American Journal of Biology and Natural Sciences
https://biojournals.us/index.php/AJBNS
ISSN: 2997-7185

Correlation between Serum Amyloid a and White Blood Cell Count in Patients with Bacterial Skin Infections

Lamyaa. Y. Radhi
Department of Pathological Analysis, College of Sciences, University of Thi-Qar, Iraq

Received: 2025, 15, Aug
Accepted: 2025, 21, Sep
Published: 2025, 30, Oct

Annotation: Background: Acute inflammatory reactions to bacterial skin infections result in the high concentration of serum biomarkers like serum amyloid A (SAA) and the high concentration of white blood cells (WBC) and hence the relationship between them is useful in evaluating the severity of the infection. **Aims of the study:** The proposed research objective is to determine the relationship between the serum amyloid A (SAA) and the count of the white blood cells (WBC) in patients with a bacterial skin infection to understand their diagnostic and prognostic value. **Methodology:** The study was a prospective case-control study (10 April- 10 August 2025) that involved 80 bacterial skin-infected patients and 50 controls who are healthy. Diagnosis was clinical and culture supported. Adults (adults over 18 years) were enrolled lately infected; the ones with chronic disease or recent antibiotics were excluded. CBC, SAA (ELISA) and CRP (immunoturbidimetry) were also sampled using blood. All the tests were done within two hours under normal quality control. **Result:** The age, gender, BMI and smoking of the patients (n=80) and the controls (n=50)

showed no significant differences so that the groups could be compared. There was significant increase in inflammatory markers in patients: SAA (148.6 mg/L vs 5.2), WBC (12.8 vs 6.5 ×10 3/ uL), neutrophils (9.4 vs 3.8), and CRP (38.7 vs 2.1) ($P < 0.001$). Most common were Cellulitis (40) and abscess (31.3). SAA was closely related to WBC, neutrophils, CRP, and temperature. The level of markers increased dramatically as the severity of infections increased. **Conclusions**: The research comes to a conclusion that high levels of SAA, WBC, neutrophils and CRP are powerful indicators of the severity of bacterial skin infections. These biomarkers are indicators of the acute inflammatory response, which is caused by cytokine release and the recruitment of neutrophils, and thus they can be useful in the diagnosis and evaluation of severity.

Keywords: Serum Amyloid A (SAA), White Blood Cells (WBC), C-reactive Protein (CRP), Neutrophils, Bacterial Skin Infection, Inflammatory Biomarkers.

Introduction:

Clinical concern on bacterial skin infections is very high given the prevalence rate that may either be mild or severe in addition to systemic complications. These are conditions that involve cellulitis, impetigo, abscesses and folliculitis mostly due to Staphylococcus aureus and Streptococcus pyogenes [1]. Their pathogenesis involves more complicated interactions of the invading pathogens and host immune defense to cause inflammation, tissue destruction, and the innate immune and adaptive immune responses. The sensitivity of the immunological and biochemical alterations under the conditions of bacterial skin infections is important to play the role of sufficient diagnosis, assessment of the degree of the disease, and assessment of the results of treatment [2,3].

Serum Amyloid A (SAA) is an acute-phase protein that is mainly produced by the liver in response to pro-inflammatory cytokines (interleukin-1 (IL-1), interleukin-6 (IL-6), and tumor necrosis factor-alpha (TNF-A). SAA could be a better indicator of the severity of local and systemic inflammatory reactivity, especially in skin and soft tissue infections compared to C-reactive protein (CRP) which is thoroughly investigated [4,5]. Recently research has pointed to the

promise of SAA as a prognostic indicator of the distinction between mild and severe bacterial infections in that its increase is associated with bacterial load and immune activation in the host. [6].

Another commonly used parameter of measuring infection and inflammation is the white blood cell (WBC) count. The process of leukocytosis or an increase in the number of WBC is the body reaction to infection when the bone marrow puts the neutrophils and other immune cells in the blood circulation [7]. The extent of leukocytosis can tend to be similar to the extent of bacterial infection; however it can be affected by the personal immune response, age or other underlying illnesses as well. Nonetheless, the WBC count might not be as specific as needed to assess disease progression, which requires applying other biomarkers like SAA to improve the level of accuracy in the diagnosis [8,9].

