



## Editorial

# TIC Disorder: Definition, Clinical Contexts, Differential Diagnosis, Neural Correlates and Therapeutic Approaches

### Giulio Perrotta\*

Department of Criminal and Investigative Psychology UNIFEDER, Jurist sp.ed SSPL, International Essayist, Italy  
**\*Corresponding author:** Dr. Giulio Perrotta, Psychologist sp.ing in psychotherapy with a strategic approach, Forensic Criminologist expert in sectarian cults, esoteric and security profiles, Director of the Department of Criminal and Investigative Psychology UNIFEDER, Jurist sp.ed SSPL, International Essayist, Italy; website: [www.giulioperrotta.com](http://www.giulioperrotta.com)

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## Abstract

Starting from the categorical definitions of “TIC disorder”, we proceeded to list the individual forms provided by the DSM-V, with a particular focus on clinical, neurobiological and therapeutic profiles, concluding the analysis of the possible strategies to be used to finalize the resolutions to problems arising from the disorder in question.

## Editorial

### 1. Definition and Clinical Context of TIC Disorder

“TIC” means all those stereotyped movements, without a specific purpose, that the individual performs without having control over them and any attempt to control it causes further psychological and muscular tensions in the form of violent contractions. Since the twitchy movements are like the caricature of voluntary movements, they often arouse the hilarity in those who assist you. This embarrasses and humiliates the person who suffers and encourages parents, relatives and adults in general to blame those who suffer, inviting them

to avoid this type of movement. An imperious need precedes reproaches and invitations that necessarily fall on deaf ears as the execution of the tics. Therefore, when the subject tries to oppose this need, he feels a growing malaise that decreases, at least momentarily, only when he gives vent to the dull movement. For this reason, tics are certainly voluntary, but they are also unreliable [1,2]. For this reason, ICT is considered a movement disorder. Tics disappear during sleep and sometimes diminish considerably until they almost go when the subject is very relaxed or distracted. Tiny movements increase when the item is more tense, worried, nervous, or when he is in an inactive attitude: for example, when he is in front of the TV or a movie theatre. They decrease when the person is very relaxed or busy [2].

From the generic but precise definition accepted by the scientific community, as “rapid, repetitive, coordinated and stereotyped movement, repeated in mimicry and gestures, which presents itself in relation to the subject’s tension without being able to be hindered by the will” [3], we must distinguish the chronic and debilitating form of the Gilles de la Tourette

Syndrome, where there is the joint presence of multiple tics, falling into the various categories described below, which make this anomaly more burdensome [4].

From the clinical point of view, ICT is divided into “simple”, “complex”, “transient” and “chronic” [5].

The “simple motor tics” include winking, neck twisting, shrug, grimacing of the face, coughing, while “simple vocal tics” include scraping the throat, grunting, “sniffing”, binge, and both forms have the following characteristics: a) they are involuntary, sometimes they can be subject to voluntary suppression (even if with great effort); b) are stereotyped and repetitive, with fluctuating frequency; c) are present in some circumstances, but not in others (for example at home and not at school); d) are absent when the subject is concentrated; e) are predominantly charged to the face and neck; f) they are more frequent in males than in females; g) last from a few weeks to less than a year, and as such are considered transient; h) they mainly concern children, but it is not rare to see adults with these forms mainly caused by particular tense psychological moments [2].

The “complex motor tics” concern movements such as miming, jumping, touching, stamping, smelling an object, while the “complex vocal tics” concern the repetition of words and phrases out of context, in severe cases coprolalia, or the use of obscene words, and the echolalia (repetition of sounds, words or phrases last heard), and both forms have the following peculiarities: a) they are complex motor sequences that take on the meaning of gestures and involve up to three groups muscles at the same time; b) vocal sequences which consist in the emission of elementary sounds; c) have a tendency to become chronic and affect both children and adults [2].

The “transient tics” concern involuntary movements that have a duration of less than a year and usually occur in children with a peak between the ages of 5 and 9 but manifest themselves in the fullness of the clinical form in the phase of childhood and adolescence ; the most affected parts of the body are the eyes, the

