



HAL
open science

Cellulitis of the face associated with SENLAT caused by *Rickettsia slovaca* detected by qPCR on scalp eschar swab sample: An unusual case report and review of literature

Marie Hocquart, Hortense Drouet, Paul Levet, Didier Raoult, Philippe Parola, Carole Eldin

► To cite this version:

Marie Hocquart, Hortense Drouet, Paul Levet, Didier Raoult, Philippe Parola, et al.. Cellulitis of the face associated with SENLAT caused by *Rickettsia slovaca* detected by qPCR on scalp eschar swab sample: An unusual case report and review of literature. *Ticks and Tick-borne Diseases*, 2019, 10 (5), pp.1142-1145. 10.1016/j.ttbdis.2019.06.010 . hal-02465936

HAL Id: hal-02465936

<https://amu.hal.science/hal-02465936v1>

Submitted on 25 Oct 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

1 **Cellulitis of the face associated with SENLAT caused by *Rickettsia slovaca* detected by**
2 **qPCR on scalp eschar swab sample: an unusual case report and review of literature**

3 Marie HOCQUART¹, Hortense DROUET¹, LEVET Paul¹, Didier RAOULT², Philippe
4 PAROLA¹, Carole ELDIN¹

5 ¹Aix Marseille Univ, IRD, AP-HM, SSA, VITROME, IHU-Méditerranée Infection,
6 Marseille, France.

7 ²Aix Marseille Univ, IRD, AP-HM, MEPHI, IHU-Méditerranée Infection,
8 Marseille, France.

9 Corresponding author e-mail: carole.eldin@gmail.com

10 **Full postal address:** Institut Hospitalo-Universitaire Méditerranée Infection, 19-21 boulevard
11 Jean Moulin, 13005 Marseille, France

12 **Phone:** [33] 413 73 20 01

13 **Abstract word count:** 183

14 **Body text word count:** 1995

15 **Keywords:** *R. slovaca*, *SENLAT syndrome*, *Periorbital Cellulitis*

16

17 **Abstract**

18 *Background:* Tick-borne rickettsioses are infectious diseases caused by obligate intracellular
19 Gram-negative bacteria belonging to the spotted fever group of *Rickettsia*.

20 *Methods:* We describe an unusual case of SENLAT (Scalp eschar and neck lymphadenopathy
21 after tick bite), caused by *Rickettsia slovaca*, associated with a cellulitis of the face in a 70-
22 year-old woman, and diagnosed using qPCR on a scalp eschar swab. We review the literature
23 regarding cases of SENLAT-associated-cellulitis and case of SENLAT diagnosed by qPCR
24 on scalp eschar swabs.

25 *Results:* We found only one previous report of SENLAT associated with a cellulitis of the
26 face. It was a nine-year-old French girl diagnosed by seroconversion for *Rickettsia* sp. Our
27 review of the literature showed that qPCR on eschar swab samples is a less invasive method
28 than performing cutaneous biopsy of the eschar and has good sensitivity and specificity (90%
29 and 100% respectively).

30 *Conclusions:* We report the second case of cellulitis of the face associated with the SENLAT
31 syndrome. Detection of *Rickettsia* by qPCR on swab sample of the scalp eschar is a simple,
32 noninvasive technique allowing rapid diagnosis and treatment when SENLAT is suspected.

33

34

35

36 **Introduction**

37 Tick-borne rickettsioses are infectious diseases caused by obligate intracellular Gram-
38 negative bacteria of the spotted fever group (SFG), belonging to the genus *Rickettsia* in the
39 order Rickettsiales. Hard ticks may act as vectors, reservoirs, and/or amplifiers of SFG
40 rickettsiae (Delord et al., 2014). The pathogenic role of *Rickettsia slovaca* was first
41 demonstrated in 1997 in a patient who presented with a single inoculation lesion of the scalp
42 and enlarged cervical lymph nodes after being bitten by a *Dermacentor* tick (Raoult et al.,
43 2002). The acronym TIBOLA (tick-borne lymphadenopathy) was proposed because of
44 painful lymphadenopathy next to the region of the tick bite. Later, a similar clinical entity was
45 described and named DEBONEL (*Dermacentor*-borne necrosis erythema lymphadenopathy)
46 to emphasize the role of the *Dermacentor* ticks. Finally, the name SENLAT (scalp eschar and
47 neck lymphadenopathy after tick bite) was suggested to collectively describe this entity
48 because, although *R. slovaca* is frequently involved, there have been reports describing other
49 bacteria, such as *R. raoultii*, *R. sibirica mongolitimonae*, *R. massiliae*, *Bartonella henselae*,
50 *Francisella tularensis*. (Angelakis et al., 2010; Dubourg et al., 2014). “*Candidatus Rickettsia*
51 *rioja*”, *Coxiella burnetii* and *Borrelia burgdorferi* sensu lato are possible etiological agents
52 due to indirect molecular evidence in ticks involved in SENLAT cases (Dubourg et al., 2014).
53 However, in some cases (20-25%), the causative agent remains undetermined suggesting that
54 other microorganisms might be involved (Dubourg, G. et al. 2014).