The dynamics between the counts of SAA and WBC in bacterial skin infections indicate the interdependent interaction of acute-phase and cellular immune responses. An increase in SAA does not only signify hepatic reaction to the inflammatory process but also actively participates in regulating the immune cell recruitment, chemotaxis, and cytokine secretion [10]. SAA is able to attach to the Toll-Like Receptors of the leukocytes leading to the release of additional cytokines and increasing adhesion and migration of neutrophils to areas of infection. Therefore, the two indicators, SAA and WBC are closely interconnected in the inflammatory cascade and can be used simultaneously as indicators of the severity of the infection and its prognosis [11,12].

Some investigations have shown that there is a significant relationship between acute-phase proteins and leukocyte parameters in the inflammatory and infectious diseases. But specific data on bacterial skin infection are limited, especially in the high-infestation areas of community-acquired infection and antibiotic-resistant bacteriophages. Determining the correlation between SAA and WBC count on such infections will be an interesting source of information on host-pathogen interactions and will be used to formulate more successful diagnostic and therapeutic interventions [13,14].

Thus, the objective of the current study is to examine the association between the level of Serum Amyloid A and White Blood Cell count in patients with bacterial skin infections of different severity. This study aims to unravel the question on whether SAA can be a sensitive biomarker reflecting the severity of infection and be used to supplement the conventional hematological biomarkers by comparing these parameters among mild, moderate, and severe clinical presentations. Knowing this relationship can guide clinicians to forecast the course of the disease and make better treatment choices and patient outcomes as a result of early diagnosis and specific treatment [15,16].

The study shows that the use of biochemical and hematological markers in clinical assessment is becoming increasingly more important and that SAA can serve as a diagnostic measure besides acting as a prognosis factor when it comes to measuring the severity of inflammation in bacterial skin infections.

Methodology:

This prospective case–control study was conducted from 10 April 2025 to 10 August 2025 and enrolled 80 consecutive patients with bacterial skin infections who presented to dermatology and emergency clinics in Al-Naseriah general hospital , together with 50 healthy, age- and sex-matched controls. Diagnosis of bacterial skin infection was made by an experienced clinician based on typical clinical features (erythema, warmth, swelling, pain, purulent discharge when present) and, when indicated, supported by wound swab/pus culture and Gram stain; cases were further classified as mild (localized without systemic signs), moderate (extensive local disease or requiring oral antibiotics), or severe (systemic signs, need for IV antibiotics or hospitalization). Inclusion criteria were adults ≥18 years with a new, clinically confirmed bacterial skin infection and symptom onset within 7 days; controls were healthy volunteers without recent infection or

inflammatory disease. Exclusion criteria comprised current or recent (within 14 days) systemic antibiotic therapy, known immunosuppression (HIV, chemotherapy, systemic steroids), chronic inflammatory or autoimmune disorders, chronic liver or renal failure, malignancy, pregnancy, and any hematological disease that could affect white cell or platelet counts. After informed consent and ethics committee approval, demographic and clinical data (age, sex, BMI, smoking, temperature) were recorded; from each subject 5 mL venous blood was drawn—3 mL into EDTA for complete blood count (automated analyzer) and differential, and 2 mL into plain tubes for serum separation. Serum amyloid A (SAA) was measured by ELISA, C-reactive protein (CRP) by immunoturbidimetric assay, and other routine chemistry as required; all samples were processed within two hours of collection and assays performed in the hospital laboratory under standard quality controls.

Statistical analysis:

Statistical comparisons used t-tests or Mann–Whitney tests for two-group analyses, ANOVA for multi-group comparisons, chi-square for categorical data, and Pearson correlation for biomarker relationships; significance was set at $p<0.05$.

Ethical approval:

The study was approved by the human ethics committee of Al-Naserieah general hospital, Everyone who took part in the study was told about it and asked to sign a consent form. The patient was also guaranteed that his information would be kept private.

Results

Sociodemographic Characteristics of Patients with Bacterial Skin Infections and Healthy Controls

The findings indicated that the age of patients with bacterial skin infections was 42.3 ± 14.7 years, whereas the age of patients in the control group was 40.8 ± 13.2 years, and no statistically significant difference between the two groups was found (t = 0.59, P = 0.556). As far as gender is concerned, males were represented by 55.0 and 52.0 percent of patients and controls, respectively, females were represented by 45.0 and 48.0 percent, respectively, and no statistically significant difference was observed ($\chi^2 = 0.12$, P = 0.729). Concerning body mass index (BMI), the patients had a mean of 26.4 + 4.1, and the control group had a mean of 25.1 + 3.8 and the difference was not statistically significant (t = 1.78, P = 0.078). About the current smoking, 31.3% of patients and 24.0% of controls were smokers, and the difference between the two groups was not statistically significant ($\chi^2 = 0.82$, P = 0.365). These findings imply that the two groups were comparable as regards to the simple sociodemographic traits, which increases the validity of biochemical comparisons of the two groups in the study.

