Objectives: There is a controversy on the diagnostic reliability and accuracy of synovial fluid α-defensin in periprosthetic joint infection (PJI). We performed this meta-analysis to evaluate the diagnostic accuracy of the α-defensin lateral flow test in PJI.

Methods: PubMed, Embase, and the Cochrane library were systematically searched, and articles (up to January 2020) on the diagnosis of hip and knee PJIs using the α-defensin Synovasure lateral flow test were included. The diagnostic accuracy of the α-defensin lateral flow test in PJI was evaluated using meta-analysis. The pooled sensitivity, specificity, accuracy, positive and negative likelihood ratio, diagnostic odds ratio, and post-test probabilities were calculated.

Results: Seventeen studies including 1443 cases were included. Meta-analysis showed the pooled sensitivity, specificity, positive likelihood ratio, negative likelihood ratio, and a diagnostic odds ratio was 0.83 (95% CI 0.77, 0.88), 0.95 (95% CI 0.93, 0.97), 16.86 (95% CI 11.67, 24.37), 0.17 (95% CI 0.13, 0.24) and 85.30 (95% CI 47.76, 152.35), respectively. The area under the hierarchical summary receiver operating characteristic curve was 0.97 (95% CI 0.95, 0.98). Subgroup analysis also confirmed the high efficiency of α-defensin Synovasure lateral flow test in diagnosing PJIs, irrespective of ethnicity. Fagan’s nomogram analysis there was a high positive post-test probability of 94% and a low negative post-test probability of 15%.

Conclusions: We indicated that the α-defensin lateral flow test had a high accuracy for diagnosing PJI. Large-scale studies are needed to validate its significance in PJI diagnosis.

Key words: Arthroplasty; Periprosthetic joint infection; Systematic review; α-defensin lateral flow test

Introduction
Periprosthetic joint infection (PJI) is an inevitable and catastrophic complication after total joint arthroplasty. The morbidity of PJI post primary total knee and hip arthroplasty is approximately 1%–4% and 1% within 2 years, respectively.¹⁻² It increases by more than two-fold times after revision total hip and knee arthroplasty.³⁻⁵ In addition, PJI is the most common cause for revision total joint arthroplasty, accounting for approximately 20%–47% of early or late revisions.⁶⁻⁸ Although the incidence of PJI is relatively low, it causes...
profound health, financial, and socioeconomic burdens on patients and reduces the quality of life. The accurate and timely preoperative diagnosis of PJI post arthroplasty surgeries is important to manage the catastrophic complication.

Some studies have shown the concordance between patient-related risk factors and the incidence of PJI. There is much evidence showing that comorbid conditions and medical risk factors including morbid obesity, malnutrition, hyperglycemia, malnutrition, hyperglycemia, cardiovascular disorders, and preoperative anemia associate with an increased adjusted risk of PJI\(^2,3,9,10\). The most common organisms identified in the infected joints include *Staphylococcus aureus* (*S. aureus*), methicillin-sensitive *S. aureus* (MRSA), and *S. epidermidis*\(^2,5,11\). Biomarkers including synovial fluid cell count\(^12\), C-reactive protein (CRP)\(^13\), interleukin-6 (IL-6), and α-defensin\(^12,14\) have potential efficacy in diagnosing PJI. Accordingly, the diagnostic criteria as defined by the Musculoskeletal Infection Society (MSIS) included pathogen isolation, serum CRP, synovial leukocytes, and neutrophils\(^15\), which has been regarded as the reference standard for diagnosing PJI.

Since the publication of MSIS criteria, there is tremendous evidence that shows the potential to improve the accuracy in PJI diagnosis. Alpha-defensin is a small (30–50 arginine-rich amino acid), cationic, and non-oxidative antimicrobial peptide that is mainly synthesized and secreted by polymorphonuclear lymphocytes including neutrophils (1, 2, 3, and 4 subtypes) and Paneth cells (5 and 6 subtypes) of the ileum in response to pathogens\(^16–20\). Alpha-defensin is naturally released by neutrophils into the synovial fluid in response to pathogens\(^16,21,22\). It induces rapid death of the microorganisms by promoting depolarization of the cell membrane via interacting with or binding to the negatively charged membranes\(^16,27,22\). Recent evidence shows that Alpha-defensin might be an ideal biomarker for PJI\(^14,23\). Ahmad et al.\(^14\) proved that laboratory-based α-defensin ELISA test showed a higher ever reported accuracy in PJI diagnosis compared with Synovasure lateral flow test. In 2018, Han et al.\(^23\) indicated that laboratory-based α-defensin ELISA test has a higher pooled sensitivity, specificity, and accuracy than the α-defensin lateral flow test (sensitivity: 0.96 vs 0.86; specificity: 0.97 vs 0.96; accuracy: 0.99 vs 0.95, respectively). However, some studies showed the higher accuracy of the α-defensin lateral flow test in PJI diagnosis than the MSIS criteria including CRP and erythrocyte sedimentation rate (ESR), and polymorphonuclear lymphocytes\(^2,24\). Accordingly, α-defensin protein has been recommended to be included in the diagnostic algorithm in the future\(^12,14,23\). Before that, the accuracy of the α-defensin lateral flow test in PJI should be fully analyzed.

