Streptococcus sanguis

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Streptococcus sanguis
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Streptococcus sanguis

S. sanguis is a type of Streptococcus, a genus of bacteria in the phylum Actinobacteria, which includes the species responsible for various infections, including periodontal disease. The term "sanguis" originates from the Latin word for blood, indicating a potential role in blood infections or the presence of blood components in the lifestyle of these bacteria.

Interleukin (IL) - 4 interferon (IFN) - γ is a cytotoxic factor that can be tested in a kit to detect the production of these cytokines by S. sanguis. This kit can be used to measure the level of IL-4 and IFN-γ, which are known to play critical roles in immune responses, including the inhibition of bacterial growth and the induction of protective immune responses. The positive correlation of IFN-γ with S. sanguis can help in the diagnosis of diseases associated with these bacteria.
The study found that the bacteria S. sanguis stimulates IFN-γ expression by macrophages.

The bacteria: S. sanguis, interferon-γ
Streptococcus sanguis

I. 

Hulusi Behçet 1937

1, 2, 3

4

5, 6

7, 8

9

S. sanguis

10

S. sanguis

11 S. sanguis

γδT

- 3 -
interleukin (IL) - 6, IL- 2, interferon (IFN) - γ mRNA,
12-14 S. sanguis
S. sanguis
65 kDa
11,15,16

Tumor necrosis factor (TNF) - 75, superoxide dismutase
22-25
γδ T
26,27 S. sanguis
S. sanguis
II. 

1. Streptococcus sanguis

International study group for Behçet disease, 1990) (Behçet disease research committee of Japan, 1998) (Behçet disease research committee of Japan, 1994, 1) 4 8 4 1. 

3. Streptococcus sanguis
PBS – 0.5% formalin 4 °C
PBS – PBS – PBS – 2 / 4 °C – –20 °C

4. 4. 96 well plate 105 S. sanguis
24 0.1, 10 µg/ml S. sanguis
37 °C, 5% CO2 0, 6, 72 0 100 U/ml penicillin G, 10 streptomycin, 0.3 L-glutamine, 10% Gibco BRL, Grand Island, NY, USA) RPMI 1640 (Gibco BRL, Grand Island, NY, USA)

5. ELISA IL-4, IFN-γ ELISA kit (Pierce Endogen, Rockford, IL, USA)
BSA phosphate buffer (Cistron, Pine Brook, NJ, USA) 5 96 well plate
3 well 50 streptavidin-HSP concentrate
well 100 30 3 100 tetramethylbenzidine
well stop solution 100 450 nm
III. 

1. S. sanguis Àü±Õ Ç׿ø¿¡ ÀÇÇÑ º£Ã¼Æ®º´ ȯÀÚ ¸»ÃÊÇ÷¾× ´ÜÇÙ¼¼Æ÷ÀÇ
   (26- 44) 3, 9, 12 36 2, 5, 1 1, 3 4 10 72 1, 3, 4 0.1 (p<0.01) (¶ 2).

2. S. sanguis Àü±Õ Ç׿ø¿¡ ÀÇÇÑ º£Ã¼Æ®º´ ȯÀÚ ¸»ÃÊ
   IL- 4, IFN- γ 4, IL- 4 IFN- γ (p<0.01) (¶ 1).

3. S. sanguis Àü±Õ Ç׿ø¿¡ ÀÇÇÑ º£Ã¼Æ®º´ ȯÀÚ ¸»ÃÊ
   IFN- γ 0.1 (p<0.01) (¶ 2).
4. icrobial S. sanguis IFN-γ 

IFN-γ 10 / 72  IFN-γ , 6 IFN-γ . IFN-γ (3). 

5. IFN-γ 

IFN-γ  (Spearman’s coefficient 0.894, P<0.01). IFN-γ  (Spearman’s coefficient 0.671, C 0.732). two-sample Kolmogrov-Smirnov test IFN-γ (p=0.4, 0.116) IFN-γ (p=0.023).
1. 