Table 1: Comparison of Age, Gender, BMI, and Smoking Status Between Study Groups

Variable	Patients with Bacterial Skin Infections (n=80)	Healthy Controls (n=50)	Test Statistic	P-value
Age (years), mean ± SD	42.3 ± 14.7	40.8 ± 13.2	t = 0.59	0.556
Gender, n (%)			**$\chi^2 = 0.12$**	**0.729**
· Male	44 (55.0%)	26 (52.0%)		
· Female	36 (45.0%)	24 (48.0%)		
BMI (kg/m²), mean ± SD	26.4 ± 4.1	25.1 ± 3.8	t = 1.78	0.078
Current Smokers, n (%)	25 (31.3%)	12 (24.0%)	$\chi^2 = 0.82$	0.365

Comparison of Inflammatory Biomarkers Between Patients with Bacterial Skin Infections and Healthy Controls

The results showed clear and statistically significant differences between patients with bacterial skin infections and the control group with regard to inflammatory indicators. The mean serum amyloid A concentration in patients was 148.6 ± 42.3 mg/L, compared to 5.2 ± 2.1 mg/L in controls ($t = 25.84$, $P < 0.001$). The mean white blood cell count in patients was 12.8 ± 3.2 × 10^3/μL versus 6.5 ± 1.4 × 10^3/μL in controls ($t = 13.92$, $P < 0.001$), and the mean neutrophil count was 9.4 ± 2.8 × 10^3/μL versus 3.8 ± 1.1 × 10^3/μL in controls ($t = 14.27$, $P < 0.001$). The mean C-reactive protein level was 38.7 ± 12.5 mg/L in patients and 2.1 ± 1.3 mg/L in controls ($t = 22.15$, $P < 0.001$). The consequences of these findings are that there is a substantial elevation of inflammatory indicators in the patients, which signify a good immune reaction in relation to a bacterial skin infection.

Table 2: Serum Amyloid A, White Blood Cells, Neutrophils, and C-reactive Protein Levels

Parameter	Patients (n=80) Mean ± SD	Controls (n=50) Mean ± SD	Test Statistic	P-value
Serum Amyloid A (mg/L)	148.6 ± 42.3	5.2 ± 2.1	t = 25.84	<0.001
White Blood Cells (×10^3/μL)	12.8 ± 3.2	6.5 ± 1.4	t = 13.92	<0.001
Neutrophils (×10^3/μL)	9.4 ± 2.8	3.8 ± 1.1	t = 14.27	<0.001
C-reactive Protein (mg/L)	38.7 ± 12.5	2.1 ± 1.3	t = 22.15	<0.001

Distribution of Bacterial Skin Infection Types Among Patients

The findings indicate that most frequent bacterial skin infections among patients were the Cellulitis with 40.0% (32 cases) and Abscess with 31.3% (25 cases). There were also cases of 12 incidences of 15.0% of impetigo and 11 incidences of 13.7% of Erysipelas. These data reveal that the proportion of bacterial skin infections in this sample is made up of Cellulitis and Abscess which constitutes very large majority of the infections in the population of the study.

Table 4: Frequency and Percentage of Cellulitis, Abscess, Impetigo, and Erysipelas

Infection Type	Number of Cases (n=80)	Percentage (%)
Cellulitis	32	40.0%
Abscess	25	31.3%
Impetigo	12	15.0%
Erysipelas	11	13.7%

Correlation Between Serum Amyloid A and Clinical Parameters in Patients with Bacterial Skin Infections

The correlation analysis showed that the number of white blood cells ($r = 0.72$, $P < 0.001$), neutrophils ($r = 0.68$, $P < 0.001$) and the level of C-reactive protein (CRP) and Serum Amyloid A concentration ($r = 0.72$, $P < 0.001$) have strong and positive and statistically significant positive correlation. This was correlated relative to the body temperature with a moderate level of significance ($r = 0.51$, $P = 0.001$). Such results may indicate that high concentrations of Serum Amyloid A are strongly connected with the increased concentration of inflammatory products, and white blood cells, and moderately connected with the increased body temperature which is reasonable because it is used as a convenient biomarker to assess the severity of inflammation in patients with bacterial skin infections.

