

## *Helicobacter pylori*

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### **Early Pathologic Changes of Mouse Gastric Mucosa Infected with *Helicobacter pylori***

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**Background/Aims:** The aim of the present study was to infect mice with *H. pylori* and then, to evaluate the effects of the infection on the early pathologic changes of gastric mucosa. **Methods:** A mouse- adapted *H. pylori* strain (SS1) was inoculated into 23 C57BL/6 mice. Twelve uninfected mice were also included as controls. The animals were sacrificed 3 days, 4 weeks, 8 weeks and 16 week after being infected with SS1. Gastric tissue were taken for histology and urease test. **Results:** Colonization was detectable in the stomach of all infected animals up to 16 weeks, but not in the control group. The organisms were detected in the mucus layers of the gastric epithelium. In the mice sacrificed 3 days after infection, neutrophil infiltration was identified in submucosal layer and lamina propria. Infiltration of mononuclear cells and mucosal atrophy were observed in the gastric mucosa in the mice sacrificed 4 and 8 weeks after infection respectively. In the mice sacrificed 16 weeks after infection, glandular destruction with severe infiltration of mononuclear cells was developed in the gastric mucosa. **Conclusions:** Acute gastritis occurred from early days after infection with SS1. From 4 weeks after infection, gastric mucosa showed the features of chronic gastritis, progressing to severe atrophy. **(Kor J Gastroenterol 1999;34:1 - 9)**

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**Key Words:** *Helicobacter pylori*, mouse, Gastric mucosa, Gastritis

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: 1998 5 30 , : 1999 1 4  
: , 442-749,

5 *H. pylori* 10

1920 . 1928 *pylori* strain  
*H. pylori*

.1 colonization  
. 1983 가 .9

*H. pylori*  
*H. pylori*

*H. pylori*가 colonization 가  
. 1995 *H.*  
*H. pylori* *pylori* 1) coloniza-  
tion , 2)  
가 . 3 ,4 *H. pylori* 가 ,  
5 *H. pylori* 3) , 4)  
colonization  
, 5) colonization

(Lousanne cri-  
teria).10 1997 10 42  
가 . 1990 *H. felis*  
*H. felis*  
, *H. pylori* Lousanne criteria  
Sydney  
Strain 1 (SS1)  
colonization .11  
*H. pylori*

*H. felis* 가  
. *H. felis*  
*H. pylori*가

가 . *H. pylori*  
*H. pylori* . *H. pylori*  
3.5 ,  
*H. pylori*

*H. pylori* . *H. pylori* SS1  
C57BL/6 ,  
*H. pylori* 가 16 가

.8 *H.*

0.1 mL

1. SS1

C57BL/6

6

specific pathogen free C57BL/6 Charles River Japan, Inc. (Hae Eun International Co. Ltd)

4.

3 4 , 4 7 , 8 6

1 , 16 6 , SS1

가 ethyl ether

3 12

23 12

2. *H. pylori*

Loussanne criteria *H. pylori* strain (SS1)II

modified

Gram's stain rapid urease test kit (CLO test, Delta West, Australia)