face, the neck, the shoulders and the arms. The most common symptoms are blinking and other facial tics, shaking of the upper limbs and trunk, repeated touching of objects or parts of the body; about vocal tics, there are familiar guttural sounds, sniffing, coughing. The symptoms may fade or disappear for entire periods, reappearing easily and becoming more pronounced in times of stress. Those who have a duration of more than a year and can be accompanied by new tics are instead “chronic tics”. The age of onset is always between 5 and 9 years, with a peak incidence around seven years, but continues throughout the evolutionary phase of the individual; males are affected with a frequency three times greater than females. The most serious and debilitating chronic form is Tourette Syndrome, defined as a neurological disorder, characterised by multiple motor tics and one or more vocal-type tics, which occur many times a day or intermittently for a longer period one year, during which there was no period of more than three consecutive months without tics. Motor tics consist of uncontrolled movements of the head and other parts of the body, such as the trunk, upper and lower limbs. Complex tic motors can also be present, such as touching, crouching, taking steps back, doing pirouettes. Vocal tics include words, sounds, snaps of the tongue, grunts, yelps, sniffing, coughing, coprolalia. The symptoms most frequently associated with Tourette Syndrome are: obsessive and stereotyped thoughts, repetition of what has just been said, mental coprolalia, compulsions concerning the touching of objects and parts of one’s own body and others, to reproduce complicated movements, or concerning gestures such as crush feet, trample or jump strips, touch edges, impulsion to imitate the movements of others (isolines), hyperactivity, distractibility and impulsiveness. All these manifestations cause a significant malaise and discomfort, which compromise the normal performance of activities that require particular concentration, such as reading and writing.

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) reclassified Tourette and tic disorders as motor disorders listed in the category of neurological developmental disorders, removed the word “stereotyped” from the definition of tic to distinguish better between stereotypies and tics,

it replaced the transient tic disorder with temporary tic disorder and replaced the criterion that tics occur almost every day with persistence for more than a year. More extended periods (months) without tics allow more to have Tourette's Disorder or a persistent (chronic) Tic Disorder. The DSM-V, however, also categorizes the hypothesis of "transitory tics not otherwise specified: it is all those engine and/or vocal tics that do not satisfy all the criteria to fall into one of the categories described above (for example the tics last less four weeks, or the onset occurs after twenty years of age) [5].

So far, the involuntary nature of tics appears from the clinical description of the symptoms; in reality, the best explanation is that of the "semi-volunteers" [6], because they are not strictly involuntary: they can be experienced as a voluntary response to the unwanted premonitory impulse. A unique aspect of tics, compared to other movement disorders, is that they are suppressible but irresistible [7]; they are experienced as an irresistible impulse that must ultimately be expressed [6]. Tics can increase due to stress, fatigue, boredom or high-energy emotions, which can include negative emotions, such as anxiety, as well as positive emotions, such as excitement or anticipation. Relaxation can lead to an increase in tic (for example, watching television or using a computer), while concentration on an absorbing activity often leads to a reduction in tics [8,9].

Immediately before the onset of tic, most individuals are aware of an impulse similar to the need to yawn, sneeze, blink or scratch an itch. Individuals describe the need for spasms as an accumulation of tension that they consciously choose to release, as if "they had to". Examples of this premonitory impulse are the feeling of having something in the throat or a localised discomfort in the shoulders, leading to the need to clear the throat or shrug the shoulders. The real tic can be felt like a relief from this tension or sensation, similar to scratching an itch. Another example is blinking to relieve an unpleasant sensation in the eyes. Some people with tics may not be aware of the premonitory impulse. Children may be less aware of the premonitory impulse associated with tics than adults, but their

awareness tends to increase with maturity. Complex tics are rarely seen in the absence of simple tics. Tics "can be difficult to differentiate from compulsions", as in the case of klazomania (compulsive cries). While many tics, such as clearing the throat and blinking, are usual among populations, some tics represent a disorderly psychiatric behaviour [10-12].

With reference to the clinical profiles of possible differential diagnoses, dystonia, paroxysmal dyskinesias, chorea, other genetic conditions and secondary causes of tic should be excluded in the differential diagnosis. Conditions other than Tourette syndrome that can manifest tics or stereotyped movements include developmental disorders, autism spectrum disorders and stereotyped movement disorder; Sydenham Korea; idiopathic dystonia; and genetic conditions such as Huntington's disease, neuroacanthocytosis, pantothenate-kinase-associated neurodegeneration, Duchenne muscular dystrophy, Wilson's disease and tuberous sclerosis. Other possibilities include chromosomal disorders such as Down syndrome, Klinefelter syndrome, XYY syndrome and fragile X syndrome. Acquired tic causes include drug-induced tics, head trauma, encephalitis, stroke, and carbon monoxide poisoning. TSH levels can be measured to rule out hypothyroidism, which can be a cause of tics. Brain imaging studies are generally not guaranteed. In adolescents and adults who have a sudden onset of tic and other behavioural symptoms, a drug screen for cocaine and stimulants may be needed. If a family history of liver disease is present, serum copper and ceruloplasmin levels may rule out Wilson's disease. Repetitive movements such as compulsions caused by the obsessive-compulsive disorder may appear as tics. Individuals with Obsessive-Compulsive Disorder (OCD) may have features typically associated with a tic disorder, such as compulsions that may resemble motor tics. The "DOC related to Tic" is hypothesised to be a subgroup of the DOC, distinct from the DOC not related to tic from the content and type of obsessions and compulsions; individuals with tic-related obsessive-compulsive disorder have more intrusive thoughts and show more hoarding and counting rituals than individuals with non-tic-related OCD. Finally,