(1) 

(2) 

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* 1-4, 4-5, 5-12, 12-4, 4-5, 5-12.
1. *S. sanguis* produced a significant increase in IL-4, IFN-γ levels after 72 hours of incubation compared to normal samples.
Whole cell antigen (µg/ml)

Interferon-γ (pg/ml)

- Normal
- BD, inactive state
- BD, active state

2. *S. sanguis* IFN-γ

0.1 µg/ml, 1 µg/ml, 10 µg/ml

72 hours

IFN-γ
3. \( S. \text{sanguis} \) were used to measure IFN-\( \gamma \) levels. 10 \( S. \text{sanguis} \) were used during 0, 6, 72 hours.
IV. cascade

cascade [31] of MICA, MICA [65, 70] T\(_H\)1, T\(_H\)2, IL- 1\(\beta\), IL- 2, IL- 6, IL-8, IL- 12, IFN-\(\gamma\), TNF- \(\alpha\), RANTES, MIP-1\(\alpha, \beta\) [32-35]. T\(_H\)1/T\(_H\)2 ≥ 10% [36].

T\(_H\)1/T\(_H\)2 ≥ 10% [33-36]. 37% [33-36].

IL- 2, 8, 12 [34]. TNF- 75, superoxide dismutase [31]. 22-25.
IL- 1, 4, 6, 8, 10, 12, TNF- α, IFN- γ. 32

Herpes simplex virus 37- 39

IL- 12, IL- 4, 10, 13 48

IFN- γ 34

IL- 12 34

Phytohemagglutinin (PHA) 32

IL- 12 34

T 34

PHA
IL- 4, 10

phorbol myristate acetate (PMA) with ionomycin.

S. sanguis, Escherichia coli, Staphylococcus aureus Cowan I,

IFN- γ, TNF- α

IFN- γ

Tₜ₁

Tₜ₂

Tₜ₁

IL- 2, IL- 6, IFN- γ, TNF- α

IL- 4, 5, 10

IFN- γ

Tₜ₂

Tₜ₂

C

IFN- γ

C

IFN- γ
Chamberlain\textsuperscript{43} 2 2 2 2 2

- 18 -
V.

1. **Streptococcus sanguis** incubated with IL-4, IFN-γ produced in parallel.

2. **IL-4**, **IFN-γ** were added to the culture at concentrations of 0.1, 1, 10 μg/mL, respectively.

3. Cells were incubated for 72 hours in the presence of **IL-4**, **IFN-γ**. 

4. **Streptococcus sanguis** incubated with IFN-γ.


Abstract

Cytokine production of peripheral blood mononuclear cells stimulated with Streptococcus sanguis antigen in patients with Behçet’s disease

Hyoung Sup Kim

Department of Medicine

The Graduate School, Yonsei University

(Directed by Professor Dongsik Bang)

Behçet’s disease is a syndrome of unknown etiology consisting of recurrent oral and genital aphthous ulcerations, ocular manifestations such as uveitis, cutaneous involvements and other inflammatory responses encompassing all systems of the body including cardiovascular, respiratory, gastrointestinal and central nervous system. The streptococcal influence on Behçet’s disease might well be emphasized, especially with regard to the S. sanguis antigen, which stimulates T cells to alter the cytokine production. Somehow, the specific cytokine species produced in this reaction still remains controversial.

In this study, we have investigated the production of cytokines IL-4, IFN-γ in cultured supernatant after incubating inactivated S. sanguis whole cell antigens with peripheral blood mononuclear cells isolated from healthy controls, and patients in both active and inactive stages of the disease. We made use of commercially available enzyme-linked immunosorbent assay (ELISA) kit to measure the respective concentrations of these cytokines. The production of IFN-γ
was significantly increased in patients with active Behçet’s disease as compared with healthy controls or the patients with inactive disease after 72 hrs, whereas there was no significant increase of IL-4. Taking time course into consideration, IFN-γ production increased with time starting 6 hrs after the incubation with the antigen and the reaction was also dose-dependent with respect to the amount of antigen. At some point IFN-γ production in patients with active disease rose in response to a very low concentration which had failed to bring out any response from healthy controls and patient with inactive disease, suggesting the hypersensitivity reaction to *S. sanguis* antigens by the peripheral blood monocytes in patient with active disease.

The duration since the onset of the symptoms and the amount of IFN-γ production showed evidences of positive correlation that was stronger than with erythrocyte sedimentation rate or C-reactive protein.

We conclude that IFN-γ production in patients with active Behçet’s disease differ in response to stimulation with *S. sanguis* antigen from that of healthy controls and inactive states, and therefore may be utilized to determine the disease activity and to evaluate the efficacy of therapeutic modalities.

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**Key Words**: Behçet’s disease, *Streptococcus sanguis*, interferon-γ