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Editorial

Update on diagnosis and treatment of Kawasaki disease

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1. Introduction

Kawasaki disease, an acute systemic vasculitis syndrome first described by Japanese physician Tomisaku Kawasaki in 1967, has long been a major cause of acquired heart disease in children [1].

In recent years, great progress has been made in the diagnosis, treatment and research of Kawasaki disease worldwide. China has a large population and a high incidence of Kawasaki disease. China medical personnel have completed the three-step guideline for Kawasaki disease diagnosis and treatment and the three-part consensus on the treatment of Kawasaki disease with gamma globulin, aspirin, and glucocorticoids in the past four years. One of the guidelines was published in BMC Pediatric, the other is China's first Kawasaki disease general practitioner diagnosis and treatment guidelines (practice edition, 2025) for primary healthcare workers [1,2].

This guideline was jointly compiled by national experts in Kawasaki disease and is aimed at general practitioners and pediatric medical staff at the primary level to standardize the diagnosis and treatment process of Kawasaki disease in primary medical institutions. The World Association for Artificial Consciousness's Professional Committee on Active Medicine is deeply involved in the development of the guidelines, incorporating the cutting-edge concept of "active medicine" into the content and injecting an innovative perspective and international collaboration. This guide emphasizes practicality and operability, and is dedicated to providing specific guidance for primary care physicians to identify and manage Kawasaki disease.

In industrialized countries, the incidence of the disease is on the rise, and about 15–30% of untreated children will develop coronary artery lesions, even aneurysms, which seriously threaten life.

In recent years, with the development of molecular biology and precision medicine, significant progress has been made in the research of Kawasaki disease in many aspects. This article will comprehensively review the latest research trends of Kawasaki disease to provide reference for clinicians and researchers.

2. Breakthrough in molecular mechanisms

In recent years, research on Kawasaki disease has made important progress in the field of molecular mechanisms, and a variety of signaling pathways and molecules have been revealed to participate in the regulation of vascular inflammation [3,4].

Recent studies have revealed that T-cadherin (T-cad) expression is markedly reduced in vascular endothelial cells of Kawasaki disease patients. The loss of this protein triggers pyroptosis—an inflammatory programmed cell death—through the SOD2/ROS/NLRP3 pathway, ultimately causing vascular damage.

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The mechanism involves reduced T-cad expression, which decreases superoxide dismutase 2 (SOD2) activity and expression. This leads to reactive oxygen species (ROS) accumulation, activating the NLRP3 inflammasome and triggering caspase-1-mediated pyroptosis [5].

Another study revealed that neutrophil extracellular traps (NETs) promote NLRP3 inflammasome activation and pyroptosis of peripheral blood mononuclear cells (PBMCs) via ROS-dependent signaling pathways, thereby exacerbating vasculitis in Kawasaki disease.

The miR-155-5p/sirt1 signaling pathway has been shown to contribute to immune dysregulation in Kawasaki disease. Inhibiting miR-155, a key regulator in this process, may help treat Kawasaki disease—a childhood-onset acute vasculitis with coronary artery damage as its most severe complication. In recent years, significant progress has been made in basic research, clinical treatment strategies and precision diagnosis and treatment of Kawasaki disease worldwide.

3. Etiology and pathogenesis

The pathogenesis of Kawasaki disease involves dysregulation of bile acid and lipid metabolism, with neutrophil extracellular trap (NET) activation via reactive oxygen species (ROS) signaling pathways exacerbating inflammatory responses [3].

Biological markers: Serum CHI3L1 may be associated with Kawasaki disease; investigate potential links between bile acid metabolites and resistance to intravenous immunoglobulin (IVIG).

Optimizing treatment strategies: IVIG combined with glucocorticoids proves more effective for patients resistant to IVIG or at high risk. Different hormone dosages have distinct advantages: High-dose methylprednisolone (IVIG-plus-HDMP) is effective for rapid symptom control, while low-dose methylprednisolone (IVIG-plus-LDP) demonstrates better long-term efficacy in preventing coronary artery dilation.

Precision diagnosis and treatment: Establish an IVIG non-response prediction model based on indicators such as platelet/lymphocyte ratio (PLR) and hemoglobin (Hb) [5].

4. Clinical implications and future prospects

Based on the above advances, current clinical practice and future research are showing the following trends:

1) Treatment decisions tend to be stratified and individualized: The latest research evidence supports initial treatment plans based on the patient's risk level. For pediatric patients with high IVIG resistance risk, initiating treatment with IVIG combined with glucocorticoids (particularly high-dose) has become the preferred approach, as it more effectively controls acute symptoms and protects coronary arteries.

2) Predictive models for precision medicine: The development and application of localized IVIG non-response prediction models will help doctors identify early on children who may not respond well to standard treatment, so as to achieve earlier and more active intervention and improve prognosis [6].

3) Basic research points to new targets for the future: Although most of the in-depth exploration of mechanisms such as CHI3L1, bile acid metabolism, and NETs is still in the research stage, they reveal the complex pathophysiological process of Kawasaki disease and provide hope for the development of new targeted therapies (such as specific inflammatory pathway inhibitors) in the future. The road to research on Kawasaki disease is long, and we still face many challenges. Therefore, it is necessary for the global medical staff to work together to complete this important task for the benefit of mankind, which will help to continue to improve the diagnosis and treatment system of vasculitis diseases in the field of pediatric medicine, so that children can grow up healthily.

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