Table 4: Pearson's Correlation Coefficients Between Serum Amyloid A, White Blood Cells, Neutrophils, C-reactive Protein, and Body Temperature

Parameter 1	Parameter 2	Pearson's r	P-value
Serum Amyloid A	White Blood Cell Count	0.72	<0.001
Serum Amyloid A	Neutrophil Count	0.68	<0.001
Serum Amyloid A	C-reactive Protein	0.75	<0.001
Serum Amyloid A	Body Temperature	0.51	<0.001

Comparative Analysis of Serum Amyloid A, WBC Count, and CRP Levels According to Disease Severity in Patients with Bacterial Skin Infections

The results showed the existence of a direct correlation between the extent of skin bacterial infection and the concentrations of the studied indicators of inflammation. A considerable amount of variability in the mean concentration of Serum Amyloid A and the number of white blood cells (WBC) and the amount of c-reactive protein (CRP) was observed as the disease became more severe. The mild cases had lower values than the moderate and severe cases with the mean level of Serum Amyloid A coming to (85.4 ± 18.2) in mild cases and gradually rising to (218.7 ± 35.9) in severe cases. The number of white blood cells was also raised as (9.2 ± 1.5) to (16.5 ± 2.3), as well as CRP was raised (22.8 ± 6.4) to (59.3 ± 11.7). All these differences were very statistically significant ($P < 0.001$), which shows that the rise in these indicators indicates the rise of the intensity of inflammation due to bacterial infection of the skin.

Table 5: Association Between Inflammatory Biomarkers and Clinical Severity

Disease Severity	n	Serum Amyloid A (mg/L)	WBC Count ($\times 10^3/\mu L$)	CRP (mg/L)
Mild	25	85.4 ± 18.2	9.2 ± 1.5	22.8 ± 6.4
Moderate	38	146.2 ± 22.7	12.9 ± 1.8	38.5 ± 8.1
Severe	17	218.7 ± 35.9	16.5 ± 2.3	59.3 ± 11.7
P-value (ANOVA)		**<0.001**	**<0.001**	**<0.001**

Discussion:

The current paper has assessed demographic factors, inflammatory biomarkers and clinical severity of patients having bacterial skin infections versus healthy controls. There were no significant differences in age, gender, and BMI or a smoking status between the patients and controls ($p > 0.05$) following the analysis of the demographic data (Table 1). This homogeneity of the demographic reduces the effect of confounding factors, which implies that the differences in the presence of inflammatory markers are observed, which may be related to the presence of infections and not the inherent population properties. The results are consistent with [17] who found that age and sex did not have significant effects on the acute-phase protein levels in infectious diseases. In contrast, other authors have observed that obesity and smoking may increase inflammatory reactions and this could be the cause of the moderately higher BMI and smoking rate in our group of patients, though it was not statistically significant [18].

Large increases of Serum Amyloid A (SAA), white blood cell (WBC), neutrophils, and C-reactive protein (CRP) were found in patients relative to controls (Table 2, $p < 0.001$). These findings indicate a solid systemic immune to bacterial cutaneous infections. The noted rise in SAA and CRP is congruent with the existing literature that states that they are sensitive biomarkers of acute bacterial infection [19,20]. The significant increase in the number of WBC and neutrophils indicates the involvement of the innate immune system since neutrophils can be considered the initial line of defense against the invasion of bacteria. Other studies have also reported slight differences in the magnitude of biomarker elevations, probably a result of differentiation in the

type of infection, bacteria load and the time of collection of these samples compared to onset of symptoms [20,21].

The analysis of infection types used in this study (Table 3) showed that cellulitis was the most dominant type (40%), then abscesses (31.3), impetigo (15%), and erysipelas (13.7). Such results are in line with the epidemiological evidence in the similar populations of clinical practices, whereby cellulitis and abscesses are more often the main types of bacterial skin infections [22]. The variations in prevalence could occur due to the presence of regional disparity in bacterial strains, access to healthcare, and diagnostic methods applicable [23,24].