Several studies focusing on the intraoperative performance of the α-defensin lateral flow test in PJI diagnosis have been published during the past 2 years\(^25–27\). The reanalysis of the performance of the α-defensin lateral flow test in PJI diagnosis is necessary. Therefore, the purpose of this study was to evaluate the diagnostic reliability and accuracy of the α-defensin lateral flow test in PJI.

**Materials and Methods**

**Ethics Statement**

This study was a systematic review and meta-analysis to evaluate the accuracy of the α-defensin lateral flow test in PJI diagnosis.

![Flow chart of selection process for eligible studies.](image)

Table 1: The study inclusion criteria (PICOS-criteria) used in this current study

| Parameter | Inclusion criteria |
|-----------|-------------------|
| **Population** | Patients have hip and knee PJs after total hip/knee arthroplasty; without restrictions on sex, race, and age |
| **Intervention** | α-defensin lateral flow test (Synovasure™) was used to assess PJs |
| **Comparison** | Without interventions before diagnosis of PJs. Other diagnostic methods could be used as comparisons |
| **Outcome** | Diagnostic accuracy of PJI using α-defensin lateral flow test; The false-negative, false-positive, true positive, and true negative data were included. |
| **Study design** | Retrospective, prospective, and cohort studies published in English |

**TABLE 1 The study inclusion criteria (PICOS-criteria) used in this current study**
| Study          | Year | Study design | Region  | Participants | Median age (range, yrs) | Detection method | Assay platform                                      | Gold standard | TP | FP | FN | TN |
|----------------|------|--------------|---------|--------------|------------------------|------------------|---------------------------------------------------|---------------|----|----|----|----|
| Kasparek et al. | 2016 | retrospective | USA     | 40           | 71 (41–91)            | Lateral flow test | Synovasure (CD Diagnostics)                       | MSIS          | 8  | 2  | 4  | 26 |
| Suda et al.    | 2017 | prospective  | Germany | 28           | 67.7 (39–88)          | Lateral flow test | Synovasure™ PJI Test (Zimmer, Warsaw, IN)         | MSIS          | 10 | 3  | 3  | 14 |
| Sigmund et al. | 2017 | prospective  | Austria  | 49           | 65 (20–89)            | Lateral flow test | Synovasure                                        | MSIS          | 9  | 2  | 4  | 34 |
| Vincent et al. | 2018 | prospective  | France   | 39           | NA (35–78)            | Lateral flow test | Synovasure™, (Zimmer, Warsaw, IN)                | MSIS          | 8  | 3  | 1  | 29 |
| Scholten et al.| 2018 | prospective  | Netherlands | 37       | 66 (51–81)           | Lateral flow test | Synovasure™, (Zimmer, Warsaw, IN)                | MSIS          | 1  | 0  | 4  | 29 |
| Gehrke et al.  | 2018 | prospective  | Germany  | 191          | NA                    | Lateral flow test | Synovasure kit                                    | MSIS          | 70 | 0  | 6  | 119|
| Sigmund et al. | 2018 | retrospective | Germany  | 71           | 70 (41–85)            | Lateral flow test | Synovasure kit (Zimmer Biomet)                  | MSIS          | 48 | 1  | 12 | 22 |
| Riccio et al.  | 2018 | retrospective | Italy    | 72           | 68.7 (57–79)          | Lateral flow test | Synovasure (CD Diagnostics)                       | MSIS          | 34 | 1  | 6  | 32 |
| Renz et al.    | 2018 | prospective  | Germany  | 167          | 70 (41–94)            | Lateral flow test | Synovasure kit (Zimmer Biomet)                  | MSIS          | 38 | 1  | 7  | 33 |
| Kuiper et al.  | 2020 | cohort       | Netherlands | 52       | 72 (9.2)              | Lateral flow test | Synovasure (CD Diagnostics)                       | MSIS          | 6  | 5  | 0  | 41 |
| Balato et al.  | 2017 | prospective  | Italy    | 52           | 63 (48–79)            | Lateral flow test | Synovasure (CD Diagnostics)                       | MSIS          | 14 | 1  | 2  | 34 |
| Ding et al.    | 2019 | retrospective | Singapore | 70           | 67                    | Lateral flow test | Synovasure kit (Zimmer Biomet)                  | MSIS          | 14 | 4  | 5  | 47 |
| Plate et al.   | 2018 | prospective  | Switzerland | 109     | 63(48–85)             | Lateral flow test | Synovasure(Zimmer Biomet, Winterthur, Switzerland) | MSIS          | 18 | 7  | 2  | 82 |
| Sigmund et al. | 2019 | prospective  | Austria  | 101          | 71(22–91)             | Lateral flow test | Synovasure (Zimmer Inc., Warsaw,JN, USA)         | MSIS          | 21 | 4  | 9  | 67 |
| Stone et al.   | 2018 | retrospective | USA      | 183          | 65.7 (34–91)          | Lateral flow test | Synovasure (CD Diagnostics)                       | MSIS          | 30 | 6  | 7  | 140|
| Bingham et al. | 2014 | retrospective | USA      | 61           | 64.2                  | Lateral flow test | Synovasure (CD Diagnostics Inc., Wynnewood, PA,USA) | MSIS          | 21 | 2  | 0  | 38 |
| Berger et al.  | 2017 | cohort       | Belgium  | 121          | 63.5 (36–88)          | Lateral flow test | Synovasure (PJI lateral flow; Zimmer Biomet, Warsaw, Indiana) | MSIS          | 33 | 3  | 1  | 84 |

