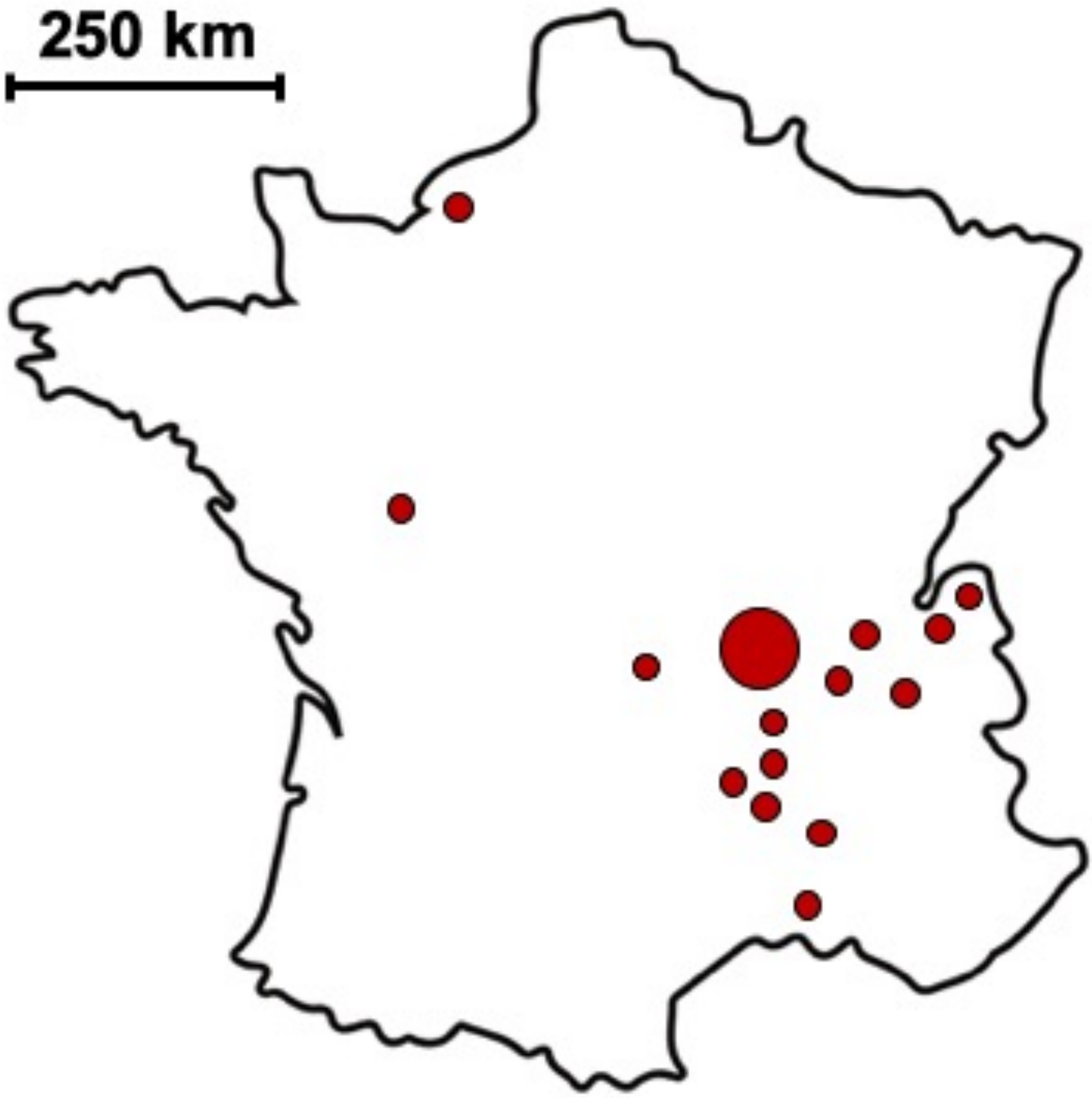


BACKGROUND

Phage therapy is a promising option in patients with bacterial infections, especially in the context of worldwide dissemination of resistance. Phages have been historically used to treat patients with bone and joint infections (BJI), with contradictory results. As bacteriophages have anti-biofilm effect, they are nevertheless promising to treat such infections, as other implant-associated infections. Since 2009, the French health ministry labelled regional reference center for the management of complex BJI (CRIOAc). Since 2017, we implemented in CRIOAc Lyon a multidisciplinary group dedicated to develop phage therapy as salvage treatment for such patients.

