

## Case report of rabies-induced persistent mental symptoms

Xiaoqing WANG<sup>1,2</sup>, Xiaowen YU<sup>1</sup>, Yangtai GUAN<sup>2\*</sup>

**Summary:** Rabies is a viral infection with a high case fatality rate. Typical symptoms of rabies include hydrophobia, pharynx muscle spasms, and progressive paralysis. Rabies-induced persistent mental disturbances are rare. Here we report a 22-year-old male who was infected with rabies after being attacked by a dog. He did not receive rabies vaccine immediately after the incident and was only provided with non-standard treatment at a local clinic. A week later he became disorientated, paranoid, and aggressive. One month after the attack, rabies antibody was found in his cerebrospinal fluid and a Magnetic Resonance Imaging (MRI) examination of his head revealed abnormal signals in the putamina, caudate nucleus, and insula. His mental symptoms persisted for six years and his daily functioning was severely impaired, but his vital signs were stable without signs of brain stem damage. Six years after the incident, a repeat MRI showed brain atrophy.

**Key words:** Rabies; mental symptoms; brain atrophy; China

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### 1. Case history

A 22-year-old male patient was brought to the hospital reporting psychological symptoms that had lasted for more than 6 years. He was bitten by a dog when he was 16 (in 2008) and developed fever, delirium, poor orientation, and confusion three days later. He was given antipyretic treatment at the local village clinic but was not given a rabies vaccine. One week after the incident, he began to show mental symptoms such as poor orientation, paranoia, and delirium. He could not recognize his family members and attacked his parents. One month after the incident, rabies antibody was found in his cerebrospinal fluid at a third tier hospital. Routine laboratory tests showed no other abnormal results. Antiviral therapy was provided. His cranial Magnetic Resonance Imaging (MRI) results at the time are shown in Figure 1a: abnormal signals were found in his bilateral caudate nucleus, lenticular nucleus, and insula.

His mental symptoms persisted and severely affected his social functioning. At the time of the current admission (6 years after the incident), the patient showed low muscular tension of the limbs, normal muscle strength, tendon hyperreflexia, positive pathological reflexes of both lower limbs, unstable gait, and involuntary movements of the upper limbs. The patient wore dirty clothes and did not cooperate

with the examination. He was agitated, acted inappropriately, and had slurred speech. He was not fully orientated to time and place and had difficulty concentrating on the interviewer's questions. He had no apparent physical diseases and the family reported no history of allergies. He had normal vital signs (body temperature=37.3°C, pulse= 89/min, breath=20/min, blood pressure=120/70mmHg) and no abnormal results were found from his physical examination. His four limbs showed no atrophy. He had a slightly elevated level of white blood cells but routine laboratory tests showed no other abnormality. Head MRI showed brain atrophy (Figure 1b). Based on the above results and his symptoms, he was diagnosed with residual mental symptoms due to rabies encephalitis.

### 2. Discussion

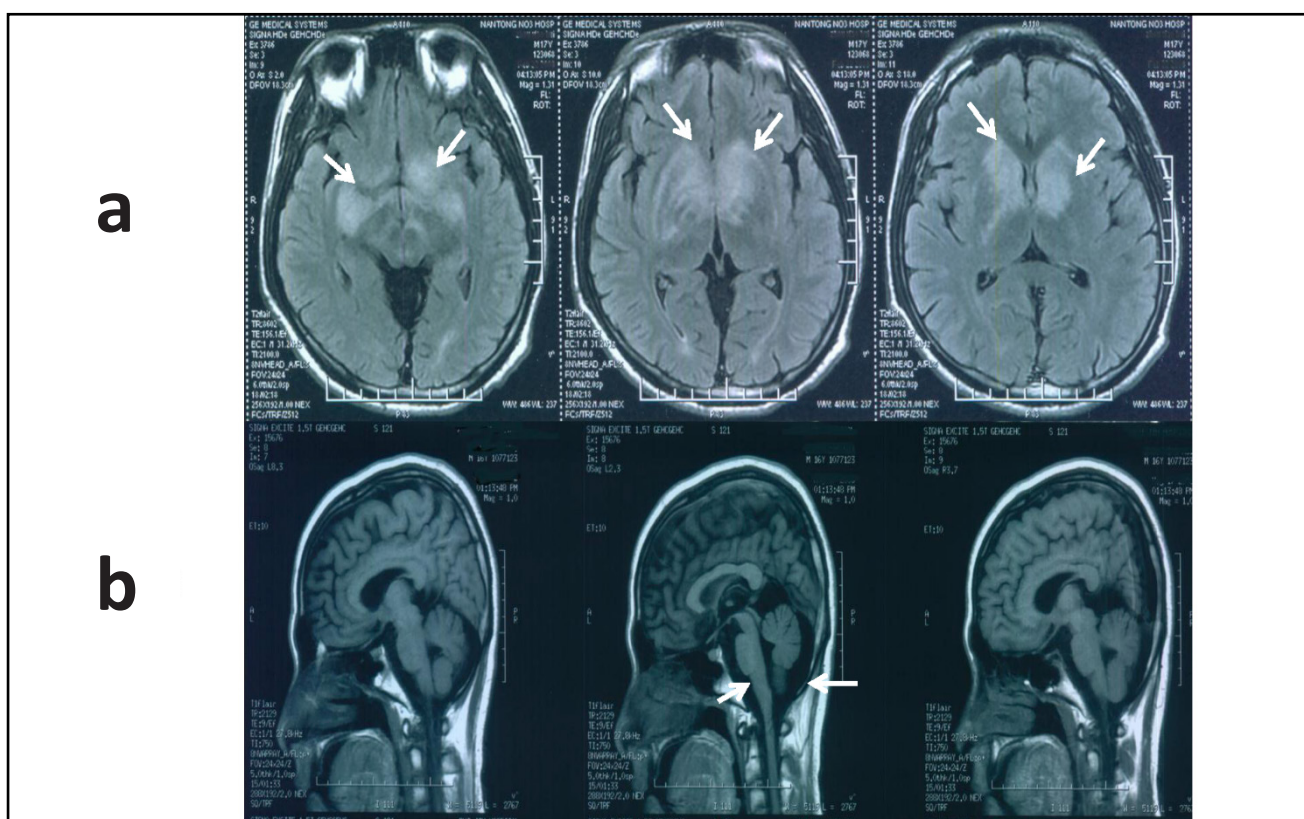
In China, rabies is more commonly seen in rural areas where people are more frequently exposed to domestic animals.<sup>[1,2]</sup> In these areas, local medical infrastructure is usually poor, so treatment is often not provided promptly. The incubation period of rabies is usually within three months. The length of the incubation period is related to age, the site of the wound (a shorter incubation period is seen for those who were bitten in the head or face), the depth of the wound, and the

