www.elsevier.es/hgmx

ORIGINAL ARTICLE

Effect of MAOA promoter polymorphism and neuropsychological performance on psychopathy traits

C. Romero-Rebollar[a], F. Ostrosky-Shejet[a,*], B. Camarena-Medellín[b], M.A. Bobes-León[c], K.X. Díaz-Galván[a]

[a] *Laboratorio de Neuropsicología y Psicofisiología, Facultad de Psicología, Universidad Nacional Autónoma de México (UNAM), México, D.F., Mexico*
[b] *Instituto Nacional de Psiquiatría, Ramón de la Fuente Muñiz, México, D.F., Mexico*
[c] *Departamento de Neurociencia Cognitiva, Centro de Neurociencias de Cuba (CNEURO), La Habana, Cuba*

Received 16 December 2014; accepted 19 March 2015
Available online 7 April 2015

KEYWORDS
Monoamine oxidase A;
Neuropsychology;
Psychopathic personality;
Violence

Abstract
Introduction: Psychopathy is a personality disorder characterized by affective and antisocial traits. The defining features of psychopathy are risk factors to present violent behavior. It has been suggested that both orbitofrontal neuropsychological performance and genetic factors are fundamental for the development of psychopathy.
Objective: To assess the moderating role of MAOA genotype on the relationship between orbitofrontal function and psychopathy traits.
Methods: 66 adult male inmate subjects were assessed by an executive functions battery and the MAOA-uVNTR polymorphism was obtained. Multiple regression analysis was carried out to compare the group slopes according to the genetic variation of MAOA and to assess the effect of this variation in the relationship between orbitofrontal functioning and psychopathy traits.
Results: The relationship between low orbitofrontal neuropsychological performance and the presence of antisocial traits of psychopathy was stronger among the low activity of MAOA allele carriers.
Discussion: These findings were according to the previous studies about abnormal emotional processing and behavioral inhibition failures reported in subjects with genetic risk for violence, as well as with studies about neuropsychological performance in psychopaths. Further the MAOA genotype moderates the relationship between orbitofrontal functioning and antisocial traits of psychopathy which is a risk factor for violence.

* Corresponding author at: Facultad de Psicología, Universidad Nacional Autónoma de México, Av. Universidad # 3004, Col. Copilco-Universidad, Del. Coyoacán, C.P. 04510, México, D.F., Mexico. Tel.: +52 55 5622 2327; fax: +52 5 5251 76 56.
E-mail address: feggyostrosky@gmail.com (F. Ostrosky-Shejet).

http://dx.doi.org/10.1016/j.hgmx.2015.03.004

PALABRAS CLAVE
Monoamino Oxidasa A;
Neuropsicología;
Personalidad Psicopática;
Violencia

Efecto del polimorfismo MAOA y el desempeño neuropsicológico sobre rasgos de psicopatía

Resumen
Introducción: La psicopatía es un trastorno de la personalidad que se caracteriza por rasgos afectivos y antisociales. Se considera que los rasgos definitorios de la psicopatía son un factor de riesgo para presentar conductas violentas. Se ha sugerido que tanto el desempeño neuropsicológico orbitofrontal como los factores genéticos son importantes para el desarrollo de la psicopatía.
Objetivo: Evaluar el efecto moderador del genotipo MAOA en la relación entre función orbitofrontal y rasgos de psicopatía.
Método: 66 hombres adultos de población carcelaria fueron evaluados mediante una batería de funciones ejecutivas y se obtuvo el genotipo del polimorfismo MAOA-uVNTR. Se realizó un análisis de regresión múltiple para comparar las pendientes de regresión entre los grupos divididos de acuerdo a la variación genotípica de MAOA y evaluar el efecto de dicha variación sobre la relación entre función orbitofrontal y rasgos de psicopatía.
Resultados: Se encontró que la relación entre bajo desempeño orbitofrontal y el incremento en rasgos antisociales es más fuerte en los sujetos portadores del alelo de baja actividad de MAOA.
Discusión: Estos hallazgos se relacionan con los estudios acerca del procesamiento emocional alterado y fallas en inhibición conductual en sujetos con riesgo genético a la violencia, así como con los estudios sobre neuropsicología y psicopatía, además el genotipo MAOA modera la relación entre función orbitofrontal y rasgos antisociales de psicopatía, los cuales se consideran un factor de riesgo para la violencia.

Introduction

Psychopathy is a personality disorder characterized by interpersonal, affective, behavioral and lifestyle traits such as manipulation, grandiosity, glibness, shallow affect, lack of empathy and remorse, an impulsive and irresponsible lifestyle, and the persistent violation of social norms.[1] Since development and implementation of Hare's psychopathy checklist-revised (PCL-R[1]), the evaluation of this disorder has been improved. Psychopathy, as assessed by PCL-R, is related to interpersonal and affective personality features such as manipulation, pathological lies and lack of remorse, all together grouped in Factor 1 (F1). On the other hand the antisocial tendencies such as irresponsibility, impulsivity and criminal behavior are grouped in Factor 2 (F2).[2]

There is a clear relationship between psychopathy and hazardous behaviors such as violence, and it has been suggested that the deficiency of violence inhibitors such as empathy, emotional ties, low fear to punishment, egocentrism, self-justification and impulsivity facilitates the presence of violent behaviors in psychopaths.[3] Also, it has been proposed that the psychopathic personality in adolescence predicts antisocial behavior, aggression and the violation of law in adulthood.[4]

It has been suggested that the etiology of psychopathy has an important biological component. This idea arises by studies that demonstrate the contribution of genetic factors on the development of antisocial personality disorder (ASPD) that is closely related to psychopathy. In these studies genetic factors account for 50% of variance of ASPD.[5–8]

It has been demonstrated that genetic factors influence psychopathy traits such as antisocial behavior and detachment[9]; callous unemotional traits, and antisocial behavior when detachment is high[10]; cruelty in men with higher level of this over the time[11]; and cruelty, disinhibition and manipulation.[12]

A reason to relate genes of serotonergic system to psychopathy is the modulation of serotonin (5HT) on violence and impulsivity, namely there is a relationship between 5HT function and impulsivity in which the more impulsive offenders had more psychopathic traits.[13]

Monoamine oxidase A (MAOA) is an enzyme that catalyzes monoamines in brain and has affinity for 5HT. The MAOA gene is located in X chromosome (Xp11.4–Xp11.3).[14] A functional polymorphism of MAOA of variable number of tandem repetitions (MAOA-uVNTR) has been described. MAOA-uVNTR is a repetition of 30 base pairs sequence in the promoter region of gene that impacts the transcription in vitro. The expression of the enzyme is relatively higher in carriers of 3.5–4 repetitions (alleles MAOAH) and lower in carriers of 2, 3, 5 repetitions (alleles MAOAL).[15]

Studies about molecular genetics follow the same idea about the relationship between ASPD and psychopathy, particularly MAOAL allele is associated with psychopathy traits such as violence, ASPD, aggression and impulsivity.[16–23] Specific to psychopathy Fowler and colleagues[24] found an association between MAOAL allele and affective traits of psychopathy.

Neuropsychological findings about psychopathy suggest a frontal dysfunction,[25] specifically in ventromedial and