

Masked, controlled study to investigate the efficacy of a *Staphylococcus intermedius* autogenous bacterin for the control of canine idiopathic recurrent superficial pyoderma

C. F. Curtis*, A. I. Lamport† and D. H. Lloyd‡

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*Dermatology Referral Service, 'Rooftops', Spring View Road, Ware, Herts, UK

†79 Deepdene, Potters Bar, Herts, UK

‡Royal Veterinary College, Hawkshead Lane, Hatfield, Herts, UK

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Correspondence: C. F. Curtis.

E-mail: cfcurtis@btinternet.com

Abstract

A masked, controlled study was designed to investigate the clinical efficacy of a staphylococcal autogenous bacterin for the control of canine idiopathic recurrent pyoderma (IRP). Ten dogs with at least three prior episodes of recurrent superficial pyoderma were recruited. All were screened and found to be free of ectoparasitic and fungal disease and failed to respond favourably to a dietary trial. Those exhibiting signs of pruritus responded completely to antibacterial therapy. Haematological and biochemical parameters were generally unremarkable and all dogs were euthyroid. *Staphylococcus intermedius* cultures from lesions were used to produce an autogenous bacterin for each animal. A numerical 'lesion score' was allocated and dogs were randomly divided into two groups of five (groups 1 and 2). Both groups received a 4-week course of antibiotic; group 1 also received concurrent s/c injections of bacterin, which continued until week 10. Group 2 received no additional therapy. All dogs were re-examined and rescored at weeks 5 and 10 and repeat blood samples were submitted at week 10 to screen for adverse effects. Comparison of scores at week 0 and week 5 (Mann-Whitney *U*-test) revealed no significant differences between the groups. At week 10, group 2 (control group) individual lesion scores were significantly higher compared with the group receiving bacterin ($P < 0.05$) and there was a significantly greater increase in the sum of the individual lesion scores for group 2 compared with group 1, from week 5 to week 10 ($P < 0.05$). No adverse reactions to bacterin therapy were detected. These results suggest that autogenous bacterins may provide an alternative, safe, effective method for the control of canine IRP. Further studies using larger groups of dogs and for a longer follow-up period are now warranted.

Introduction

Canine recurrent pyoderma can be categorized as primary, secondary or idiopathic. The former results from a primary immune deficiency which can affect the skin as well as other organs, and several such syndromes have been described in the dog.¹ The most common form, however, occurs as a secondary phenomenon to some underlying cutaneous and/or systemic disease, for example, a hypersensitivity disorder, an ectoparasitic infestation or an endocrinopathy. Individuals affected by this form of pyoderma develop papules, pustules, epidermal collarettes and patchy alopecia at the predilection sites of the underlying disease, in addition to the typical dermatological lesions and, where applicable, the systemic signs of that disease. Appropriate antibiotic treatment will clear the pyoderma and, in pruritic dogs, may reduce the degree of pruritus, but it will not control the signs attributable to the primary disease.

A diagnosis of idiopathic recurrent pyoderma (IRP) is made for those individuals in which an underlying dermatological or systemic disease cannot be detected. Such cases are typically managed by either full-dose intermittent ('pulsed') or low-dose maintenance courses of antibiotics, or by immunomodulatory therapy.² Various immunomodulators have been used in the treatment of canine IRP, the most familiar of which is prepared from strains of *Staphylococcus aureus* serotypes 1 and 3, which have been lysed by a bacteriophage (Staphage Lysate, Delmont Laboratories, Swarthmore, PA, USA). In a controlled study,³ affected dogs receiving Staphage Lysate were significantly better controlled than their counterparts receiving a placebo. Similar favourable responses were reported in two earlier studies using bacterins containing a *S. aureus* cell wall and toxoid mixture (Staphoid AB, Jensen-Salsbery Laboratories, Kansas City, MO, USA)⁴ and a *Propionibacterium acnes*-based product (Immunoregulin, ImmunoVet Incorporated, Tampa, FL, USA).⁵ Given that *Staphylococcus intermedius* is the major cause of canine pyoderma, it may be more appropriate to use this organism as the immunomodulator. Although there are anecdotal reports of the use of *S. intermedius* autogenous bacterins, no controlled studies have been undertaken to investigate their true efficacy.

