

# A Case of Cat Scratch Disease Neuroretinitis Confirmed by Polymerase Chain Reaction

Atsuki Fukushima\*, Michiko Yasuoka\*, Masato Tsukahara<sup>†</sup> and Hisayuki Ueno\*

\*Department of Ophthalmology, Kochi Medical School, Kochi, Japan;

<sup>†</sup>Faculty of Health Sciences, Yamaguchi University School of Medicine, Yamaguchi, Japan

---

**Background:** Cat scratch disease neuroretinitis is caused by infection by *Bartonella henselae*. To demonstrate *B. henselae* infection, serologic examination is commonly used, but sometimes serologic examination is not adequate for correct diagnosis. Here we present a case of cat scratch disease neuroretinitis confirmed by polymerase chain reaction in addition to serologic examination.

**Case:** A 55-year-old woman, presenting with headache and high fever, had noticed visual disturbance. The best-corrected visual acuity in her right eye was 0.01. Meningitis, optic neuritis and retinitis were observed and she was treated with oral prednisolone. After repeated questioning, the patient remembered being scratched by a cat. Systemic examination focusing on *B. henselae* infection was conducted and *B. henselae*-specific immunoglobulin (Ig) G, but not IgM, was detected in both serum and cerebrospinal fluid. To confirm *B. henselae* infection, polymerase chain reaction (PCR) analysis using cerebrospinal fluid was performed and the presence of *B. henselae*-specific DNA was demonstrated. From these results, we diagnosed cat scratch disease neuroretinitis and treated the patient with minocycline hydrochloride together with prednisolone. Following this treatment regimen, the patient's condition improved, and the best-corrected visual acuity in her right eye increased to 0.6 five months after the onset.

**Conclusion:** The PCR technique is useful to correctly diagnose cat scratch disease neuroretinitis, if patients exhibit marginal data on *B. henselae*-specific antibody titer. **Jpn J Ophthalmol 2003; 47:405–408** © 2003 Japanese Ophthalmological Society

**Key Words:** *Bartonella henselae* infection, cat scratch disease neuroretinitis, polymerase chain reaction.

---

## Introduction

Cat scratch disease, which was initially reported in 1950 by Debre et al,<sup>1</sup> manifests lymph node swelling and fever. It was demonstrated that infection by *Bartonella henselae* causes cat scratch disease. To ascertain *B. henselae* infection, serologic examination is most commonly used, yet there are patients exhibiting borderline values of *B. henselae*-specific antibody titer.<sup>2</sup> Polymerase chain reaction (PCR) theoretically amplifies a minute amount of DNA, and recently this approach has been applied to diagnose cat scratch disease.<sup>3,4</sup> To the best of

our knowledge, there has been only one publication reporting this method to diagnose cat scratch disease neuroretinitis.<sup>5</sup> Here, we report a case of cat scratch disease neuroretinitis confirmed by the PCR method together with serologic examination.