FN, false negative; FP, false positive; MSIS, Musculoskeletal Infection Society; NA, not applicable; TN, true negative; TP, true positive.
This study was performed according to the guidelines for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. This systematic review did not include animal and human experiments, and the ethics committee approval was not applicable accordingly.

**Search Strategy**

Studies that were published up to January 2020 were searched in medical databases (PubMed, Embase, and the Cochrane library) using the keywords “periprosthetic joint infection,” “prosthesis-related infections,” “synovial α-defensin,” “synovial alpha defensin” and “synovial defensin.” The search strategy was “periprosthetic joint infection [Title/Abstract] OR periprosthetic joint infection [MeSH Terms] OR prosthesis-related infections [Title/Abstract] OR prosthesis-related infections [MeSH Terms]” AND “α-defensin [MeSH Terms] OR α-defensin [Title/Abstract] OR alpha defensing [Title/Abstract] OR alpha defensing [MeSH Terms] OR defensing [Title/Abstract] OR defensing [MeSH Terms]” AND “sensitivity and specificity* OR accuracy OR predictive value* OR ROC OR likelihood ratio*.” Eligible studies were manually searched from the reference lists of the review articles and included studies.

**Study Selection**

Studies were independently selected by two authors. The inclusion criteria were: (i) studies that evaluate the diagnostic accuracy of PJI using α-defensin lateral flow test; (ii) studies did not put restrictions on sex, race, and age; (iii) English articles; (iv) PJJIs were diagnosed according to the recommended criteria by MSIS or modified criteria by International Consensus Meeting; and (v) studies with complete clinical data (diagnosis criteria, assay platform, and the number of patients with true positive, false positive, true negative, and false negative PJI) that could be used for the sensitivity and specificity. The inclusion criteria are shown in Table 1. Patients with true-positive PJJIs were defined as suspected PJJIs by α-defensin test and final diagnosis by culture-positive microbiology investigation of preoperative aspirates and intraoperative samples of synovial fluid. False-positive was defined as: the α-defensin test showed positive reactions, but aspirates were culture-negative. True negatives were defined when the α-defensin test was negative and aspirates were
culture-negative, while false-negatives were defined when the α-defensin test was positive, but aspirates were culture-positive.

Studies were excluded if they were: (i) with incomplete data; (ii) duplicated articles (articles using the same study cohort); (iii) contained patients with infection of sites or organs outside the periarticular prosthesis; and (iv) reviews, animal studies, comments or conference paper without complete clinical data.