Correlation analysis (Table 4) indicated that there was a strong positive relationship between SAA and WBC count ($r = 0.72$), neutrophils ($r = 0.68$), CRP ($r = 0.75$) and moderate correlation with body temperature ($r = 0.51$). The results of these findings suggest that SAA is a reliable indicator of systemic inflammatory states and certain laboratory and clinical findings related to infection. The same correlations have been reported in other studies, which proves the usefulness of SAA as a prognostic indicator in bacterial infections [25]. The differences in strengths of correlation that have been reported elsewhere could be due to the dissimilarity in the age of patients, the chronicity of the infection, or the sensitivity of laboratory assays [26].

Comparison of levels of biomarkers based on the severity of the disease (Table 5) showed a linear gradient: in severe cases the maximum levels of SAA (218.7 ± 35.9 mg/L), WBC ($16.5 \pm 2.3 \times 10^3/\mu L$), and CRP ($59.3 \pm 11.7$ mg/L) were observed, then moderate and mild ones. Such results lead to the conclusion that inflammatory biomarkers as objective markers of the severity of the infection are applicable, which is consistent with the previous studies that confirmed that elevated SAA and CRP levels were linked to more serious bacterial infections [27]. The variation of absolute biomarker values in different studies could be attributed to differences in the virulence of the pathogen, location of infection and collection of samples [28].

Conclusion:

Lastly, it has been determined by the study that bacterial skin infections may trigger a coordinated inflammatory process and one of the findings is that acute-phase proteins and leukocyte parameters are highly raised and are associated with the clinical severity. In particular, SAA may be considered as a reliable biomarker to monitor the course of the infection. Comparisons to the existing literature prove validity of the obtained results as well as introduce potential sources of variation, such as the differences in demographics, features of infections, and approaches. Combined, these results suggest the importance of integrating diverse parameters of inflammation in to a complex clinical assessment of patients and their therapy.

References

1. Falcone, Marco, et al. "Diabetes and acute bacterial skin and skin structure infections." diabetes research and clinical practice 174 (2021): 108732.
2. Saeed, Javaria, et al. "Experimental and in silico evaluation of Carthamus tinctorius L. oil emulgel: a promising treatment for bacterial skin infections." Frontiers in Cellular and Infection Microbiology 13 (2023): 1253095.
3. Mohammad, Sarmad, Abdullah Mohsen, and Idriss Jalil. "Assessing the prevalence of bacterial vaginosis among infertile women in Thi-Qar Province, Iraq." Infection Epidemiology and Microbiology 10.4 (2024): 0-0.
4. Chang, Yixin, et al. "Recent advances in studies of serum amyloid A: implications in inflammation, immunity and tumor metastasis." International Journal of Molecular Sciences 26.3 (2025): 987.
5. Hamad, Anas Abdullah, Hamssa Majid Mustafa, and Osama A. Mohsein. "Detection of the levels of immune cytokines (IL4, IL5, TNF-α) in school-age and preschoolers with an Ascaris lumbricoides infection." Journal of Parasitic Diseases 48.4 (2024): 782-787.

