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## Editorial



Violent behaviors are alarmingly common in our society and are considered a public health problem. They range from domestic violence to street crimes. What moves human beings to hurt others, including relatives and/or strangers? Can these impulses and actions be prevented or controlled?

Some of the questions that neuroscience tries to answer is how an adaptive behavior, like aggression, can turn into violent behavior. Aggression has been defined as an adaptive, natural behavior that can be regulated by reinforcements and whose immediate goal is to provoke physical or psychological damage to another individual or object in order to survive and maintain the species.<sup>1</sup> When aggression is extreme, destructive, unjustified and not socially approved then is best considered as violence, which is more commonly related to human beings than animals. It has always been present in the human history and it is currently increasing significantly as a growing problem of mortality in Latin America and insecurity in Mexico. Therefore, it is useful to understand what contributes to increase the predisposition to be violently aggressive in order to improve its prevention and the existing methods for its regulation.

Different areas within neuroscience have focused on the study of violent and delinquent behavior, coinciding in that most of the criminals present the antisocial personality disorder (or sociopathy) and/or psychopathy.<sup>2,3</sup> According to the DSM-V,<sup>4</sup> sociopathy is considered a personality disorder and it is characterized by a generalized pattern of disregard and violation of the social rules and rights of others, beginning at least at 15 years of age. Individuals presenting these disorders show impulsivity, irresponsibility, lack of planning, mood changes, an increased need for immediate gratification, aggressiveness, and a low tolerance to frustration<sup>5</sup>. However, psychopathy differs from antisocial personality disorder in that individuals can elicit both reactive and proactive aggression acts by using manipulation, glibness, callousness, and a lack of empathy and guilt that allows them to reach their goals despite all costs. Previous studies have found that between 1% and 3% of the population and 15% and 25% of inmates qualify as psychopaths.<sup>6,7</sup>

Tovar and Ostrosky<sup>5</sup> make an etiological distinction between psychopathy and sociopathy, and conclude that

psychopathy has a predominant genetic origin,<sup>8</sup> whereas sociopathy is mainly acquired and can be subsequent to neural damage or to environmental conditions.<sup>9,10</sup> They state that 'neuronal sociopathy' results from brain damage or accidents (i.e. tumors, neurovascular diseases, neuronal detriments or traumatic brain injuries) in the frontal lobe, and especially within the ventromedial region of the prefrontal cortex.<sup>9,10</sup> Conversely, 'cultural sociopathy' may be acquired following detriments on the individual's psychosocial structure at vulnerable ages which facilitate his/her incorporation into a delinquent life-style,<sup>11,12</sup> as recently portrayed by the Mexican child killer aka 'El Ponchis'.<sup>5</sup>

The purpose of this special issue is to present experimental findings obtained in a community sample of phenotypically well-defined groups classified as violent as well as in forensic groups.

The authors used new technologies of molecular genetics, structural and functional brain imaging, quantitative electroencephalographic analysis and neuropsychological batteries to explore brain-behavior relationships in this population. Current research is aimed at the development of efficient treatment as well as preventive programs.

Romero, Ostrosky, Camarena, Díaz and Pérez explored the effect of MAOA-uVNTR polymorphism on the brain structure of violent subjects. The gray matter concentration of 47 adult male subjects from a community sample classified as violent or controls was assessed through DARTEL-voxel-based morphometry technique. They found that violent-low activity allele carriers had decrease of gray matter concentration in the right superior temporal pole compared to controls of the same allelic variation. This finding suggests that gray matter integrity in superior temporal pole could be a neurobiological correlate of the allelic association between MAOA-uVNTR polymorphism and violent behavior due to its implication in socio-emotional processing.

An important question regarding aggression and violence is related to sex differences in antisocial behavior. It has been well accepted that biological sex contributes significantly to aggression, men being generally more aggressive than women, particularly in a physical manner; however, the research by Castillo, Ostrosky, Camarena and Velez

focuses on analyzing not only biological sex but also how gender and specific genes contribute to violence and aggression.

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. Romero, Ostrosky, Camarena, Díaz and Pérez assess the moderating role of MAOA genotype on the relationship between orbitofrontal function and psychopathy traits.

Using a Quantitative Electroencephalogram, Ortega, Pérez and Ostrosky present the case of an inmate psychopath who has been in jail for three years accused of rape. The subject was evaluated with the Psychopathy Checklist-Revised (PCL-R) and Quantitative Electroencephalogram. Results showed a Theta excess and Alpha decrease, and the occipital Alpha medium frequency was below the norm according to the subject's age. Findings suggest a cortical hypoactivation.

Several studies have suggested that empathy is impaired in psychopathy, and as mentioned previously, psychopathy has been highly associated to violent and criminal behavior. Empathy is not a univariate concept; however studies about the role of empathy components in these population have not been conclusive and they are mostly made in forensic samples. Díaz, Ostrosky and Romero explore the relationships of psychopathy with empathy dimensions.