55 *Rickettsia slovaca*, the most frequent reported agent of SENLAT, is transmitted by
56 ticks of the genus *Dermacentor* and especially by *D. marginatus* (**Supplementary Figure 1**)
57 or *D. reticulatus*. The geographical distribution of *R. slovaca* most likely corresponds to the
58 geographical distribution of these ticks in Europe and North Africa (Dubourg et al., 2014).
59 *Rickettsia slovaca* has also been found in *D. marginatus* ticks in the Kurgan region (Ural) of
60 Russia and in Georgia, and in 6.5% of *D. silvarum* ticks in China. Human cases have not been

61 reported in Asia (Parola et al., 2013). Infection is most frequent among women (67 to 100%)
62 and children under 12 years old (41 to 43%). The median incubation period is of 5 to 10 days
63 (range, 1 to 15 days). In Europe, infections occur most frequently from March to May and
64 from September to November, which corresponds to the periods of greatest activity of
65 *Dermacentor* adult ticks (Parola et al., 2013). *Rickettsia slovaca* has also been reported as an
66 agent of fever of unknown origin (Botelho-Nevers and Raoult, 2007) among travelers
67 returning from Mongolia, Italy and Corsica (Delord et al., 2014).

68 Clinical manifestations of SENLAT include inoculation lesion at the upper half of the
69 body, mainly on scalp in humans, probably because *Dermacentor* ticks are used to parasitize
70 long-haired animals like horses and wild boar (Parola et al., 2009). The inoculation lesion is
71 often centered by the tick bite with an erythema of at least 5mm that encircles the lesion and
72 second cervical or occipital lymphadenopathies, satellite of the eschar, which may be large,
73 inflammatory and painful (Parola et al., 2009). These two elements may be associated with
74 fever, rash, localized alopecia, headache, asthenia, sweats, arthralgia and myalgia (Dubourg et
75 al., 2013).

76 We describe an unusual case of SENLAT associated with a cellulitis of the face
77 diagnosed by qPCR on a scalp eschar swab and review the literature about this entity and the
78 diagnosis by qPCR on eschar swabs.

79

80 **The Case**

81 A 70-year-old woman with medical history of hypothyroidism was admitted in our
82 department in Marseille on April 2017 with a periorbital cellulitis associated with a scalp
83 eschar and cervical lymphadenopathies. The patient reported a walk in the forest about ten
84 days ago with the apparition, a few days later, of odynophagia, bilateral cervical
85 lymphadenopathies and lesion of the scalp, without fever. Her family doctor thought she had

86 tonsillitis and prescribed amoxicillin. Subsequently, a large erythema and edema of the face
87 appeared, so that she consulted to our unit. At physical examination we recorded a scalp
88 eschar on the left side of the head, an erythema and edema at the forehead with rapid
89 extension to periorbital, retro auricular and cervical areas with left-sided lymphadenopathies
90 (**Figure 1**). Laboratory tests were normal except a slight increase in the C- reactive- protein
91 (15mg/l). Cervical and face tomodensitometry showed a cellulitis without fascia involvement
92 or abscess. Empirical antibiotherapy with amoxicillin- clavulanic acid and clindamycin had
93 been started before at the emergency unit and we added oral doxycycline (200mg/daily) for
94 ten days because of the presence of the inoculation eschar on the scalp. A dry sterile swab
95 sample was collected from the inoculation eschar. The swab, while being rotated vigorously,
96 was directed to the base of the eschar at a 50°–60° angle for 5–6 times (Mouffok et al., 2011).
97 qPCR on scalp eschar swab targeting a fragment of the *gltA* gene, as previously described
98 (Aubry et al., 2016), was positive for *Rickettsia* sp. and sequencing of a fragment of the *ompA*
99 gene (Aubry et al., 2016) identified *Rickettsia slovacica*. Culture of the scalp swab sample on
100 human embryonic lung cells using shell vial methods as previously reported (Raoult et al.,
101 2002) were negative. Serum sample were analysed using indirect Immunofluorescence Assay
102 (IFA) against two spotted fever group rickettsial antigens (*R.conorii conorii*, *Rickettsia felis*)
103 and a typhus group antigen (*R.typhi*). The IFA test during the acute phase was considered
104 positive if antibody titres were > 1:128 for immunoglobulin G (IgG) and > 1:64 for
105 immunoglobulin M (IgM) for the spotted fever group, and > 1:64 for IgG and > 1:32 for
106 typhus group, as previously described (Hayet et al., 2018). These serological testings were
107 negative in the acute phase serum sample and in a convalescent serum sample one month after
108 the resolution of symptoms. The patient completely recovered after ten days of doxycycline
109 except for a small cicatricial alopecia at the site of the eschar (**Figure 1**).