Encouraging results obtained during a pilot study involving the Royal Veterinary College's staphylococcal autogenous

Table 1. Demographics, historical and clinical details, and group allocation of dogs entering study

Dog	Breed	Age (years)	Sex	Duration of disease	Relapse interval	Pruritus	Blood results	Group*
1	WHW terrier	4.0	ME	9 months	5 weeks	Mild	NAD	2 (control)
2	GSD	9.0	ME	7 years	4 weeks	Mild	HGA (41 g L ⁻¹)	2 (control)
3	Yorkshire terrier	5.0	MN	1 year	3 weeks	Marked	HGA (43 g L ⁻¹)	1 (treated)
4	Dobermann	3.0	ME	5 months	1 week	Mild	NAD	2 (control)
5	Springer spaniel	10.0	FN	2.5 years	3 weeks	Marked	NAD	1 (treated)
6	Cocker spaniel	4.0	FN	2.5 years	4 weeks	Mild	NAD	1 (treated)
7	English pointer	2.5	ME	2 years	3 weeks	Mild	NAD	2 (control)
8	Boxer	6.0	ME	4 years	3 weeks	Moderate	HGA (51 g L ⁻¹)	1 (treated)
9	Dachshund	1.5	ME	1 year	2 weeks	Moderate	NAD	1 (treated)
10	Cocker spaniel	4.0	ME	2 years	4 weeks	Marked	HGA (52 g L ⁻¹)	2 (control)

WHW – West Highland white; GSD – German shepherd dog; M – male, F – female, E – entire, N – neutered; NAD – no abnormalities detected; HGA – hyperglobulinaemic (normal laboratory reference range 30–35 g L⁻¹).

*Group allocation decided randomly by microbiologist preparing bacterin (AL).

bacterin, in which 9 of 13 dogs had an excellent to good response to therapy⁶ prompted this masked, controlled study to investigate the efficacy of the bacterin in the control of canine idiopathic recurrent superficial pyoderma.

Materials and methods

Recruitment of cases

Ten dogs, belonging to various breeds, aged between 18 months and 10 years, were recruited to the study. There were eight males and two females. Seven of the males were entire and the females were neutered. Owner-written consent was obtained for inclusion in the trial and all diagnostic tests were justifiable on clinical grounds. Each had a history of at least three prior episodes of superficial pyoderma spanning over the previous 5 months to 7 years (with a mean duration of 2.5 years), with a relapse interval of between 1 and 4 weeks (case nos 2–10) or 5 weeks (case no. 1) (Table 1). The age of onset of disease was 6 months to 7 years, although 8 of the 10 dogs developed problems at 3 years of age or younger. Animals that had received prior therapy with immunomodulatory products were excluded. Only dogs that were otherwise deemed to be in good general health following a thorough clinical examination were selected and their clinical signs (including pruritus) had to be known to be completely responsive to antibiotics. Direct examination of the coat and skin, in addition to coat brushings and the microscopic examination of acetate tape strippings, trichograms suspended in liquid paraffin and multiple superficial and deep skin scrapings in liquid paraffin, was performed to rule out the presence of ectoparasites. Routine mycological tests were undertaken to check for the presence of fungal organisms [i.e. cytological examination of Diff-Quik (Dade Behring, Newark, DE, USA) stained tape strippings and fungal culture on modified Dixon's agar for yeast, and Wood's lamp examination, trichography and culture on modified Sabouraud's dextrose agar for dermatophytes]. Potential recruits were subjected to a dietary trial of between 4- and 12-week duration, which ultimately had no effect on their skin disease. None of the dogs satisfied either Willemse's⁷ or Prelaud's⁸ historical and clinical diagnostic criteria for canine atopic dermatitis, hence intradermal and serological tests for the detection of elevated IgE concentrations to environmental allergens were not performed.