Neurosurgery has been applied as a treatment to solve psychiatric disorders since the beginning of the past century. As Jiménez, Garcia and Carrillo point out, it has been considered as an alternative in the treatment of mental disorders, due to the existence of a group of patients refractory or hard to control with conventional methods, the abundance of information regarding the physiopathologic brain substrate of mental disorders and the remarkable technological development that has transformed neurosurgery into a safer and more precise speciality. However, the authors stressed that neurosurgery for mental disorders must be revised from the ethical and moral perspective.

García-Muñoz, Carrillo-Ruíz and Jiménez-Ponce assessed if aggressiveness behavior as a symptom could be modified by stereotactic surgery. Amygdalo-hypothalamotomy by radiofrequency was used as single procedure in 9 patients; the results showed a significant decrease of aggressiveness behavior, transient somnolence was present in the entire group and permanent hemiparesia and urinary incontinence in one patient. Additionally, hypersexuality behavior decreased in 4 of 6 patients.

The last article focuses on prevention of violent behaviors rather than its remediation once it has become established. Violence is a complex phenomenon involving the interaction of biological, psychological, and social factors. Among these factors, executive functions (EF) and dysfunction of the frontal lobes have been given special emphasis. It has been hypothesized that cognitive disorders, such as impulsivity, poor planning, mental inflexibility, low verbal intelligence, and alterations in attention, predispose subjects to feelings of frustration and anxiety, difficulty in emotional regulation

and finally an increased risk of aggressive or violent behavior.

In order to develop a program which could prevent violent behaviors in risk Mexican populations Brito, Lozano, Ostrosky, González and Aguilera conducted a study to evaluate the effects of the Programa de Entrenamiento Materno-Infantil: Enfoque Neuropsicológico (PREMIEN). A pre and post assessment of children's perception of parenting style of his mother and the development of executive functions were performed. Compared with the control group they documented changes in perception of parenting style by children whose mothers attended the PREMIEN program at post test. There was also an increase in their scores on tasks of executive functions. Educational interventions that provide mothers with strategies and knowledge regarding the cognitive and emotional development of their preschool children have an impact on mother-child relationship, promoting interpersonal affective behavior and mother responsiveness to the needs of their children. This kind of program may also promote the development of self-control and regulation of children, which allow them a functional social adjustment, thus preventing the onset of antisocial behavior.

The phenomenon of violence has risen significantly in recent years as well as the number of research aimed at studying its neurobiological bases. In order to treat adequately violent individuals as well as to develop preventive programs it is important to understand how the brain, environment and genetics interact in violent individuals. We hope that the results of the studies published in this volume will help with this endeavor.

## References

1. Ostrosky F. Conducta Violenta y sus Bases Biológicas: Neuroimagen, Neuropsicología, Electrofisiología y Genética. In: García E, editor. *Fundamentos de Psicología Jurídica y Forense*. Oxford University Press; 2012.
2. Dolan M, Park I. The neuropsychology of antisocial personality disorder. *Psychol Med*. 2002;32:417-27.
3. Blair RJR. The amygdala and ventromedial prefrontal cortex in morality and psychopathy. *Trends Cogn Sci*. 2007;11(9): 214-26.
4. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 5th ed. Washington, DC: American Psychiatric Association; 2014.
5. Tovar J, Ostrosky F. *Mentes Asesinas ¿eligen el mal?* México: Editorial Manual Moderno; 2013.
6. Arias N, Ostrosky F. Evaluación neuropsicológica en internos penitenciarios mexicanos. *Rev Chil Neuropsicol*. 2010;5(2):113-27.
7. Raine A, Ishikawa S, Arce E, et al. Hippocampal structural asymmetry in unsuccessful psychopaths. *Biol Psychiatry*. 2014;55:185-91.
8. Viding E. Evidence for substantial genetic risk for psychopathy in 7-year-olds. *J Child Psychol Psychiatry*. 2005;46: 592-7.
9. Anderson SW, Bechara A, Damasio H, et al. Impairment of social and moral behavior related to early damage in human prefrontal cortex. *Nat Neurosci*. 1999;2:1032-7.
10. Damasio AR, Tranel D, Damasio H. Individuals with sociopathic behavior caused by frontal damage fail to respond automatically to social stimuli. *Behav Brain Res*. 1990;41:81-94.

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11. Krischer M, Sevecke K. Early traumatization and psychopathy in female and male juvenile offenders. *Int J Law Psychiatry*. 2008;31(3):253–62.
  12. Luntz BK, Widom CS. Antisocial personality disorder in abused and neglected children grown up. *Am J Psychiatry*. 1994;151:670–4.

F. Ostrosky (PhD)  
*Head Neuropsychology and Psychophysiology Lab, Faculty  
of Psychology, National University of Mexico, Mexico*  
E-mail address: [Feggy@unam.mx](mailto:Feggy@unam.mx)  
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