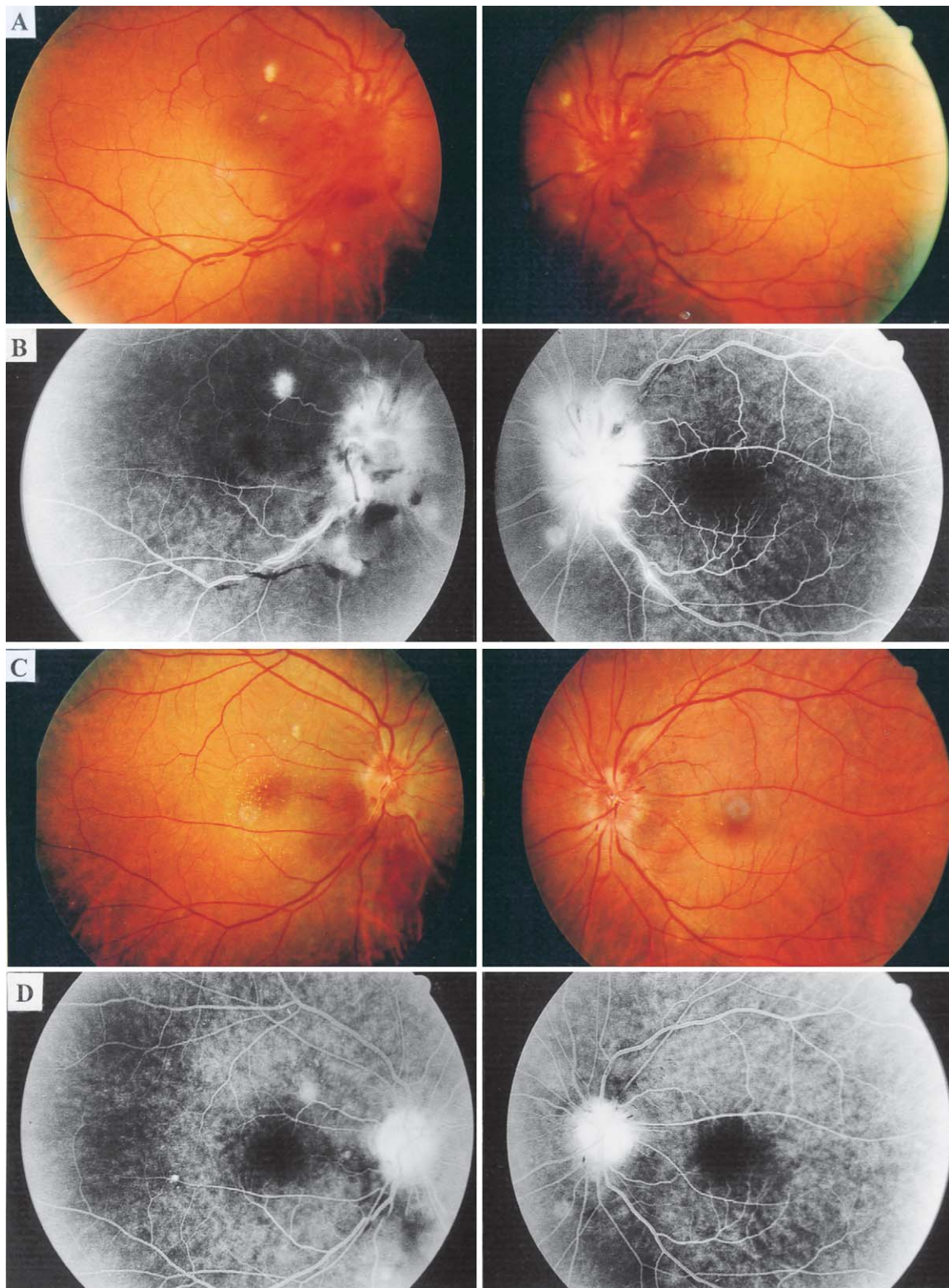
## Case

A 55-year-old woman, presenting with headache and high fever, was treated at a local hospital with ceftriaxone sodium. Following these symptoms, she noticed visual loss, OD. Her general condition did not improve and she was referred to another hospital 1 week after the onset. Optic neuritis and meningitis were indicated. Best-corrected visual acuity was 0.03 OD and 1.0 OS. One day later, she was referred to our department for further

---

Received: October 2, 2002

Correspondence and reprint requests to: Atsuki FUKUSHIMA, MD, PhD, Department of Ophthalmology, Kochi Medical School, Kohasu, Oko-cho, Nankoku-shi, Kochi-ken 783-8505, Japan. Tel.: 81-88-880-2391; fax: 81-88-880-2392; E-mail: fukushima@kochi-ms.ac.jp



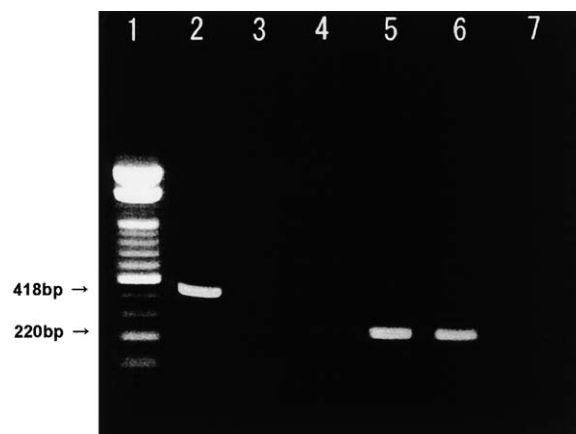
**Figure 1.** (A) Fundus photographs at first visit by a 55-year-old woman whose disease was confirmed by polymerase chain reaction as cat scratch disease neuroretinitis. (B) Results of fluorescein angiography at first visit. (C) Fundus appearance after treatment with minocycline hydrochloride and prednisolone. (D) Results of fluorescein angiography after treatment.

examination. At the initial visit, best-corrected visual acuity was 0.01 OD and 1.0 OS. Optic neuritis and retinal exudates in the posterior pole were noted in both eyes, whereas mild iridocyclitis, retinal and vitreous hemorrhage and macular edema were observed in the right eye (Figure 1A). Fluorescein angiography showed leakage from both optic discs and hyperfluorescence in the area concordant with retinal exudates (Figure 1B). Systemic investigation including lumbar puncture was performed. Complete blood cell count showed a leukocytosis (11,000 per  $\mu\text{L}$ ) consisting of 67% neutrophils. C-reactive protein was within normal range. Cytology of cerebrospinal fluid (102/3  $\text{mm}^2$ ) suggested infectious meningitis. Therefore, we started treatment with 50 mg of prednisolone together with cefpirome sulfate. One week after the treatment was begun, best-corrected visual acuity was 0.04 OD and 1.0 OS. After repeated questioning, the patient recalled that her left wrist had been scratched by a cat. Then, systemic check-up focusing on *B. henselae* infection was conducted. Immunoglobulin (Ig) G titers of serum and cerebrospinal fluid against *B. henselae* were 1: 128 and 1: 4, respectively, while IgM titers were below detectable level.