Study protocol

All dogs were assessed by the same investigator on each occasion (CC), who remained unaware whether they were receiving auto-genous bacterin injections. During the first visit at week 0, all dogs were subjected to a full systemic and dermatological examination and were allocated a total numerical score (known as the 'lesion score') of between 0 and 216. This score was the sum of individual lesion scores of between 0 and 3, depending on severity, of nine various

Table 2. Scoring of lesion types in various body regions, and their severity

Lesions	Papules, pustules, collarettes, sinuses, ulcers, alopecia, erythema, crusts, miscellaneous
Body regions	Head, ears, trunk, axilla, abdomen, perineum, limbs, feet
Severity	0 = no lesions; 1 = few scattered lesions; 2 = many distinct lesions; 3 = many or confluent lesions

lesion types present in eight different body regions (Table 2). Intact papules or, preferentially, pustules were located and then ruptured with a sterile needle to permit the contents to be harvested with a sterile cotton swab. Following this, a 4-week course of either cephalaxin (Ceporex, Schering-Plough Animal Health, Uxbridge, UK) at 25 mg kg⁻¹ twice daily (nine dogs) or marbofloxacin (Marbocyl, Vetoquinol UK Ltd, Bicester, UK) at 2 mg kg⁻¹ once daily (one dog) was dispensed to clear the existing pyoderma, the latter drug being prescribed for dog no. 2 because the referring veterinary surgeon had reported that cephalaxin had ceased to be of clinical benefit to this dog.

The harvested samples were inoculated onto horse blood agar plates (Oxoid Ltd, Basingstoke, UK) and incubated overnight at 37 °C. Staphylococcal isolates were identified to species level using API ID32 Staph Test (BioMerieux, France). Antibacterial sensitivity testing was also performed for each isolate using OxoidTM discs (Oxoid Ltd), according to a standard method first described by Bauer and others.⁹ Bacterin was subsequently produced according to the protocol developed by the Royal Veterinary College. From a pure culture of *S. intermedius*, five isolated colonies of the organism were harvested using a sterile bacterial loop and were used to inoculate 15 mL of brain heart infusion (BHI) broth (Oxoid Ltd), which had been prepared according to the manufacturer's standard package instructions. This suspension was incubated overnight at 37 °C and was centrifuged at 1300 **g** for 10 min the following day. The supernatant was discarded and the deposit was subjected to three spin washes using 20 mL of 0.5% phenol saline [prepared by dissolving 2.5 g phenol and 4.5 g sodium chloride in 500 mL distilled water and then filtering through Whatman no. 1 filter paper (Microbiological Supply Company, Bedfordshire, UK)]. It was then sterilized by steam autoclave at 1.034 bar for 15 min. Following this, the deposit was re-suspended in 10 mL of 0.5% phenol saline, to act as a preservative, and 0.1 mL of 10% formal saline was added to kill the bacteria. The suspension was again incubated at 37 °C overnight. The following day, 0.05 mL of the suspension was added to 20 mL BHI broth and then incubated at 37 °C for 72 h, examining daily for evidence of bacterial growth. The remaining bacterial suspension was stored in the refrigerator at 4 °C. If the

Table 3. Subcutaneous injection protocol for staphylococcal bacterin

Days 1 and 4	1.0 mL
Days 8 and 11	2.0 mL
Days 15 and 18	3.0 mL
Weekly thereafter	3.0 mL

Table 4. Culture and sensitivity results following sampling during visit 1

Dog no.	Microbe(s) isolated	Sensitivity
1	<i>S. intermedius</i>	C, CPA, E, M, PS
2	<i>S. intermedius</i> and <i>S. aureus</i>	<i>S. intermedius</i> ; C, CPA, E, M, PS <i>S. aureus</i> ; C, CPA, E, M, PS
3	<i>S. intermedius</i>	C, CPA, E, PS
4	<i>S. intermedius</i>	C, CPA, E, M, PS
5	<i>S. intermedius</i>	C, CPA, Ery, Lin, Oxa, Oxy, P, PS
6	<i>S. intermedius</i>	C, CPA, E, M, PS
7	<i>S. intermedius</i>	C, CPA, E, M, PS
8	<i>S. intermedius</i>	C, CPA, E, M, P, PS
9	<i>S. intermedius</i>	C, CPA, E, M, PS
10	<i>S. intermedius</i>	C, CPA, E, M, P, PS