Data Extraction and Quality Assessment
The false negative, false positive, true positive, and true negative data in each article were extracted. Article quality was evaluated independently by two reviewers using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) quality appraisal tool, which consists of four domains: patient selection, index test, reference standard, and flow and timing. The risk of bias and applicability concerns of included studies was assessed. A discussion was required to resolve disagreements, and adjudication was made by a third reviewer.

Statistical Analysis
Data were processed and analyzed using the Stata 15.1 and RevMan5.2 software. A mixed-effect model for bivariate meta-analysis of diagnostic test accuracy studies was used to calculate the sensitivity, specificity, positive likelihood ratio, negative likelihood ratio, and diagnostic odds ratio. A hierarchical summary receiver operating characteristic curve (HSROC) was calculated. The heterogeneity of data across studies was statistically assessed by the Q test and I-square

Fig. 3 Sensitivity analysis of the included studies.

Fig. 4 Pooled sensitivity and specificity for the diagnostic efficiency of periprosthetic joint infection using the α-defensin lateral flow test. CI, confidence interval.
Results

Study Selection
Medical databases included 161 studies that related to the keywords. After removing 68 duplicated articles, 93 publications were screened based on title and abstract. After the full-text screening, 17 studies\(^{15,25-27,31-43}\) were included according to the predetermined inclusion and exclusion criteria (Fig. 1 and Table 1).

Study Characteristics
All the 17 studies\(^{5,25-27,31-43}\) evaluated the diagnostic accuracy of the \(\alpha\)-defensin lateral flow test in PJI (Table 2). In total, 1443 cases who underwent hip or knee arthroplasty surgeries were included. All studies included the number of patients with false negative, false positive, true positive, and true negative PJI. Among the 17 included studies, nine were prospective studies\(^{26,32-36,39-41}\), six were retrospective studies\(^{15,27,31,37,38,42}\), and two were cohort studies\(^{25,43}\). Also, 13 studies were performed in European countries, including Germany\(^{32,36,37,39}\), France\(^{34}\), Netherlands\(^{25,35}\), Italy\(^{38,40}\), Switzerland\(^{41}\), Belgium\(^{43}\), and Austria\(^{26,33}\), three in the USA\(^{15,31,42}\), and one in Singapore\(^{37}\), and two in. All studies were published between 2014 and 2020.

Quality Assessment
There was a low risk of bias and applicability concerns based on the QUADAS-2 quality appraisal tool (Fig. 2A). Egger’s \((t = 1.39, 95\% \text{ CI} -0.96, 4.30, P = 0.191\); Fig. 2B) and Begg’s test \((z = 1.95, \text{ Pr } > |z| = 0.059, \text{ continuity corrected}; \text{Fig. 2C})\) indicated that there was no evidence of significant publication bias in the 17 included studies. Sensitivity analysis showed that the results of true positive were relatively stable and reliable (Fig. 3).

Meta-Analysis for the Diagnostic Efficiency of PJI Using the \(\alpha\)-Defensin Lateral Flow Test
Meta-analysis indicated that the \(\alpha\)-defensin lateral flow test had a pooled sensitivity of 0.83 (95\% CI 0.77, 0.88; \(I^2 = 59.90\%\)) and a pooled specificity of 0.95 (95\% CI 0.93,
0.97; $I^2 = 29.75\%$) in diagnosing PJIIs (Fig. 4). The pooled positive likelihood ratio was 16.86 (95% CI 11.67, 24.37, $I^2 = 0\%$), pooled negative likelihood ratio was 0.17 (95% CI 0.13, 0.24, $I^2 = 0\%$; Fig. 5), with a pooled diagnostic odds ratio of 85.30 (95% CI 47.76, 152.35; $I^2 = 30.9\%$; Fig. 6).

**Subgroup Analysis for the Diagnostic Efficiency of PJI**

Subgroup analysis was performed to analyze the regional difference in diagnostic efficiency of PJI using the $\alpha$-defensin lateral flow test. We found the diagnostic sensitivity of the $\alpha$-defensin lateral flow test for PJI was 0.81 (95% CI 0.67, 0.90) and 0.85 (95% CI 0.78, 0.90) in patients from Europe countries ($n = 11$) and others ($n = 6$), respectively, and the specificity was 0.96 (95% CI 0.92, 0.97) and 0.95 (95% CI 0.91, 0.97), respectively (Table 3). Besides, the $\alpha$-defensin lateral flow test had a sensitivity of 0.82 (95% CI 0.76, 0.87) and 0.85 (95% CI 0.75, 0.91), and an equivalent specificity of 0.95 (95% CI 0.92, 0.97) in diagnosing PJI based on the retrospective experience and prospective/cohort experience, respectively (Table 3).