110 **Discussion**

111 In 2009, Parola et al. described facial edema without cellulitis as a new clinical feature
112 of SENLAT because it was found in 19% of cases of *R. slovaca* and 40% of *R. raoultii*
113 infections (Parola et al., 2009). A literature search revealed only one previous reference
114 reporting a case of SENLAT associated with a similar cellulitis of the face. It was a nine-year-
115 old French girl with an acute hemifacial edema and erythema requalified as TIBOLA in 2011
116 (Gaston et al., 2011). The removal of two ticks in the scalp had occurred 10 days earlier. The
117 edema appeared suddenly in a context of fever at 39.5 °C, headache and vertigo. The clinical
118 examination revealed an erysipeloid placard of the left hemiface, associated with a
119 homolateral jugulo-carotid inflammatory adenitis. At the same time, the examination of the
120 scalp revealed two necrotic eschars surrounded by an erythematous halo. The diagnosis was
121 done by seroconversion for *Rickettsia* fifteen days later (Gaston et al., 2011).

122 The microbiological methods available for the diagnosis of tick-borne rickettsioses are
123 serology, culture and PCR. Serology is the most widespread method for the diagnosis of tick-
124 borne rickettsioses, but seroconversion occurs only 15 to 21 days after the beginning of the
125 symptoms (Foissac et al., 2013). Moreover, even when using IFA, which is the reference
126 method, cross reactions are frequent and the specific serological sensitivity for *R. slovaca* is
127 low (about 12%), probably due to a limited locoregional dissemination of the infection
128 (Foissac et al., 2013), as illustrated by our case, where even convalescent serum sample was
129 negative. Culture is fastidious and requires cell cultures that are only performed in specialized
130 BSL 3 laboratories. On the other hand, molecular techniques (qPCR targeting the *gltA* gene
131 for *Rickettsia* group and species-specific qPCR) are useful given their good sensitivity at the
132 beginning of the infection, especially on eschar samples (Foissac et al., 2013). qPCR on a
133 swab sample of the eschar requires the use of a sterile swab to obtain a sample from inside the
134 eschar, simply by inserting the swab into the eschar and rotating it to the basis of the eschar.
135 The material obtained via swabbing can be then processed for nucleic acid extraction and

136 subsequent PCR analysis (Luce-Fedrow et al., 2015). It has a sensitivity of 85 to 90% and a
137 specificity close of 100% (Bechah et al., 2011; Mouffok et al., 2011; Renvoise et al., 2012;
138 Wang et al., 2009). These performances are almost comparable to the ones of qPCR on eschar
139 cutaneous biopsy (sensitivity >95% and specificity >98%) (Foissac et al., 2013). qPCR on
140 eschar swab samples has been used with success around the world for detection of *R. parkeri*,
141 *R. conorii*, *R. sibirica mongolitimonae*, *R. africae*, *R. australis*, *R. felis* and *O. tsutsugamushi*
142 (**Table 1**). To date, only 2 references reported the detection of *R. slovaca* by qPCR on a swab
143 eschar sample (Bechah et al., 2011; Dubourg et al., 2014). Swabbing an eschar has a lot of
144 advantages because it is a noninvasive, simple, rapid and painless technique that can be easily
145 performed without risk, especially in children. This test can be used at the bedside or in an
146 outpatient clinic and could be useful for epidemiologic, surveillance and clinical studies even
147 although health care workers are not able to perform biopsies (Le Viet et al., 2017; Luce-
148 Fedrow et al., 2015; Renvoise et al., 2012). In a recent study, opinions of health care
149 providers and patients were evaluated and they both preferred collecting swab samples over
150 biopsy samples (46 vs. 5 and 57 vs. 2, respectively; $p = 0.0001$) (Mouffok et al., 2011).