C – cephalixin; CPA – clavulanate-potentiated amoxicillin;
E – enrofloxacin; Ery – erythromycin, Lin – lincomycin;
M – marbofloxacin; Oxa – oxacillin; Oxy – oxytetracycline;
P – penicillin; PS – potentiated sulphonamide (co-trimazole).

broth remained clear, sterility was confirmed by streaking a loopful onto blood agar and incubating overnight to check for the absence or presence of bacterial organisms. If none was isolated, the bacterin was prepared after the bacterial content of the formalized staphylococcal suspension was assessed using a McFarland nephelometer.¹⁰ Traditionally, the concentration of the suspension had always been adjusted so that its optical density (OD) was comparable to that of a number 1 standard McFarland tube (equivalent to a concentration of 3×10^8 organisms per millilitre). In the event that the OD was greater than the number 1 standard tube, sterile phenol saline was added aseptically until the desired OD was achieved. Twenty millilitre aliquots of 0.5% phenol saline were then dispensed into glass vaccine bottles and autoclaved at 1.034 bar for 15 min. To each, 100 μ L of the formalized bacterial suspension was added aseptically. The 10 dogs were then randomly divided into two groups of five by the microbiologist preparing the bacterins (AL) so that the investigator could remain 'blinded' and unbiased when scoring the lesions during subsequent visits. Seven to 10 days after bacterin preparation, 40 mL of the product was mailed to each of the 10 owners. Those which had been placed in group 1 (the treatment group) were sent an accompanying letter, instructing them to immediately contact their primary veterinary surgeon regarding the subcutaneous administration of the bacterin according to the protocol in Table 3. The owners of dogs in group 2 (the control group) were instructed to store the bacterin in a sealed container in the refrigerator at 4 °C for future use at the end of the masked trial period (i.e. after week 10).

All dogs were then re-examined on two occasions at weeks 5 and 10 and a numerical lesion score was again allocated during each visit. The individual lesion scores for the dogs in each of the two groups at each time point were then compared using the Mann-Whitney *U*-test (Unistat® Statistical Package version 4.53a; Unistat Ltd, London, UK). As an alternative method of analysing the data, the sums of the individual lesion scores for each of the two groups of dogs at each time point, and the changes in the sum of these scores from one time point to another, were compared, using the same statistical test and package. A second blood sample was taken at week 10 to screen for haematological or biochemical evidence of adverse reactions to the bacterin.

For the chief investigator's interest, owners were contacted periodically for anecdotal updates on their pet's progress for up to 18 months following the study period.

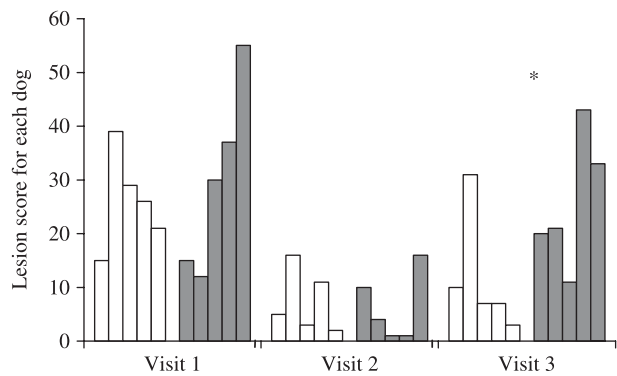


Figure 1. Lesion scores from each individual dog in the treated (group 1, white bars) and control (group 2, grey bars) groups at visits 1 (week 1), 2 (week 5) and 3 (week 10). *Difference between groups at visit 3 is significant ($P < 0.05$; Mann-Whitney *U*-test).

