Lipids-2015

Effect of phospholipids from echinoderms in content of TI-complexes on immunogenicity of human serum albumin

Natalia Vorobyeva, Nina Sanina, Eduard Kostetsky, Andrey Mazeika, Ludmila Davydova, Peter Velansky

Far Eastern Federal University, Vladivostok, Russia

Introduction

Application of subunit antigens in vaccine prophylaxis is an effective way to improve the safety and protective abilities of modern vaccines. However, highly purified subunit antigens possess low immunogenicity. In this regard, considerable efforts have been made to find safe and effective adjuvants, as well as to develop new methods of presenting the antigen to immunocompetent cells. We previously demonstrated the possibility of using tubular immunostimulating complex (TI-complex) based on monogalactosyldiacylglycerol (MGDG) from marine macrophytes, cholesterol and cucumarioside A_2-2 of the holothurian *Cucumaria japonica (Fig. 1.)* as an adjuvant carrier of membrane protein antigens.

Aim

Present work aims to test the possibility of using TI-complexes as an adjuvant of hydrophilic antigens, which will greatly simplifies the production of vaccines based on TI-complexes and extends the range of their application. Human serum albumin (HSA) was used as a model soluble antigen.

Methods

FA were analyzed by gas liquid chromatography.

The mice were twice immunized subcutaneously, with 7 days interval. Experiments were terminated 21 days after the first immunization. The content of anti-HSA antibodies and cytokines was estimated by ELISA.

Results

Substitution MGDG on phospholipids led to the formation of tubular particles similar TI-complex based on MGDG.

MGDG of *Ulva lactuca* and PC of *Distolasterias nippon* in composition of TI-complex maximize the immunogenicity of HSA (Fig. 2.). However, the replacement of MGDG with other phospholipids induces a decrease in the adjuvant activity of TI-complexes compared to the effect of individual HSA. The strongest suppressive influence exerted TI-complex based on PE from *Strongilocentrotus intermedius*.

The content of cytokines IL-6, IL-12 and GM-CSF varied in most depending on the composition of TI-complexes (Fig. 3.).

Conclusion

TI-complexes based on MGDG from *U. lactuca* and PC from *D. nippon* are different from other lipid high ratio of n-3 / n-6 polyunsaturated fatty acids (Table. 1.), by promoting expression of the adjuvant properties of TI-complexes towards HSA.

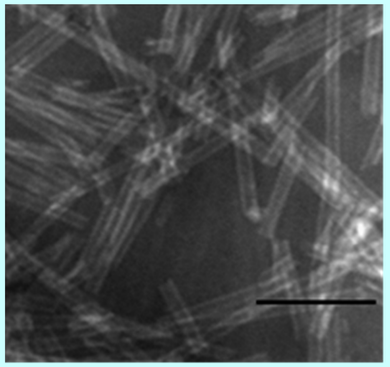

Fig. 1. An electron micrograph of the particles of TI-complex. Scale 100 nm.

Fatty acids	Ulva lactuca	Distolasterias nippon		Strongilocentrotus intermedius	
	MGDG	PC	PE	PC	PE
SFA	1.3	15.7	10.1	18.3	26.8
MUFA	2.5	19.1	9.8	16.8	22.9
PUFAs	96.2	65.2	80.1	64.9	50.3
Saturated / unsaturated	75.9	5.3	8.9	4.7	2.7
n-3/n-6 PUFAs	38.75	2.8	1.1	0.7	0.8
IU	357	314	336	254	216

Table 1. The total indicators of fatty acid composition of phospholipids *Distolasterias nippon* and *Strongilocentrotus intermedius* and MGDG *Ulva lactuca.*

