81回 日本感染症学会 (2007) 4月

Protective Efficacy of Anti- *Candida albicans* Chicken Egg Yolk Immunoglobulins (anti-CA IgY) in Murine Model of Oral Candidiasis

El-Sayed Moustafa IBRAHIM, A. K. M. Shofiqur RAHMAN, Rie ISODA, Kouji UMEDA, Nguyen Van SA, and Yoshikatsu KODAMA

Immunology Research Institute, GHEN Corporation
839-1 Sano, Gifu-City 501-1101, Japan

The incidence of fungal infections caused by the opportunistic yeast *C. albicans* has increased significantly in recent years. Moreover, Limited antifungal drug choices and their high toxicity as well as the potential risk of the emergence of the drug-resistant *C. albicans* strains indicate the need for novel therapeutic strategies. We prepared anti-*C. albicans* antibodies in chicken egg yolk (anti-CA IgY) and investigated its protective effectiveness against *C. albicans* in a murine model of oral candidiasis. Anti-CA IgY was administrated in the oral cavity twice a day starting one day before the infection. The tongue lesions were monitored and the CFUs of *C. albicans* in tongue, lungs, kidneys, and intestine were counted. The tongue lesion scores were significantly reduced ($P \leq 0.05$). The symptomatic effect was confirmed by the reduction of the number of *C. albicans* CFUs in tongue homogenates. These results indicate that anti-CA IgY has a protective effect against the oral candidiasis of experimentally infected immunocompetent mice. Moreover, there was a significant reduction in the *C. albicans* CFUs in the other organs. These results indicate that anti-CA IgY inhibits the dissemination of the systemic *C. albicans* infection. In conclusion, anti-CA IgY might be considered as a prophylactic immunotherapy or possibly an adjunct to antifungal therapy.

Protective Efficacy of Anti- *Candida albicans* Chicken Egg Yolk Immunoglobulins (anti-CA IgY) in Murine Model of Oral Candidiasis

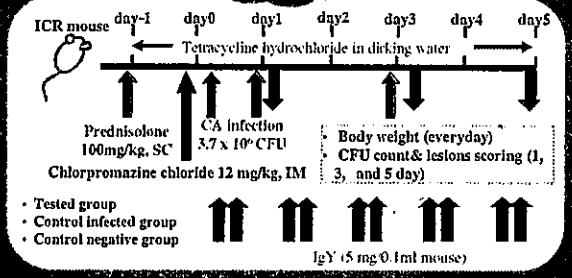
El-Sayed M. Ibrahim, A. K. M. Shofiqur Rahman, R. Isoda, K. Umeda, N. Van Sa, and Y. Kodama

GHEN Immunology Research Institute GHEN Corporation, Gifu

Introduction

- *C. albicans* (CA)is a member of the microbial flora of the GIT, mucocutaneous membranes, and oral cavity in healthy humans. Immunosuppressed patients can suffer from mucosal, cutaneous, or systemic candidiasis. It is also a frequent cause of complicating systemic infections in patients under chemotherapy for cancer, or prolonged antibiotic therapy. Oropharyngeal candidiasis is the most common opportunistic infection associated with oral injuries.
- The expression of *C. albicans* virulence in the oral cavities is correlated to impairment of the immune system, particularly in patients with HIV. In addition, several conditions such as hyposalivation, and prolonged use of antibiotics or immunosuppressive drugs can predispose to oral candidiasis.
- Limited antifungal drug choices and the potential risk of the emergence of the drug-resistant strains indicate the need for adjunctive therapeutic strategies. The use of specific antibodies as an adjunct to antifungal drugs can be considered one approach.
- Chicken egg yolk has been recognized as an inexpensive alternative antibody source. Passive immunization with egg yolk immunoglobulin (IgY) has shown therapeutic value against *E. coli*, *S. typhimurium*, *S. mutans*, *H. pylori*, and *P. gingivalis*.
- In this study, we prepared anti-CA antibodies in chicken egg yolk (anti-CA IgY). The in-vitro and in-vivo efficacy of anti-CA IgY were investigated. Here, we show the protective efficacy of anti-CA IgY in murine model of oral candidiasis.

Materials and Methods



Results

Fig. 1: *Candida albicans* CFU/g in tongue

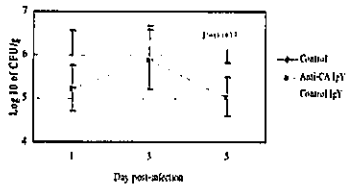
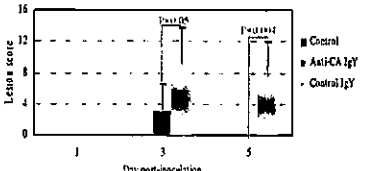
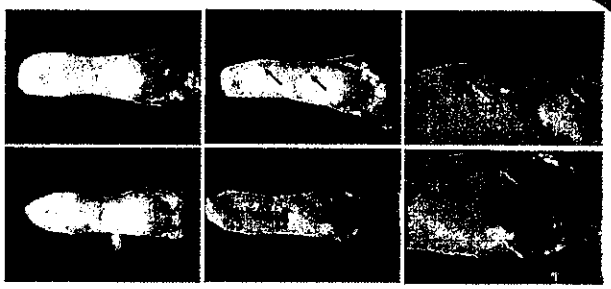


Fig. 2: Tongue lesions score



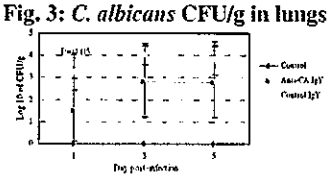
Positive mice

Days PI	1	3	5
Control Negative	0%	0%	0%
Anti-CA IgY	0%	80%	0%
Control IgY	0%	100%	100%



Anti-CA IgY + CA — Tongue lesions of the control infected group

Fig. 3: *C. albicans* CFU/g in lungs



Positive mice

Days PI	1	3	5
Control Negative	0%	0%	0%
Anti-CA IgY	60%	80%	80%
Control IgY	100%	100%	100%

Fig4: *C. albicans* CFU/g in intestine

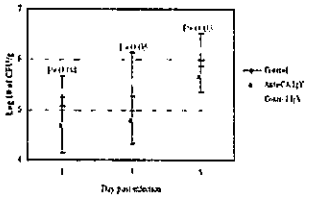
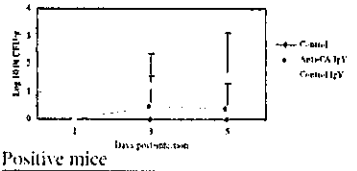


Fig. 5: *C. albicans* CFU/g in kidneys



Positive mice

Days PI	1	3	5
Control Negative	0%	0%	0%
Anti-CA IgY	0%	20%	20%
Control IgY	0%	60%	40%

Summary of the results

- There was a significant reduction of the number of *C. albicans* (CFU/g) in the tongue homogenates of anti-CA IgY-treated mice in the comparison with those of the control IgY-treated mice.
- The tongue lesions of anti-CA IgY-treated mice were milder than those of the control IgY-treated mice.
- There was a significant reduction in the *C. albicans* (CFU/g) in the internal organs of anti-CA IgY-treated mice in the comparison with those of the control IgY-treated mice.

Conclusions

- Anti-CA IgY has a protective effect against the oral candidiasis of experimentally infected immunocompetent mice.
- Anti-CA IgY inhibits the dissemination of the systemic *C. albicans* infection.
- Anti-CA IgY might be considered as a prophylactic immunotherapy or possibly an adjunct to antifungal therapy.
- Further studies are required to investigate the possible applications of anti-CA IgY for human preventive immunotherapy.