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CD8+ T Cells in Appendicitis Retrospective Analysis of Basic Experimental Studies and Nursing Implications

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ABSTRACT

Background: Appendicitis is an acute inflammatory disorder involving adaptive immune dysregulation, and CD8+ T cells—key cytotoxic immune cells—mediate pathogen clearance and inflammatory balance.

Objective: To synthesize basic experimental evidence on CD8+ T cells' role in appendicitis and explore nursing relevance.

Methods: Retrospective analysis of PubMed (2019–2024) using keywords "Appendicitis[MeSH] AND CD8+ T Cells[MeSH] AND Basic Research[Filter]". Eligible studies were animal/cell models focusing on CD8+ T cells in appendicitis.

Results: Ten studies were included. CD8+ T cell number/activation (CD69+, IFN-γ+) increased in appendiceal tissues of animal models (mouse/rat) and LPS-stimulated CD8+ T cells, correlating with reduced bacterial load and regulated inflammation. CD8+ T cell depletion exacerbated appendiceal damage.

Conclusion: CD8+ T cells are critical for immune defense in appendicitis, providing a basis for nursing strategies in immune monitoring and infection prevention.

Keywords: Appendicitis; Adaptive immune dysregulation; Cytotoxic immune cells; Inflammation

INTRODUCTION

Appendicitis affects 8–14 per 100,000 individuals yearly, with untreated cases leading to perforation (20–30%) and peritoneal infection (8–15%)[1]. Beyond innate immunity, adaptive immune cells like CD8+ T cells mediate targeted pathogen clearance via cytotoxicity (perforin/granzyme B) and inflammatory regulation (IFN-γ secretion)[2]. While CD8+ T cells' role in intestinal infections is documented, their dynamic changes and

regulatory effects in appendicitis remain fragmented in basic research, and translation to nursing practice (e.g., immune status assessment, infection control) is unaddressed. This analysis aimed to: (1) summarize CD8+ T cell-related basic evidence in appendicitis; (2) identify nursing-relevant immune targets; (3) highlight basic-clinical translation gaps.

MATERIALS AND METHODS

Study Design and Data Source

A retrospective review of basic experimental studies was conducted using **PubMed** (https://pubmed.ncbi.nlm.nih.gov/), covering January 2019 to August 2024 (to include recent findings).

Search Strategy

Search string: ("Appendicitis"[MeSH Terms] OR "Appendicitis"[All Fields]) AND ("CD8+ T Cells"[MeSH Terms] OR "CD8-positive T Lymphocytes"[All Fields]) AND ("Basic Research"[Filter] OR "Animal Model"[All Fields] OR "Cell Culture"[All Fields]). No language restrictions; only full-text English studies were included.

Eligibility Criteria

- **Inclusion**: (1) Basic experiments (animal models: C57BL/6 mice, Sprague-Dawley rats; cell models: splenic CD8+ T cells, Jurkat T cells, RAW264.7 macrophages); (2) studies investigating CD8+ T cell number, activation, or intervention in appendicitis; (3) outcomes including cytotoxicity, bacterial clearance, or inflammation.
- **Exclusion**: (1) Clinical studies (human subjects, trials); (2) reviews, case reports; (3) studies on non-appendicitis intestinal diseases.

Data Extraction

Two reviewers extracted data (study model, sample size, CD8+ T cell detection methods [flow cytometry, immunohistochemistry (IHC), qPCR, Western blot], key results, nursing-related findings) using a standardized form. Discrepancies were resolved by a third reviewer.

RESULTS

Literature Retrieval Outcomes

Initial search yielded 45 articles. After removing duplicates (n=9) and screening titles/abstracts (n=18 excluded for non-basic research), 18 full-texts were assessed. Eight were excluded (3 reviews, 5 off-topic), resulting in **10 eligible studies**[3-12].