Results

There was a variation in the degree of pruritus exhibited by the recruited dogs, ranging from absent to mild in 5, moderate in 2 and marked in 3. In accordance with the selection criteria, all dogs were completely nonpruritic whilst receiving appropriate oral antibacterial therapy.

Preliminary haematological and biochemical screens and total thyroxine (T4) and canine thyrotropin stimulation hormone (cTSH) assays were unremarkable, with the exception of four dogs which had mild hyperglobulinaemia, possibly as a consequence of the pyoderma (Table 1).

Staphylococcus intermedius was isolated from all 10 dogs and *S. aureus* was also identified in the sample from dog number 2. In each case, the bacteria isolated were sensitive to the antibiotic prescribed during the study and the sensitivity profiles of the isolates are shown in Table 4. On questioning, owner compliance with the study protocol appeared to be excellent, i.e. no problems were reported by the owners themselves, or by their veterinary surgeons, and all drugs and treatments had been administered in accordance with study protocol. At each of the follow-up visits at week 5 and week 10, all dogs were reported to be in good general health, with no adverse reactions to either the antibiotics prescribed or, in the case of the group 1 dogs, the bacterin. General clinical examination on both occasions confirmed that there were no overt signs of systemic disease and blood samples submitted from all dogs at week 10 for haematological and biochemical screens were unremarkable.

At the first visit, individual lesion scores for the 10 dogs varied between 12 and 55 (Fig. 1) and the range of lesion scores amongst dogs in the two groups was similar. The sum of these scores for groups 1 and 2 were 130 and 149, respectively (Fig. 2) Following antibiotic therapy (visit 2, week 5), the sums of the lesion scores had fallen to 37 and 32 for groups 1 and 2, respectively. At week 10, sum score of group 1 had risen to 58 but that of group 2 was 128. Analysis of the data, as described in the Materials and Methods section above, revealed two statistically significant findings. When the individual lesion scores of group 1 and 2 dogs were compared at the three time points (visits 1, 2 and 3), only those scores recorded at visit 3 were

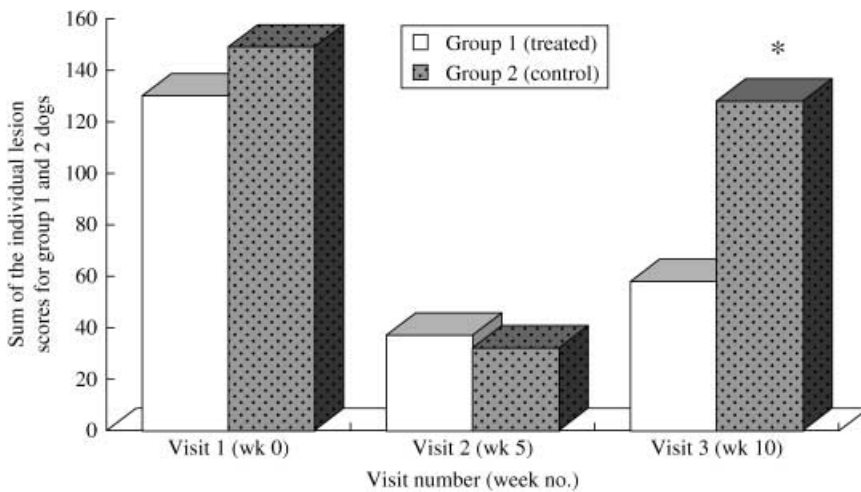


Figure 2. Comparison of the sums of the individual lesion scores for both groups of dogs at visits 1, 2 and 3. Note the significantly greater increase in the sum of the lesion scores from visit 2 to visit 3 in group 2 dogs* compared with group 1 dogs (Mann-Whitney *U*-test, $P = 0.029$).

significantly different ($P < 0.05$, two-tail probability; difference between medians = -13.50 with a 95% confidence interval of -33.0 to -1.0) (Fig. 1). Additionally, when the sums of the individual lesion scores at the three time points, and the changes in these sum scores between the three time points were compared for each group, a statistically significantly greater increase in the sum scores of the group 2 (control) dogs was detected between visits 2 and 3 ($P < 0.03$, two-tail probability; difference between medians = -12.50 with a 95% confidence interval of -37.0 to -2.0) (Fig. 2). These findings demonstrate that, as a group, the dogs receiving the bacterin had less severe lesions compared with the untreated controls at week 10 and that the untreated dogs had deteriorated to a significantly greater degree between weeks 5 and 10, compared with the treated dogs.