6. Abbas, Zainab Khamis, et al. "Immunological biomarkers and their role in the diagnosis and prognosis of leishmaniasis: A case–control study." Tropical Parasitology 15.1 (2025): 33-41.
7. Muna, Aliaa M., and Russul A. ALhameed. "The role of C-reactive protein and white blood cell count as diagnostic, prognostic, and monitoring markers in bacterial orofacial infections." Journal of Oral and Maxillofacial Surgery 80.3 (2022): 530-536.
8. Abdulmuttaleb, Nabaa Azhar, Mohammed Qasim Mohammed, and Osama Akram Mohsein. "Exploring the connection between inflammatory cytokines, hypertension, and diabetes in angina patients." Cytokines 14.15 (2024): 16.
9. Ismail, Mona Adel, et al. "Exploring the genetic variability of Escherichia coli pathotypes in urinary tract infections: implications for diagnostics and treatment." Central Asian Journal of Medical and Natural Science 6.1 (2025): 179-191.
10. Zhu, Shunxin, et al. "The clinical diagnostic values of SAA, PCT, CRP, and IL-6 in children with bacterial, viral, or co-infections." International Journal of General Medicine (2021): 7107-7113.
11. Abdulhussien, Adeeb Abdulally, Zainab M. Farhan, and Osama A. Mohsein. "The Clinico-Pathological Role of Horizontal Gene Transfer in the Ability of Pseudomonas Aeruginosa to Cause Disease in Lung Tissue." European Journal of Medical and Health Research 3.1 (2025): 27-34.
12. Taha, Ruqayah Qubtan, et al. "Bacterial aetiologies of otitis media and their antimicrobial susceptibility in ear swab culture." IJBS 6.1 (2024): 94-99.
13. Donato, Giulia, et al. "A retrospective comparative evaluation of selected blood cell ratios, acute phase proteins, and leukocyte changes suggestive of inflammation in cats." Animals 13.16 (2023): 2579.
14. Powanda, Michael C., and Elizabeth D. Moyer. "A brief, highly selective history of acute phase proteins as indicators of infection, inflammation and injury." Inflammopharmacology 29.3 (2021): 897-901.
15. Faqri, Ayoob Murtadha Alshaikh, et al. "The Role of Cytokines in Autoimmune Diseases: Pathogenesis and Therapeutic Implications." Central Asian Journal of Medical and Natural Science 6.3 (2025): 852-873.
16. Al-Isawi, S. A., et al. "The impact of trace elements and cytokines on the pathogenesis and severity of acne." Regulatory Mechanisms in Biosystems 16.2 (2025): e25080-e25080.
17. Ain, Qurrat Ul, et al. "Confounders in identification and analysis of inflammatory biomarkers in cardiovascular diseases." Biomolecules 11.10 (2021): 1464.
18. Liu, Ruen, et al. "Systemic inflammation versus clinical demographics: patient age surpasses the platelet-to-lymphocyte ratio in differentiating secondary trigeminal neuralgia." Frontiers in Aging Neuroscience 17 (2025): 1658854.
19. Zhu, Shunxin, et al. "The clinical diagnostic values of SAA, PCT, CRP, and IL-6 in children with bacterial, viral, or co-infections." International Journal of General Medicine (2021): 7107-7113.
20. Levinson, Tal, and Asaf Wasserman. "C-reactive protein velocity (CRPv) as a new biomarker for the early detection of acute infection/inflammation." International journal of molecular sciences 23.15 (2022): 8100.
21. Ali, Ahmed Abdulkareem, Ruqayah Qubtan Taha, and Hamza A. Khalid. "Frequency and sensitivity of Proteus spp, Pseudomonas spp, and Staphylococcus spp in urine cultures." Central Asian Journal of Medical and Natural Science 4.6 (2023): 889-900.

22. Shih, En-Jie, et al. "Differences in characteristics, aetiologies, isolated pathogens, and the efficacy of antibiotics in adult patients with preseptal cellulitis and orbital cellulitis between 2000–2009 and 2010–2019." British Journal of Ophthalmology 107.3 (2023): 331-336.
23. Grossi, Antonio Paolo, et al. "Skin infections in Europe: a retrospective study of incidence, patient characteristics and practice patterns." International Journal of Antimicrobial Agents 60.3 (2022): 106637.
24. Skuhala, Tomislava, et al. "Analysis of types of skin lesions and diseases in everyday infectious disease practice—how experienced are we?." Life 12.7 (2022): 978.
25. Chang, Huanhuan, and Jiao Li. "“Lymphocyte* Neutrophil” count decreased in SARS-CoV-2 Omicron patients in Shanghai with no significant change in CRP and SAA." Journal of clinical laboratory analysis 36.10 (2022): e24671.
26. Cho, Jooyoung, et al. "Performance comparison of procalcitonin, delta neutrophil index, C-reactive protein, and serum amyloid A levels in patients with hematologic diseases." Diagnostics 13.7 (2023): 1213.
27. Sejersen, Kristina, Mats B. Eriksson, and Anders O. Larsson. "Calprotectin as a Biomarker for Infectious Diseases: A Comparative Review with Conventional Inflammatory Markers." International Journal of Molecular Sciences 26.13 (2025): 6476.
28. Ancuța, Diana-Larisa, Arianna Barbara Lovati, and Cristin Coman. "The clinical significance of inflammatory biomarkers, IL6 cytokine, and systemic immune inflammatory index in rabbit model of acute and chronic Methicillin-resistant Staphylococcus epidermidis-induced osteomyelitis." Plos one 19.8 (2024): e0309145.