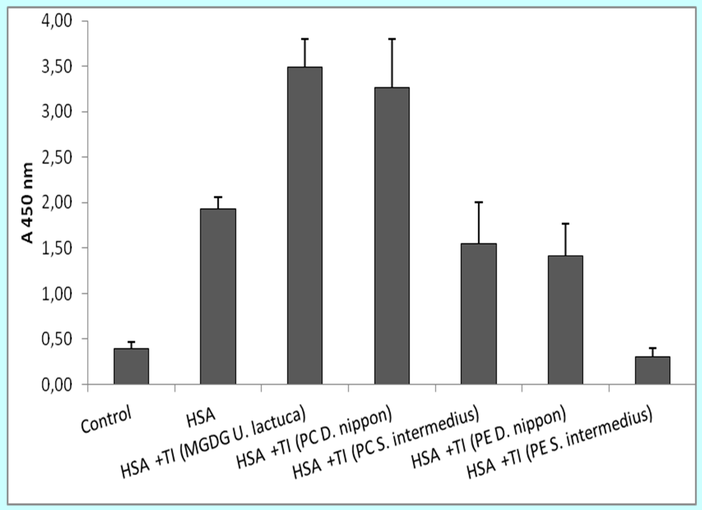

Fig. 2. The intensity of immune response BALB/c mice immunized by individual human serum albumin (HSA) and HSA mixed with TI-complexes based on MGDG from *Ulva lactuca* (HSA + TI (MGDG *U. lactuca*)), PC from *Distolasterias nippon* (HSA + TI (PC *D. nippon*), PC from *Strongylocentrotus intermedius* (HSA + TI (PC *S. intermedius*), PE from *D. nippon* (HSA + TI (PE *D. nippon*) or PE from *S. intermedius* (HSA + TI (PE *S. intermedius*). Y-axis: absorption of samples at a wavelength of 450 nm (A 450 nm). The arithmetic means ± confidence interval.

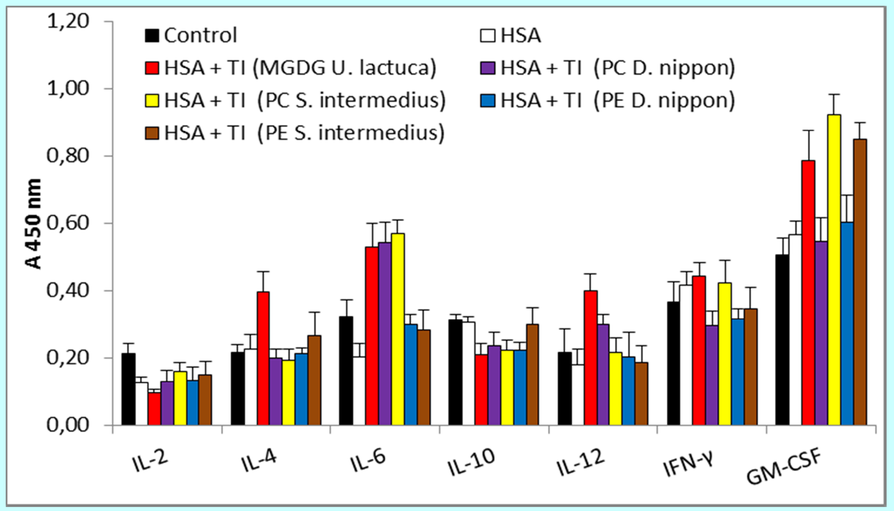

Fig. 3. The content of cytokines in mice serum immunized by individual human serum albumin (HSA) and HSA mixed with TI-complexes based on MGDG from *Ulva lactuca* (HSA + TI (MGDG *U. lactuca*)), PC from *Distolasterias nippon* (HSA + TI (PC *D. nippon*), PC from *Strongylocentrotus intermedius* (HSA + TI (PC *S. intermedius*), PE from *D. nippon* (HSA + TI (PE *D. nippon*) or PE from *S. intermedius* (HSA + TI (PE *S. intermedius*). Y-axis: absorption of samples at a wavelength of 450 nm (A 450). The arithmetic means ± confidence interval.

Acknowledgements

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