<sup>1</sup> Department of Neurology, Changhai Hospital, Shanghai Second Military Medical University, Shanghai, China

<sup>2</sup> Department of Neurology, Renji Hospital, Shanghai Jiaotong University, School of Medicine, Shanghai, China

\*correspondence: [yangtaiguan@126.com](mailto:yangtaiguan@126.com)

**Figure 1. MRI results of the patient one month after being bitten (panel 1a) and six years after being bitten (panel 1b)**



load and strength of the virus.<sup>[1]</sup> Non-thorough cleaning of the wound, other injuries, cold, and stress can also contribute to a shorter incubation period. After the incubation period, the typical clinical course of rabies, which usually lasts no longer than one month, can be divided into three stages.<sup>[3,4]</sup> (a) In the Prodromal Stage most patients have a fever, some have other flu-like symptoms, and many experience abnormal sensations around the wound such as numbing, pain, itching and formication. (b) In the Excitative Stage patients are hydrophobic and can show paroxysmal spasm of the pharyngeal muscle, difficulty breathing, difficulty urinating and defecating, hidrosis, and hydrostomia. And (c) in the Paralytic Stage patients become quiet and develop flaccid paralysis, particularly in the limbs; if facial muscles are be involved, this can cause irregular eye movements, mandible straining, mouth slacking, and lack of facial expression.

This patient's initial symptoms were high fever and changes of consciousness followed by decreased muscular tension of the limbs without typical hydrophobic symptoms. His family members indicated that at the time of the original injury he was not given rabies vaccine. Approximately one month later, rabies antibody was found in his cerebrospinal fluid, confirming the diagnosis of rabies. In this case, however, the course of illness was atypical. The patient did not progress to the Excitative or Paralytic stage of rabies but, rather, continued to manifest mental symptoms of

disorientation, disorganization, and unusual behavior. Six years after he was initially bitten, there was no improvement of his mental symptoms and his cranial MRI showed signs of brain atrophy, which is presumably secondary to rabies encephalitis. The primary damage was found in the insula, which can explain his mental symptoms. There were also abnormalities in the caudate nucleus and lenticular nucleus, which probably explain his extrapyramidal symptoms.

Rabies is currently prevalent in many places around the world, especially in underdeveloped areas where effective prevention and control methods are limited. Rabies is a disease with a high case fatality rate. After the central nervous system is infected, the subsequent encephalitis is often life-threatening. Once the rabies symptoms manifest, there is no effective treatment. However, as this case demonstrates, the clinical phenotypes of rabies can vary. This variability in presentation may cause misdiagnoses and delayed treatment – which can be fatal; so it is essential to be very careful in collecting the history of the early course of the condition.<sup>[5,6]</sup> For example, paralysis usually develops from the lower limbs and then spreads to respiratory muscles; a pattern of symptoms that can be confused with Guillain-Barré syndrome.<sup>[7,8]</sup> MRI may help find rabies at the early stages.<sup>[9,10]</sup> This case shows that mental symptoms may be the most prominent presenting symptoms, so psychiatrists and neurologists must always include rabies on the list of differential

diagnoses they consider when evaluating new patients, particularly those from rural communities.

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#### Conflict of interest

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### 狂犬病毒致持续性精神症状一例

王晓晴, 于晓雯, 管阳太

**概述:** 狂犬病是一种致死率很高的病毒性传染疾病。狂犬病的典型症状包括恐水症、咽肌痉挛和进行性瘫痪。狂犬病所致的持续性精神障碍较为罕见。这里报道一名 22 岁的男性狂犬病患者。该患者自被病狗咬伤后, 没有立即接种狂犬病疫苗, 而只是在当地诊所不规范治疗。一周后, 患者出现定向障碍、偏执, 并表现出攻击性。咬伤后一个月, 患者脑脊液中检测到狂犬病病毒抗体, 头颅磁共振成像 (MRI) 显示豆状核、

尾状核以及岛叶异常信号影。患者的精神症状持续了 6 年, 生活不能自理, 但生命体征平稳, 无脑干受损表现。发病 6 年后再次检查头颅 MRI, 检查结果为脑萎缩。

**关键词:** 狂犬病; 精神症状; 脑萎缩

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Xiaqing Wang received a bachelor's degree in medicine from Shanghai Jiao Tong University School of Medicine in 2012. She has worked in the Department of Neurology of Shanghai Chang Hai Hospital since 2012. Her main research interests are stem cell transplantation in the treatment of multiple sclerosis and cerebral vascular endothelial cell injury and its protective mechanism.