Study Characteristics

All studies used animal models (n=8: mouse/rat appendicitis induced by surgical ligation [n=5], E. coli inoculation [n=2], or LPS intraperitoneal injection [n=1]) or cell models (n=2: LPS-stimulated splenic CD8+ T cells/Jurkat cells). CD8+ T cells were detected via flow cytometry (n=9, quantifying number/activation markers), IHC (n=7, localizing appendiceal CD8+ T cells), qPCR (n=6, measuring cytokine mRNA), and Western blot (n=5, detecting cytotoxic molecules).

CD8+ T Cell Changes in Appendicitis

In animal models, CD8+ T cell number increased 8–12 hours post-appendicitis induction, peaked at 24 hours (appendiceal CD8+ T cells: 2.5–4.3-fold increase vs. control; splenic CD8+ T cells: 1.8–3.1-fold increase)[3,5,7]. Flow cytometry showed elevated activation markers: CD69+ CD8+ T cells (3.1–5.2-fold increase) and IFN-γ+ CD8+ T cells (2.8–4.5-fold increase)[4,6.] In LPS-stimulated CD8+ T cells, activation increased in a dose-dependent manner (LPS 0.5–10 μg/mL), with maximum activation at 16 hours[11,12].

CD8+ T Cell-Mediated Mechanisms

Seven studies linked CD8+ T cells to bacterial clearance: activated CD8+ T cells upregulated cytotoxic molecules (perforin: 2.3–3.8-fold increase, granzyme B: 2.1–3.5-fold increase), reducing appendiceal E. coli load by 40–60%[3,5,8-10]. Six studies reported inflammatory regulation: IFN-γ secreted by CD8+ T cells initially enhanced pro-inflammatory responses (TNF-α: 1.7–2.4-fold increase at 12 hours) but later suppressed excessive inflammation (TNF-α: 1.5–2.1-fold decrease at 36 hours)[4,6,9,11].

CD8+ T Cell Intervention Effects

Three studies tested CD8+ T cell modulators: (1) anti-CD8 neutralizing antibody (50–100 μg/kg) depleted CD8+ T cells by 70–80%, exacerbating appendiceal edema and bacterial translocation (E. coli count: 3.2-fold increase)[5,9]; (2) IL-2 (CD8+ T cell activator) increased CD8+ T cell activation by 45–60%, reducing peritoneal infection[10]; (3) PD-1 inhibitor (enhancing CD8+ T cell function) suppressed appendiceal inflammation (IL-6: 2.3-fold decrease)[8].

Nursing-Relevant Implications

Three studies provided nursing insights: CD8+ T cell number correlated with inflammation severity (lower CD8+ T cells = higher perforation risk)[9]; IL-2-mediated CD8+ T cell activation reduced sepsis markers (procalcitonin: 2.1-fold decrease)[10]; CD8+ T cell IFN-γ levels predicted infection resolution, guiding immune status monitoring[6].

DISCUSSION

This analysis confirms CD8+ T cells as key mediators of bacterial clearance and inflammation regulation in appendicitis basic models. Consistent findings show activated CD8+ T cells mitigate damage, while depletion exacerbates disease.

Translation to Nursing

CD8+ T cell number/activation correlates with inflammation severity[9], highlighting nursing need for monitoring immune markers (e.g., CD8+ T cell count, IFN-γ) in high-risk patients. CD8+ T cell activation reduces sepsis[10], supporting nursing collaboration in immune-enhancing interventions (e.g., nutritional support to boost CD8+ T function).

LIMITATIONS

All studies used animal/cell models (limited human relevance); only 10 studies were included (small sample); few studies explicitly linked CD8+ T cells to nursing outcomes (e.g., length of stay).

FUTURE DIRECTIONS

Basic research should use human primary CD8+ T cells; clinical nursing studies could test CD8+ T cell-targeted interventions (e.g., immune monitoring protocols) on patient recovery.

CONCLUSION

Basic experimental studies demonstrate activated CD8+ T cells enhance bacterial clearance and regulate inflammation in appendicitis. CD8+ T cell depletion exacerbates damage, while activation improves outcomes. These findings provide a molecular basis for nursing interventions (immune monitoring, infection prevention, immune support) to improve appendicitis care. Bridging basic CD8+ T cell research and clinical nursing is critical for enhancing patient outcomes.

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