At the end of a 9–18 month follow-up period, five of the 10 dogs were still receiving bacterin as their owners and veterinary surgeons considered that they were still benefiting from its administration. No adverse reactions attributable to the bacterin had been observed or reported.

Discussion

When neither a specific immune dysfunction nor a concurrent dermatological or systemic disease can be detected in dogs with superficial recurrent pyoderma, the condition is described as 'idiopathic'. Patients are otherwise healthy and are chronically affected by relapsing bouts of skin disease, which particularly affect the trunk and are characterized by the typical lesions of superficial pyoderma, namely patchy alopecia and/or hypotrichosis, papules, pustules and epidermal collarettes. The degree of accompanying pruritus varies from absent to severe but, significantly, it is completely responsive to antibiotics, a feature that can help to distinguish it from some causes of the more common, 'secondary' form of superficial pyoderma. This opinion is controversial, however, as some dermatologists do credit antibiotics with the ability to completely eliminate pruritus in dogs affected by superficial pyoderma, which is secondary to atopic dermatitis, and claim that allergen-specific immunotherapy can be used as a sole therapy to control relapsing pyoderma in such individuals. To the authors' knowledge, no controlled studies to substantiate such claims have been published and in their view, it is

possible to differentiate between a dog with IRP and an atopic dog with secondary superficial pyoderma on historical and clinical grounds.

Relatively few studies investigating the possible causes of canine IRP have appeared in the literature and the majority of these involve deep pyoderma and furunculosis of German shepherd dogs (GSDs).^{11–16} The authors failed to detect any consistent humoral immune responses in affected dogs, but did demonstrate that affected GSDs had a T cell-mediated immune deficiency that may result in a CD4⁺/CD8⁺ subset imbalance, at the expense of the CD4⁺ (helper) T cells. To the current authors' knowledge, there are only two published studies pertaining to the immune function of dogs with superficial, as opposed to deep IRP.^{17,18} Both describe a marked variation in serum antistaphylococcal IgG concentrations in affected dogs, prompting one group of workers to conclude that serum levels of this antibody are unrelated to disease state or resistance to recurrent infection.¹⁷ However, the latter group also assayed serum antistaphylococcal IgE concentrations in dogs with superficial IRP and they detected significantly higher levels of this antibody in affected dogs compared with dogs that were either healthy or affected by nonrecurrent or deep pyoderma.¹⁸ It was suggested that some form of type I hypersensitivity reaction directed at one or more bacterial antigens may be responsible for superficial IRP, but further studies are required to confirm the pathomechanism of this disease.

Superficial IRP is typically managed by either maintenance, systemic antibacterial therapy (administered according to an intermittent or daily regimen) or by means of a bacterin. Previous studies investigating the use of nonautogenous bacterins for canine IRP have varied in design and duration and none of the bacterins used was based on the organism responsible for the vast majority of canine superficial pyoderma, namely *S. intermedius*.^{3–5} Individually, such studies could also be criticised for being open as opposed to masked⁴ or for providing a relatively short follow-up period,⁵ and given the 5-week relapse interval of one of the subjects in the present study (case 1), it would be useful to follow and score subjects for several months following antibiotic withdrawal, in contrast to the 5-week interval selected. Despite these criticisms, the current study, in common with previous studies, demonstrated significantly favourable results which claimed overall success

rates of between 77 and 88%.³⁻⁵ It is also interesting to note that De Boer and others³ reported an identical long-term success rate of 50%, as five of the 10 dogs treated with Staphage Lysate® (Delmont Laboratories) were still receiving regular injections 22 months after the end of the trial.