tics must also be distinguished from fasciculations. Small contractions of the upper or lower eyelid, for example, are not tics, because they do not involve an entire muscle. They are contractions of some bundles of muscle fibres, which can be felt but just seen. These contractions of the eyelids also differ from tics in that they are not suppressible, are strictly involuntary and tend to fade after a day or two [13-18].

## **2. The Etiopathology and the Neural Correlates in TIC Disorder**

The most shared position in the scientific community is that of multifactorial etiopathology. Since the presence, the accentuation or the sharp decrease of the symptomatology is often related to a greater malaise or well-being of the child and of the adult, for which they can worsen in a condition of stress, of fatigue, of intense emotion and anxiety, for many authors tics, when they do not depend on an evident organic lesion, are a way to download, through movement, anxiety, tension and inner conflict due to an emotional discomfort, due to family, social and professional difficulties or school; sometimes they conceal a repressed aggression [2].

With reference to the neural correlates, the most consolidated thesis speaks of a direct involvement of the basal ganglia and the dopaminergic system, deep structures of the brain that are involved in an essential number of motor and cognitive functions and, specifically, a modification of the procedures of the systems that connect these structures with the motor cortex [2]. A recent Italian study has shown that there is an anomaly in the functioning of the primary motor cortex, where the movements and tics originate and if there are anomalies in the way in which the other brain areas control the exercise of this cortex, with particular reference to the nuclei of the base. The results showed the existence of a mechanism that indicates a “tug of war” between the different brain areas that control the primary motor region: if the control coming from the pre-motor regions prevails, i.e. the high-level motor regions of the lobe frontal, then the disorder is milder; vice versa, if the connections presented by the subcortical structures prevail then the symptoms are more serious. The higher the imbalance between pre-motor connections and subcortical connections to the

primary motor cortex, more severe problems and motor symptoms of the syndrome, such as tics, measured in this case with a scale, the Yale Global Tic Severity Scale, a questionnaire that classifies the severity of the syndrome based on the number, frequency, complexity and intensity of tics and their impact on the quality of life of the patient [19]. Another recent Italian discovery concerns the attention of a hormone in the brain: acute stress increases tic-like manifestations through the intervention of “allopregnanolone”, a stress hormone produced in the brain, administering allopregnanolone to animals, it increases tics, and on the contrary, drugs that stop the synthesis of this hormone reduce the frequency and intensity of involuntary movements [20].

## **3. Clinical Strategies for the Management of the Disorder**

To reduce the severity and frequency of this anomaly, subjects are treated with a haloperidol medicine, which is useful in most cases. In reference instead to the relational aspects, since the main objective should be to decrease the inner tension of the subject that suffers from this pathology, it is good to avoid reproaching, underlining or worse punishing, the child or the adult who performs such movements. These behaviors would do nothing but accentuate the discomfort. Autogenic training exercises and psychotherapy sessions can also be useful [2].

Research shows that cognitive behavioural therapy (TCC) is the most effective treatment for solving the problem [21]. The therapy program is generally structured according to these phases:

- a) “self-monitoring”: to obtain information on tics taking note of the circumstances in which they experience, with frequency, duration, emotions and a state of mind.
- b) “reinforcement”: based on the theory of operant conditioning, a program of rewards and incentives is built with people to encourage alternative behaviour and/or control of tics.
- c) “massive practice” and “habit reversal training”: the patient voluntarily performs the typical movements of tics in the most realistic way possible or opposite incompatible



behaviours, for specific periods interspersed with periods of rest, preferably in front of the mirror. The person develops reactive inhibition of tics due to muscle fatigue due to movement [22].

d) “relaxation”: always used in behavioural treatments, it involves different techniques (guided imagery, autogenic training, mindfulness, focused attention, hypnosis, etc.). Progressive muscle relaxation often monitored by the biofeedback device, is preferred.

Very useful are then specific training on self-esteem, social skills and assertiveness, to enhance the person’s relational abilities and lower discomfort. However, cognitive-behavioural therapy always promotes autonomy and capacity building, encouraging the person with tics and family members to play an active role during all stages of treatment and is, therefore, the most appropriate approach..

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