To confirm *B. henselae* infection, we performed PCR to detect *B. henselae* DNA in a sample of the patient's cerebrospinal fluid.<sup>3,4</sup> The primer pairs used were 5'GAT-TCAATTGGTTTGAAGGAGGCT'3<sup>3</sup> and 5'TCACAT-CACCAGGACGTATTC'3<sup>3</sup> (predicted size of product: 418 bp) and 5'AATGATGTCCGTGATCTAGC'3,<sup>4</sup> and 5'CATCAGAAGGAGCAACAATC'3<sup>4</sup> for nested PCR (predicted size of product: 220 bp). The size of the amplified product obtained was the same as the predicted size of *B. henselae* DNA shown in positive controls<sup>3,4</sup> (Figure 2). The patient's disease was diagnosed as cat scratch disease neuroretinitis and she received oral minocycline hydrochloride for 4 weeks. Two weeks after minocycline hydrochloride and prednisolone treatment, findings of optic neuritis such as disc swelling (Figure 1C) and fluorescein leakage from the optic disc (Figure 1D) decreased and best-corrected visual acuity increased to 0.15 OD and 1.0 OS. No recurrence has been noted and the best-corrected visual acuity in her right eye became 0.6, five months after the onset.

## Discussion

To date, numerous ophthalmological findings have been reported in patients with cat scratch disease. In particular, neuroretinitis is sight-threatening and, therefore, it is important to diagnose cat scratch neuroretinitis correctly. As noted in this case as well as in others, papillitis, retinitis and iridocyclitis are major findings. There are several ocular diseases exhibiting findings similar to



**Figure 2.** Agarose gel electrophoresis of polymerase chain reaction (PCR) products. Lane 1: 100-bp molecular size marker. Lane 2: first PCR product (418 bp) from positive control (DNA from *Bartonella henselae* ATCC 49882). Lane 3: first PCR product from cerebrospinal fluid of the patient. Lane 4: first PCR product from negative control. Lane 5: nested PCR product from positive control (220 bp). Lane 6: nested PCR product from cerebrospinal fluid of the patient. Lane 7: nested PCR product from negative control.

cat scratch disease. Because cat scratch disease is caused by *B. henselae* infection, detection of *B. henselae* is a hallmark for diagnosis. Previously, serologic examination was the major approach, yet borderline values of *B. henselae*-specific antibody titer have been noted in some patients, depending on levels of *B. henselae*-specific immunity.<sup>2</sup>

Recently, the PCR technique has been applied for diagnosis of cat scratch disease.<sup>4,5</sup> Taking advantage of this method, which is able to amplify a single copy of *B. henselae* DNA to 2 cycle numbers, the presence of a minute amount of *B. henselae* could be revealed. In this case, *B. henselae* immunoglobulin titers in both serum and cerebrospinal fluid had led to a strong suspicion of cat scratch disease. To further confirm *B. henselae* infection, PCR was conducted and *B. henselae* DNA was detected in cerebrospinal fluid.

To the best of our knowledge, only one case has been reported demonstrating the presence of *B. henselae* by PCR in cat scratch disease neuroretinitis.<sup>5</sup> In the previous report, the patient exhibited remarkable swelling of lymph nodes and, therefore, aspirates from lymph nodes were used for PCR.<sup>5</sup> On the contrary, our case did not exhibit apparent swelling of lymph nodes. However, headache and high fever indicated meningitis, leading us to examine cerebrospinal fluid for the presence of *B. henselae*. Our case suggests that direct *B. henselae* invasion rather than an indirect pathophysiologic mechanism appears likely to cause neuroretinitis.

Therefore, PCR is a useful method to correctly and quickly diagnose cat scratch disease neuroretinitis. The samples for PCR analysis should be collected from a variety of organs, depending on the symptoms of patients.

### References

1. Debre R, Lamy M, Jammot ML, Costil L, Mozziconacci P. La maladie des griffes de chat. *Semaine des hopitaux* 1950;26:1895–1905.
2. Suhler EB, Lauer AK, Rosenbaum JT. Prevalence of serologic evidence of cat scratch disease in patients with neuroretinitis. *Ophthalmology* 2000;107:871–876.
3. Anderson B, Sims K, Regnery R, et al. Detection of *Rochalimaea henselae* DNA in specimens from cat scratch disease patients by PCR. *J Clin Microbiol* 1994;32:942–948.
4. Tsukahara M, Tsuneoka H, Iino H, Ohno K, Murano I. *Bartonella henselae* infection from a dog. *Lancet* 1998;352:1682.
5. Labalette P, Bermond D, Dedes V, Savage C. Cat-scratch disease neuroretinitis diagnosed by a polymerase chain reaction approach. *Am J Ophthalmol* 2001;132:575–576.