CASES DESCRIPTION

Twenty-one patients (12 males; median age 73 years), referred throughout the territory, have been treated since 2017 (Figure and Table). Patients were selected during our CRIOAc multidisciplinary meeting, in close interactions with the French health care authority, as phage therapy is only conceivable in France as salvage treatment. The most relevant indication was prosthetic joint infection (PJI; 16 patients), with implementation of a specific procedure called **PhagoDAIR** to perform phage therapy during Debridement Antibiotics and Implant Retention (DAIR) in patients with chronic infection. Other patients had osteomyelitis (n=1), spinal abscess (n=1), femoral nail infection (n=1). Two patients with vascular implant infection such as endocarditis were also treated, following the acquired experience in BJI. All patients were treated with an active phage cocktail tested on the patient’s strains (phagogram) before administration, that were finally prepared by our hospital pharmacist at the time of administration. Patients received phages targeting *S. aureus* (n=10), *P. aeruginosa* (n=8), *S. lugdunensis* (n=1) or *S. epidermidis* (n=1) purified by a French private company (n=18) or by the Queen Astrid military hospital (n=3). Four patients received the phages also intravenously. For one patient infected with a pandrug-resistant *P. aeruginosa*, a unique European academic collaboration was needed to discover active phages, to identified and purified them, before treating the patient with success.



Residency of the 21 patients treated with phages in CRIOAc Lyon

Number of patients	2017	2018	2019	2020	Total
Managed in CRIOAc Lyon	557	594	647	520	2318
For whom a phagogram was performed	7 (1.2%)	10 (1.7%)	17 (2.6%)	23 (4.4%)	57 (2.4%)
For whom phage therapy was done	4 (0.0%)	2 (0.3%)	8 (1.2%)	7 (1.3%)	21 (0.9%)

Number of patients treated with phages since 2017

PUBLISHED CASES (n=7 out of the 21)

Innovations for the treatment of a complex bone and joint infection due to XDR *Pseudomonas aeruginosa* including local application of a selected cocktail of bacteriophages

Tristan Ferry ✉, Fabien Boucher, Cindy Fevre, Thomas Perpoint, Joseph Chateau, Charlotte Petitjean, Jérôme Josse, Christian Chidiac, Guillaume L’hostis, Gilles Leboucher, ... Show more

Journal of Antimicrobial Chemotherapy, Volume 73, Issue 10, 1 October 2018, Pages 2901–2903,

Open Forum Infectious Diseases

BRIEF REPORT

Salvage Debridement, Antibiotics and Implant Retention (“DAIR”) With Local Injection of a Selected Cocktail of Bacteriophages: Is It an Option for an Elderly Patient With Relapsing *Staphylococcus aureus* Prosthetic-Joint Infection?

Tristan Ferry^{1,2,3,4*}, Gilles Leboucher³, Cindy Fevre⁵, Yannick Henry^{2,4,7}, Anne Corrad^{1,2,4}, Jérôme Josse^{2,5,6}, Cécile Batailler^{2,4}, Christian Chidiac^{1,2,3,4}, Mathieu Medina⁸, S. Lustig² and Frédéric Laurent^{2,4,6}, on behalf of the Lyon BJI Study Group

The Potential Innovative Use of Bacteriophages Within the DAC® Hydrogel to Treat Patients With Knee Megaprosthesis Infection Requiring “Debridement Antibiotics and Implant Retention” and Soft Tissue Coverage as Salvage Therapy

Tristan Ferry^{1,2,3,4*}, Cécile Batailler^{2,3,5}, Charlotte Petitjean⁶, Joseph Chateau⁷, Cindy Fevre⁸, Emmanuel Forestier¹, Sophie Brosset¹, Gilles Leboucher¹, Camille Kolenda^{2,3,4,9}, Frédéric Laurent^{2,3,4,10} and Sébastien Lustig^{2,3,5} on behalf of the Lyon BJI Study Group



Case Report: Arthroscopic “Debridement Antibiotics and Implant Retention” With Local Injection of Personalized Phage Therapy to Salvage a Relapsing *Pseudomonas Aeruginosa* Prosthetic Knee Infection

Tristan Ferry^{1,2,3,4*}, Camille Kolenda^{2,3,4,5}, Cécile Batailler^{2,3,5}, Romain Gaillard^{3,5}, Claude-Alexandre Gustave^{2,3,4,5}, Sébastien Lustig^{2,3,5}, Cindy Fevre¹, Charlotte Petitjean⁷, Jérôme Josse^{2,3,4,5}, Frédéric Laurent^{2,3,4,5} and the Lyon BJI Study group



Phage Therapy as Adjuvant to Conservative Surgery and Antibiotics to Salvage Patients With Relapsing *S. aureus* Prosthetic Knee Infection

Tristan Ferry^{1,2,3,4*}, Camille Kolenda^{2,3,4,5}, Cécile Batailler^{2,3,6}, Claude-Alexandre Gustave^{2,3,4,5}, Sébastien Lustig^{2,3,4}, Matthieu Malatray^{3,5}, Cindy Fevre⁷, Jérôme Josse^{2,3,4,5}, Charlotte Petitjean¹, Christian Chidiac^{1,2,3,4}, Gilles Leboucher⁸ and Frédéric Laurent^{2,3,4,5} on behalf of the Lyon BJI Study group

SUMMARY CONCLUSION

Supported by our activity of regional reference center, we implemented a phage therapy center in France since 4 years. Based on our experience, identifying relevant clinical indications (such as prosthetic joint infection), and having multidisciplinary approach with international academic collaborations and interactions with national health authority and industry, are essential to go ahead and develop phage therapy and clinical trials in this field in a close future in each country.