151 In a clinical setting, the treatment of choice for SFG rickettsia is doxycycline
152 (Botelho-Nevers et al., 2012), including in children for whom its safety has been
153 demonstrated, notably on the absence of dental damage (Todd et al., 2015; Volovitz et al.,
154 2007). There is no data in the literature to determine the exact duration of treatment, which is
155 related to the clinical response and is classically of 7 to 14 days (Foissac et al., 2013), or at
156 least 3 days after apyrexia (Renvoise et al., 2009). The complete resolution of symptoms is
157 long but antibiotic treatment can reduce the duration of symptoms from 62 to 50 days
158 (Foissac et al., 2013). Sequelar alopecia at the tick bite site, as observed in our patient, is
159 reported in 20 to 51% of cases (Foissac et al., 2013).

160 *Rickettsia* are strict intracellular bacteria and conventional microbiological techniques
161 cannot be used to evaluate the efficacy of antibiotics. Cell culture techniques are used to test
162 in vitro susceptibility of *Rickettsia* to antibiotics by determining the minimum inhibitory
163 concentrations but can be performed only in specialized laboratories (Renvoise et al., 2009).
164 However, beta-lactams, aminoglycosides and cotrimoxazole are ineffective on rickettsia
165 (Renvoise et al., 2009). As a consequence, in a patient with a cellulitis, the presence of an
166 eschar and lymphadenopathies should prompt clinicians to add doxycycline, because beta
167 lactam are inefficient on SENLAT-associated cellulitis.

168 **Conflict of interest**

169 All the authors have no conflict of interest to disclose

170 **Funding source**

171 This research did not receive any specific grant from funding agencies in the public,
172 commercial, or not-for-profit sectors.

173 **Aknowledgements**

174 None

175

References

- 176
177
178 Angelakis, E., Pulcini, C., Waton, J., Imbert, P., Socolovschi, C., Edouard, S., Dellamonica,
179 P., & Raoult, D. 2010. Scalp eschar and neck lymphadenopathy caused by Bartonella
180 henselae after Tick Bite. *Clin.Infect.Dis.*, 50(4): 549-551.
- 181 Aubry, C., Socolovschi, C., Raoult, D., & Parola, P. 2016. Bacterial agents in 248 ticks
182 removed from people from 2002 to 2013. *Ticks.Tick.Borne.Dis.*, 7(3): 475-481.
- 183 Bechah, Y., Socolovschi, C., & Raoult, D. 2011. Identification of rickettsial infections by
184 using cutaneous swab specimens and PCR. *Emerg.Infect.Dis.*, 17(1): 83-86.
- 185 Botelho-Nevers, E. & Raoult, D. 2007. Fever of unknown origin due to rickettsioses.
186 *Infect.Dis.Clin.North Am.*, 21(4): 997-1011, ix.
- 187 Botelho-Nevers, E., Socolovschi, C., Raoult, D., & Parola, P. 2012. Treatment of Rickettsia
188 spp. infections: a review. *Expert.Rev.Anti.Infect.Ther.*, 10(12): 1425-1437.
- 189 Delord, M., Socolovschi, C., & Parola, P. 2014. Rickettsioses and Q fever in travelers (2004-
190 2013). *Travel.Med.Infect.Dis.*, 12(5): 443-458.
- 191 Dubourg, G., Socolovschi, C., Del, G. P., Fournier, P. E., & Raoult, D. 2014. Scalp eschar
192 and neck lymphadenopathy after tick bite: an emerging syndrome with multiple causes. *Eur.J*
193 *Clin.Microbiol.Infect.Dis.*, 33(8): 1449-1456.
- 194 Foissac, M., Socolovschi, C., & Raoult, D. 2013. [Update on SENLAT syndrome: scalp
195 eschar and neck lymph adenopathy after a tick bite]. *Ann.Dermatol.Venereol.*, 140(10): 598-
196 609.
- 197 Gaston, J., Durox, H., Sparsa, A., Bonnetblanc, J. M., & Doffoel-Hantz, V. 2011.
198 [Dermohypodermatitis on the face revealing TIBOLA]. *Arch.Pediatr.*, 18(5): 565-567.
- 199 Bouchaib, H., Eldin, C., Laroche, M., Raoult, D., & Parola, P. 2018. Tick-and flea-borne
200 rickettsioses in Tizi-Ouzou, Algeria: Implications for travel medicine. *Travel medicine and*
201 *infectious disease*, 26, 51-57.
- 202 Khrouf, F., Sellami, H., Elleuch, E., Hattab, Z., Ammari, L., Khalfaoui, M., Souissi, J.,
203 Harrabi, H., M'ghirbi, Y., Tiouiri, H., Ben, J. M., Hammami, A., Letaief, A., Bouattour, A., &
204 Znazen, A. 2016. Molecular diagnosis of Rickettsia infection in patients from Tunisia.
205 *Ticks.Tick.Borne.Dis.*, 7(5): 653-656.
- 206 Kim, D. M., Kim, H. L., Park, C. Y., Yang, T. Y., Lee, J. H., Yang, J. T., Shim, S. K., & Lee,
207 S. H. 2006. Clinical usefulness of eschar polymerase chain reaction for the diagnosis of scrub
208 typhus: a prospective study. *Clin.Infect.Dis.*, 43(10): 1296-1300.
- 209 Le, V. N., Laroche, M., Thi Pham, H. L., Viet, N. L., Mediannikov, O., Raoult, D., & Parola,
210 P. 2017. Use of eschar swabbing for the molecular diagnosis and genotyping of Orientia
211 tsutsugamushi causing scrub typhus in Quang Nam province, Vietnam. *PLoS.Negl.Trop.Dis.*,
212 11(2): e0005397.