Although believed to exert an immunomodulatory effect, the true mode of action of bacterins used in the current and previous studies is unknown. Only one trial investigating the specific immunological responses to a *S. aureus*-based bacterin [SPL; Staphage Lysate® (Delmont Laboratories)] has been conducted in dogs.¹⁷ This demonstrated a small, but significant increase in IgG against bacterin antigens weighing over 60 000 Da in treated dogs, but failed to show a significant increase in serum anti-*Staphylococcus intermedius* IgG concentrations. The authors concluded that SPL does not work by simply augmenting antistaphylococcal IgG responses and that it must have an alternative mechanism of action. Further studies are therefore needed to elucidate the specific and nonspecific, cellular and humoral responses to both autogenous and nonautogenous bacterins.

The prospect of a safe, reliable, cost-effective immunomodulatory bacterin, whether heterogenous or autogenous, as a principal or adjunctive therapeutic option for the control of canine IRP is appealing. This is particularly true when one contemplates the cost of protracted courses of antibiotics (particularly for large-breed dogs), the growing concerns for antibiotic resistance¹⁹⁻²¹ and the potential risk of inducing an adverse drug reaction with a maintenance antibiotic therapeutic protocol. The results of the current study suggest that *S. intermedius*-based autogenous bacterins can be of benefit in the control of this disease and that more extensive, larger studies are now warranted.

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Résumé Une étude en aveugle contrôlée a été réalisée pour évaluer l'efficacité clinique d'un vaccin antistaphylocoques pour le contrôle des pyodermites canines récurrentes idiopathiques. Dix chiens ayant présenté au moins trois épisodes précédent de pyodermite superficielle ont été inclus. Dans tous les cas, l'absence d'ectoparasite, de champignon, et d'allergie alimentaire a été vérifiée. Le prurit répondait totalement au traitement antibiotique. Les données hématologiques et biochimiques étaient dans les normes et tous les chiens étaient euthyroïdiens. Les cultures de *Staphylococcus intermedius* obtenues à partir de lésions cutanées ont été utilisées pour produire un autovaccin pour chaque animal. Un score lésionnel a été mis au point, et les chiens ont été séparés en deux groupes de 5 au hasard (Groupes 1 et 2). Les deux groupes ont été traités avec des antibiotiques pendant 4 semaines; le groupe 1 a également reçu des injections sous-cutanées de vaccin jusqu'à la semaine 10. Le groupe 2 n'a reçu aucun traitement associé. Tous les chiens ont été revus et côtés aux semaines 5 et 10 et des prélèvements sanguins ont été réalisés la semaine 10 pour vérifier l'absence d'effet secondaire. La comparaison des scores aux semaines 0 et 5 (Mann-Whitney U test) n'a pas montré de différence significative entre les groupes. A la semaine 10, les lésions du groupe 2 (contrôle) étaient significativement plus élevées en comparaison de celles observées dans le groupe recevant l'autovaccin ($P < 0.05$) et une augmentation significative des totaux lésionnels était observée dans le groupe 2 en comparaison avec le groupe 1 entre les semaines 5 et 10 ($P < 0.05$). Aucun effet secondaire n'a été observé. Ces résultats suggèrent que l'autovaccination peut représenter une alternative sans danger, efficace, pour le contrôle des pyodermites récidivantes idiopathiques du chien. Des études supplémentaires sur de plus grands nombres d'animaux, suivis pendant de plus longues durées, sont maintenant nécessaires.