**Accuracy and Validation**

The area under the HSROC curve (AUC) was 0.97 (95% CI 0.95, 0.98), with a high sensitivity of 0.83 (95% CI 0.77, 0.88) and specificity of 0.95 (95% CI 0.93, 0.97; Fig. 7A). Based on the Fagan’s nomogram analysis, we found there was a high positive post-test probability of 94% and a low negative post-test probability of 15% (Fig. 7B). These data showed that the $\alpha$-defensin lateral flow test had high accuracy in diagnosing PJI. Subgroup analysis also confirmed that the AUC value of the $\alpha$-defensin lateral flow test in PJI diagnosis were 0.97 (95% CI 0.95, 0.98) and 0.96 (95% CI 0.94, 0.97) in patients from Europe and other countries, respectively (Table 3), and were 0.96 (95% CI 0.94, 0.97), and 0.97 (95% CI 0.95, 0.98) based on the retrospective experience and prospective/cohort experience, respectively.
TABLE 3 The subgroup analysis for the efficiency of using α-defensin lateral flow test for periprosthetic joint infection

| Characteristic               | No. of Study | Sensitivity (95% CI) | Specificity (95% CI) | Diagnostic OR (95% CI) | AUC (95% CI) | LRP (95% CI) | LRN (95% CI) |
|-----------------------------|--------------|----------------------|----------------------|------------------------|--------------|-------------|-------------|
| Pooled All studies          | 17           | 0.83 (0.77, 0.88)    | 0.95 (0.93, 0.97)    | 97 (53, 176)           | 0.97 (0.95, 0.98) | 16.9 (11.7, 24.4) | 0.17 (0.13, 0.24) |
| Study design                |              |                      |                      |                        |              |             |             |
| Retrospective               | 6            | 0.82 (0.76, 0.87)    | 0.96 (0.92, 0.97)    | 87 (47, 162)           | 0.96 (0.95, 0.97) | 16.5 (10.2, 26.7) | 0.19 (0.14, 0.26) |
| Prospective/cohort          | 11           | 0.85 (0.75, 0.94)    | 0.96 (0.92, 0.97)    | 115 (67, 255)          | 0.97 (0.95, 0.97) | 18.5 (10.3, 33.2) | 0.20 (0.11, 0.30) |
| North America/Others Europe | 11           | 0.84 (0.79, 0.89)    | 0.96 (0.94, 0.97)    | 115 (67, 255)          | 0.97 (0.95, 0.97) | 18.5 (10.3, 33.2) | 0.20 (0.11, 0.30) |

**Discussion**

The diagnostic reliability and accuracy of α-defensin in PJI has been widely evaluated during the past few years, and some studies have confirmed that α-defensin is highly accurate for diagnosing PJI. While some indicate that the α-defensin lateral flow test is less sensitive and may be used as a confirmatory test for PJI. This systematic review and meta-analysis of 17 studies indicated that the α-defensin lateral flow test had a pooled sensitivity, specificity, and AUC of 0.83 (95% CI 0.77, 0.88), 0.95 (95% CI 0.93, 0.97), and 0.97 (95% CI 0.95, 0.98), respectively. The current study showed that the synovial fluid α-defensin test is a valuable indicator for PJI's post total knee/hip arthroplasty, which was consistent with that previously reported by others.

Neutrophil defensins are capable of inhibiting MRSA and regulating the production of cytokines including IL-1β and IL-8 and inflammatory responses. Wehkamp et al. indicated that α-defensin expression was increased in paneth cells of the ileum in patients in response to inflammation. Alpha-defensin is elevated in aspirates culture-positive for Propionibacterium acnes and is effective and capable of inhibiting the survival of MRSA and S. aureus. Some clinical studies showed that α-defensin was effective in predicting pathogen-positive cultures. Accordingly, α-defensin has been identified as an effective predictor of PJI.