- 213 Luce-Fedrow, A., Mullins, K., Kostik, A. P., St John, H. K., Jiang, J., & Richards, A. L. 2015.
 214 Strategies for detecting rickettsiae and diagnosing rickettsial diseases. *Future.Microbiol.*,
 215 10(4): 537-564.
- 216 Mediannikov, O., Socolovschi, C., Million, M., Sokhna, C., Bassene, H., Diatta, G., Fenollar,
 217 F., & Raoult, D. 2014. Molecular identification of pathogenic bacteria in eschars from acute
 218 febrile patients, Senegal. *Am.J Trop.Med.Hyg.*, 91(5): 1015-1019.
- 219 Mouffok, N., Socolovschi, C., Renvoise, A., Parola, P., & Raoult, D. 2011. Diagnosis of
 220 rickettsioses from eschar swab samples, Algeria. *Emerg.Infect.Dis.*, 17(10): 1968-1969.
- 221 Myers, T., Lalani, T., Dent, M., Jiang, J., Daly, P. L., Maguire, J. D., & Richards, A. L. 2013.
 222 Detecting Rickettsia parkeri infection from eschar swab specimens. *Emerg.Infect.Dis.*, 19(5):
 223 778-780.
- 224 Parola, P., Paddock, C. D., Socolovschi, C., Labruna, M. B., Mediannikov, O., Kernif, T.,
 225 Abdad, M. Y., Stenos, J., Bitam, I., Fournier, P. E., & Raoult, D. 2013. Update on tick-borne
 226 rickettsioses around the world: a geographic approach. *Clin.Microbiol.Rev.*, 26(4): 657-702.
- 227 Parola, P., Roveery, C., Rolain, J. M., Brouqui, P., Davoust, B., & Raoult, D. 2009. Rickettsia
 228 slovaca and R. raoultii in tick-borne Rickettsioses. *Emerg.Infect.Dis.*, 15(7): 1105-1108.
- 229 Raoult, D., Lakos, A., Fenollar, F., Beytout, J., Brouqui, P., & Fournier, P. E. 2002. Spotless
 230 rickettsiosis caused by Rickettsia slovaca and associated with Dermacentor ticks.
 231 *Clin.Infect.Dis.*, 34(10): 1331-1336.
- 232 Renvoise, A. & Raoult, D. 2009. [An update on rickettsiosis]. *Med.Mal Infect.*, 39(2): 71-81.
- 233 Renvoise, A., Rolain, J. M., Socolovschi, C., & Raoult, D. 2012. Widespread use of real-time
 234 PCR for rickettsial diagnosis. *FEMS Immunol.Med.Microbiol.*, 64(1): 126-129.
- 235 Socolovschi, C., Renvoise, A., Brouqui, P., Parola, P., & Raoult, D. 2012. The use of eschar
 236 swabs for the diagnosis of African tick-bite fever. *Ticks.Tick.Borne.Dis.*, 3(5-6): 361-363.
- 237 Solary, J., Socolovschi, C., Aubry, C., Brouqui, P., Raoult, D., & Parola, P. 2014. Detection
 238 of Rickettsia sibirica mongolitimonae by using cutaneous swab samples and quantitative
 239 PCR. *Emerg.Infect.Dis.*, 20(4): 716-718.
- 240 Todd, S. R., Dahlgren, F. S., Traeger, M. S., Beltran-Aguilar, E. D., Marianos, D. W.,
 241 Hamilton, C., McQuiston, J. H., & Regan, J. J. 2015. No visible dental staining in children
 242 treated with doxycycline for suspected Rocky Mountain Spotted Fever. *J Pediatr.*, 166(5):
 243 1246-1251.
- 244 Volovitz, B., Shkap, R., Amir, J., Calderon, S., Varsano, I., & Nussinovitch, M. 2007.
 245 Absence of tooth staining with doxycycline treatment in young children. *Clin.Pediatr.(Phila)*,
 246 46(2): 121-126.
- 247 Wang, J. M., Hudson, B. J., Watts, M. R., Karagiannis, T., Fisher, N. J., Anderson, C., &
 248 Roffey, P. 2009. Diagnosis of Queensland tick typhus and African tick bite fever by PCR of
 249 lesion swabs. *Emerg.Infect.Dis.*, 15(6): 963-965.
 250
 251