Resumen Un estudio ciego controlado fue designado para investigar la eficacia clínica de una bacteria autógena de estafilococos para el control de la pioderma canina recurrente. Diez perros con al menos tres episodios previos de pioderma superficial recurrente fueron incluidos en este estudio. Todos los animales fueron examinados y resultaron estar libres de enfermedades ectoparasitarias y fúngicas, y no presentaron respuesta clínica a una prueba dietética. Los perros con signos clínicos de prurito respondieron completamente a la terapia antibacteriana. Los parámetros hematológicos y bioquímicos se mantuvieron dentro de los rangos de normalidad y todos los perros eran eutiroides. Cultivos de *Staphylococcus intermedius* procedentes de lesiones de la piel se utilizaron para producir una bacteria autógena en cada animal. Se asignó una puntuación numérica para las lesiones y los perros se dividieron aleatoriamente en dos grupos de cinco cada uno (grupos 1 y 2). Ambos grupos recibieron un tratamiento de cuatro semanas con antibióticos; el grupo 1 también recibió una inyección subcutánea de bacteria que continuó hasta la semana 10. El grupo 2 no recibió ningún otro tratamiento. Todos los perros fueron reexaminados y valorados en las semanas 5 y 10, y muestras de sangre fueron enviadas en la semana 10 para buscar señales de algún efecto adverso. Cuando se compararon los valores numéricos de las lesiones en las semanas 5 y 10 no se encontraron diferencias significativas (Mann-Whitney U-test). En la semana 10, los valores de las lesiones individuales en el grupo 2 (control) fueron significativamente mayores comparados con el grupo que recibió bacteria ($P < 0.05$). No se detectaron reacciones adversas a la administración de bacteria. Estos resultados sugieren que la administración de bacteria autógena puede proporcionar una alternativa segura y eficaz para el control de la pioderma idopática canina recurrente. Nuevos estudios con un mayor número de animales y más tiempo de seguimiento serán necesarios para dar más credibilidad a estos resultados.

Zusammenfassung Eine blinde kontrollierte Studie wurde entworfen, um die klinische Wirksamkeit von autologem Staphylokokken Bakterin zur Kontrolle der caninen idiopathischen wiederkehrenden Pyodermie zu untersuchen. Zehn Hunde mit mindestens 3 vorhergegangenen Episoden von wiederkehrender oberflächlicher Pyodermie wurden rekrutiert. Alle wurden untersucht und für frei von Ektoparasiten und einer Pilzinfektion befunden und zeigten keine Verbesserung mittels Ausschlussdiät. Die Hunde, die Juckreiz zeigten, sprachen zur Gänze auf eine antibakterielle Therapie an. Hämatologische und biochemische Parameter waren generell unauffällig und alle Hunde waren euthyreoid. *Staphylokokkus intermedius* Kulturen von den Läsionen wurden verwendet, um autologes Bakterin für jedes Tier herzustellen. Ein numerischer 'Läsionsgrad' wurde bestimmt und die Hunde zufällig in 2 Gruppen zu je 5 (Gruppen 1 und 2) eingeteilt. Beide Gruppen erhielten eine 4 Wochen dauernde Behandlung mit Antibiotika; Gruppe 1 bekam zusätzlich subkutane Injektionen von Bakterin, welche bis zur 10. Woche fortgesetzt wurden. Gruppe 2 erhielt keine zusätzliche Therapie. Alle Hunde wurden nach der 5. und 10. Woche wieder untersucht und beurteilt. In der 10. Woche wurden wiederholt Blutproben genommen und eingeschickt, um auf Nebenwirkungen zu untersuchen. Ein Vergleich der Beurteilungen der Woche 0 und der Woche 5 (Mann-Whitney U-test) zeigte keine signifikanten Unterschiede zwischen den Gruppen. In der 10. Woche waren die individuellen Beurteilungen der Läsionen in Gruppe 2 (Kontrollgruppe) signifikant höher im Vergleich mit der Gruppe, die Bakterin bekommen hatte ($P < 0.05$). Außerdem bestand eine signifikant größere Zunahme in der Summe der individuellen Läsionsgrade von der 5. bis zur 10. Woche für Gruppe 2 verglichen mit Gruppe 1 ($P < 0.05$). Es wurden keine Nebenwirkungen auf die Bakterintherapie festgestellt. Diese Ergebnisse deuten darauf hin, dass autologe Bakterine eine alternative, sichere und effektive Methode zur Kontrolle der caninen idiopathischen wiederkehrenden Pyodermie darstellen. Weitere Studien mit größeren Gruppen von Hunden und einer längeren 'Follow-up' Periode sind nun gerechtfertigt.