The In-vitro and In-vivo Effectiveness of Chicken Egg Yolk Immunoglobulins Prepared Against *Candida albicans* (anti-CA IgY)

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Although *C. albicans* displays a variety of virulence factors, the ability to adhere to host tissues is considered essential in the early stages of colonization. We prepared anti-*C. albicans* antibodies in chicken egg yolk (anti-CA IgY) and investigated its effectiveness on the adherence capacity of *C. albicans* to epithelial cells. In this study, we examined the adherence capacity of *C. albicans* to FaDu (human pharynx carcinoma) cells after incubation of *C. albicans* with anti-CA IgY. Results showed that the adherence capacity of *C. albicans* was significantly reduced after incubation with anti-CA IgY ($P \leq 0.005$). Increasing of anti-CA IgY concentration gradually increased the adhesion inhibition effect. This effect might be due to blocking the binding of *C. albicans* to the host cells. Furthermore, we investigated the protective efficacy of anti-CA IgY in experimentally induced oral candidiasis in immunosuppressed mice. 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. Results showed that tongue lesion scores and CFUs of *C. albicans* in mice organs were significantly reduced. These results indicate that anti-CA IgY reduces the in-vitro adherence capacity and has a protective effect in experimentally infected mice. In conclusion, anti-CA IgY might be considered as a prophylactic immunotherapy or possibly an adjunct to antifungal therapy.

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Introduction & Objectives

- *C. albicans* (CA) is a member of the microbial flora of the GIT, mucocutaneous membranes, and oral cavity in healthy humans. It is also a potential pathogen in complicating systemic infections and mortality in patients under chemotherapy for cancer, or prolonged antibiotic therapy.
- Although it displays a variety of virulence factors, the ability to adhere to host tissues is considered essential in the early stages of colonization.
- Chicken egg yolk has been recognized as an inexpensive alternative antibody source, and 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 report, we show the preparation of anti-C A antibodies in chicken egg yolk (anti-CA IgY) and investigation of its effectiveness on the adherence capacity of CA to FaDu (human pharynx carcinoma) cells.

Diagram 1: Maternal passive Immunity

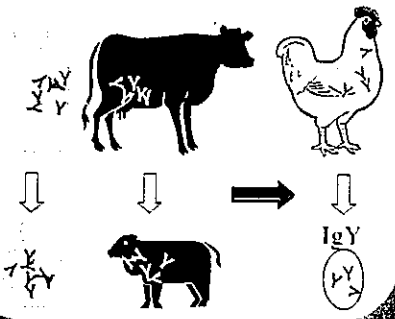
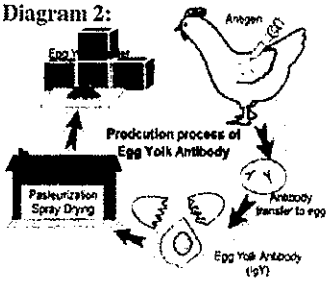


Diagram 2:



Methods

Flow sheet 1: Micro-agglutination activity assay

CA with different dilutions of anti-Ca IgY in microtiter plate

↓

Incubate at 37 ° C for one hr

↓

Examine the agglutination

Flow sheet 2: Adhesion inhibition activity assay

Mix anti-CA IgY with CA

↓

Addition of the mixture to monolayer of FaDu cells

↓

Incubate at 37 ° C for one hr

↓

Wash the non adherent CA

↓

Count the adhered CFU in YPD agar

Results

Fig. 1: Micro-agglutination titer assay

	Titer
Anti-CA IgY	128
SPF IgY	<4

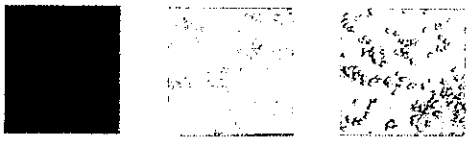


Table 1: Micro-agglutination Cross reactivity

Strain	JCM (1542)	170	JCM (1543)	GTC (654)	GTC (1754)
Origin	Human skin lesion	unknown	Human Delicate zone	Human nails	Human teeth
Anti-CA IgY	128	64	32	32	64
SPF IgY	<4	<4	<4	<4	<4

Fig. 2: Adhesion inhibition efficacy with different CA challenge doses

Log 10 of CA challenge	Adherent *C. albicans*				
	3	4	5	6	7
Anti-CA IgY	0.80	1.79	2.40	3.00	3.65
SPF IgY	2.36	3.57	4.00	4.93	5.65

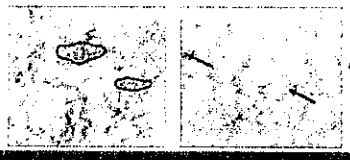


Fig. 3: Dose dependent adhesion inhibition efficacy

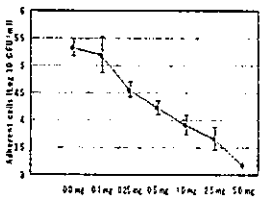
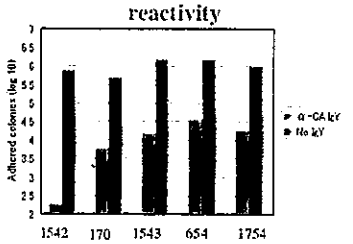


Fig. 4: Adhesion inhibition cross reactivity



Summary of the results

- Anti-CA IgY showed agglutination activity with the viable *C. albicans* cells.
- Anti-CA IgY showed different degrees of cross reactivity with different *C. albicans* strains.
- Anti-CA IgY decreased the inhibition ability of *C. albicans* to the human cells.
- The adhesion inhibition activity of anti-CA IgY was correlated with the anti-CA dose.

Conclusions

- Anti-CA IgY has the ability to reduce the in-vitro adherence capacity of *C. albicans*.
- Increasing of anti-CA IgY concentration gradually increased the adhesion inhibition effect.
- This effect might be due to blocking the binding of *C. albicans* to the host cells.
- Further studies is needed to evaluate the in-vivo activity of anti-CA IgY.