Table 1: Agents of *Rickettsia* spp. detected by qPCR on eschar swab

Agents	Authors	Positive SWAB	Clinical presentation/ Localization of eschar
<i>R. parkeri</i>	Myers et al., 2013	2	Fever, chills, night sweats, a diffuse maculopapular rash, headache, myalgia, neck stiffness, arthralgia, and malaise.
<i>R. conorii</i>	Bechah et al., 2011	25	Fever, eschar and generalized maculopapular rash.
	Khrouf et al., 2016	12	Acute fever and cutaneous rashes and/or eschars.
	Mouffok et al., 2011	2	NS
<i>R. sibirica mongolitimonae</i>	Bechah et al., 2011	2	NS
	Solary et al., 2014	1	Fever, 2 eschars on the lower right eyelid, periorbital edema, cervical lymphadenopathies.
<i>R. africae</i>	Bechah et al., 2011	2	NS
	Socolovschi et al., 2012	4	Fever, eschar, rash, lymph-adenopathy
<i>R. australis</i>	Bechah et al., 2011	1	NS

	Wang et al., 2009	4	Case 1: inguinal eschar, tender local lymphadenopathy, fever to 39.8°C, severe headache, myalgia, arthralgia, and generalized sparse rash Case 2: Fever, torso eschar, severe headache, myalgia, arthralgia, and rash Case 3: Fever, eschar on the scalp, tender local lymphadenopathy, and generalized rash with maculopapular and vesicular components. Case 4: Fever, eschar on the torso, tender local lymphadenopathy, and generalized sparse rash characterized by papular and vesiculopustular lesions.
<i>R. felis</i>	Botelho-Nevers et al., 2007	5	Fever and eschar.
<i>O. tsutsugamushi</i>	Kim et al., 2006	1	Fever with eschar or a maculopapular skin rash and also had > 2 symptoms (such as headache, malaise, myalgia, coughing, nausea, and abdominal discomfort)
	Le Viet et al., 2017	17	>15 years, axillary temperature >37.5°C and at least one of the following four secondary findings: eschar, skin rash, lymphadenopathy, hepatomegaly and/or splenomegaly
<i>R. slovaca</i>	Bechah et al., 2011	4	Fever, inoculation lesion, enlarged nodes, localized alopecia
	Dubourg et al., 2014	1	NS

Figures legends

Figure 1

Scalp eschar (Panel a) and peri-orbital cellulitis of the face before (Panel b) and after treatment (Panel c) in a 70-year-old women, revealing a SENLAT syndrome caused by *R. slovacae* detected by qPCR on scalp eschar swab.

Supplementary Figure

Supplementary Figure 1

Dermacentor marginatus ticks: female (Panel a) and male (Panel b).