When it comes to the diagnostic reliability and accuracy of α-defensin in PJI, there is a general agreement that the laboratory-based α-defensin ELISA test has a higher accuracy than the lateral flow test in diagnosing PJI. The α-defensin lateral flow test has a sensitivity ranging from 67% to 100% and a specificity ranging from 89% to 100%, and the laboratory-based α-defensin ELISA test has a sensitivity ranging from 85% to 100% and a similar specificity and accuracy. Our present study showed that the α-defensin lateral flow test had a pooled sensitivity of 0.83 (95% CI 0.77, 0.88), a pooled specificity of 0.95 (95% CI 0.93, 0.97), a pooled accuracy of 0.97 (95% CI 0.95, 0.98), a pooled positive likelihood ratio of 16.86 (95% CI 11.67, 24.37), a pooled negative likelihood ratio of 0.17 (95% CI 0.13, 0.24), and a pooled diagnostic odds ratio of 85.30 (95% CI 47.76, 152.35). Subgroup analysis showed its high sensitivity, specificity, and accuracy was not race related. These results were similar to the results reported by Han et al. and Ahmad et al. Taken together these results indicated that the laboratory-based α-defensin ELISA test might have higher diagnostic reliability and accuracy in PJI diagnosis than the α-defensin lateral flow test.

In comparison with MSIS criteria, however, the α-defensin lateral flow test had similar or higher diagnostic accuracy in diagnosing PJI. Balato et al. found that the α-defensin lateral flow test presented higher sensitivity (84.5%) and negative predictive value (94.4%) than CRP and ESR combination (81.3% and 90.6%, respectively), which previously reported by others.
synovial fluid white blood cell count (75.0% and 88.9%), two positive periprosthetic cultures (75.0% and 89.7%), sinus tract communicating with the prosthesis (25% and 74.5%) and synovial fluid polymorphonuclear percentage > 80% (75.0% and 89.5%). Ahmad et al. showed that CRP has a similar sensitivity (0.86, 95% CI 0.81, 0.91) and specificity (0.90 95% CI 0.86, 0.93) to the Synovasure™ test (0.78, 95% CI 0.66, 0.87; and 0.89, 95% CI 0.78, 0.95) in diagnosing PJI. These results suggested the high reliability of the α-defensin lateral flow test in diagnosing PJI and should be in conjunction with other MSIS criteria for PJI. Besides, the α-defensin lateral flow test had a significantly shorter examination period compared with the ELISA test. The result of the lateral flow test is available within 10 minutes. Therefore, the lateral flow test is commonly used by surgeons for the intraoperative diagnosis and prompt treatment for PJI. For the preoperative diagnosis of PJI, however, the α-defensin lateral flow test is inferior to laboratory-based the α-defensin ELISA test in consideration of the accuracy and expense. A patient must fulfill a single major criterion or at least four of the six minor criteria to be diagnosed with PJI. There is increasing evidence that shows the MSIS criteria including CRP, ESR and polymorphonuclear percentage were less accurate than α-defensin. Diagnosing PJI remains challenging due to the emerging of more available diagnostic test methods. Secondly, there was potential publication bias and heterogeneity across the 17 included studies. Thirdly, most studies were published with short follow-up for diagnosing potential PJIs. Hence, the false-negative values as well as the sensitivity and accuracy of the α-defensin lateral flow test might be misrepresentations. The latter two limitations might influence the reliability of the results in this current study.

**Conclusions**

In this study, the diagnostic reliability and accuracy of the α-defensin lateral flow test in PJI was confirmed. It was found to have a relatively high performance for diagnosing PJI. The lateral flow test had a high sensitivity (0.83, 95% CI 0.77, 0.88), specificity (0.95, 95% CI 0.93, 0.97), and accuracy (0.97, 95% CI 0.95, 0.98) in diagnosing PJI after total joint
arthroplasty. We propose that the α-defensin lateral flow test be included in the clinical diagnostic criteria for PJI. More and large-scale studies are needed to validate the significance and accuracy of the α-defensin lateral flow test in PJI diagnosis.

**Authors’ contributions**

Concept and design of the research: Yuqing Zeng. Acquisition, analysis and interpretation of data: Xingyang Zhu, Wenjun Feng, XiaoBo Sun, Jiangchun Zeng and Shu Deng. Statistical analysis: Yuqing Zeng and Haitao Zhang. Drafting the manuscript: Yuqing Zeng and Shu Deng. Literature mining: Yuqing Zeng and Shu Deng. Manuscript revision for important intellectual content: Yirong Zeng. All authors have read and approved the manuscript.

**Declarations**

**Ethical Approval**

This article does not contain any studies with human participants performed by any of the authors.

**Consent for Publication**

Not applicable.

**Availability of Data and Material**

All data generated during the analysis are included in this published article.

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