oxidase, catalase urease urease

6 chocolate 10% 4 µm H&E

150 µl , hockey stick Warthin

gaspak jar

kit (CampyPak Plus, Becton Dickinson, USA) jar

37 , O2 5%, CO2 10%, N2 85% 3 . 3

1. Urease (Table 1)

23 rapid urease test kit 37 incubator

가 1 mL 150 µl chocolate , 2

3

3

10 µl 10

10 10 cho-

colate hockey stick

colony

109 CFU/mL

**Table 1.** Summary of Positivity of Rapid Urease Test after Inoculation of *H. pylori*

	Infected	Control
3 day	4/4	0/3
4 week	7/7	0/3
8 week	6/6	0/3
16 week	6/6	0/3

9 cryptitis (Fig. 3B). 8  
 , 24 가

2. Warthin  
 23 War-  
 thin , *H.*  
*pylori* crypt S  
 , 23  
 (Fig. 1). 12

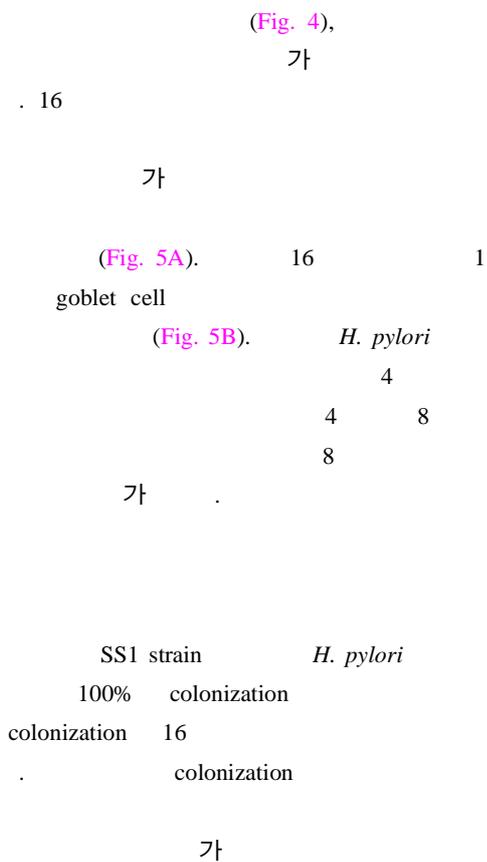
3. (Table 2)  
 23 H&E  
 , *H. pylori*  
 , glandular

glandular  
 (Fig.  
 2). *H. pylori*  
 3  
 (Fig. 3A)  
 , 4  
 (lymphocyte, plasma  
 cell)

**Fig. 1.** Warthin staining of a section of gastric mucosa of C57BL/6 mouse 8 weeks after inoculation with *H. pylori* SS1 (×1000). There are large numbers of *H. pylori* in the mucus overlying the surface and in the top of the gastric pits.

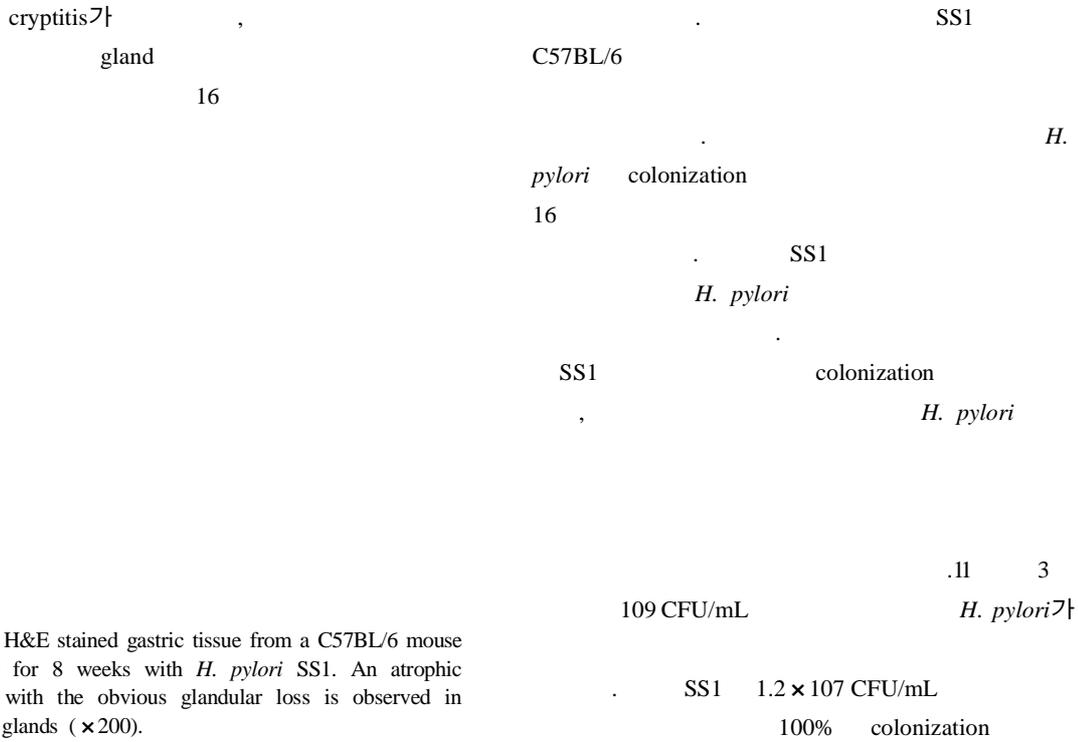
**Table 2.** Summary of Positivity of Rapid Urease Test after Inoculation of *H. pylori*

Finding	Control	3 days	4 weeks	8 weeks	16 weeks
Neutrophils in lamina propria	0/12	4/4	7/7	6/6	6/6
Neutrophils in epithelial layer	0/12	0/4	4/7	3/6	6/6
Lymphoid cells in lamina propria	0/12	1/4	6/7	6/6	6/6
Lymphoid cells in epithelial layer	0/12	0/4	0/7	1/6	6/6
Submucosal neutrophil aggregate	0/12	1/4	2/7	4/6	6/6
Crypt abscess	0/12	0/4	1/7	1/6	6/6
Mucosal atrophy	0/12	0/4	0/7	2/6	6/6
Intestinal metaplasia	0/12	0/4	0/7	0/6	1/6



**Fig. 2.** H&E stained gastric tissue from an uninfected C57BL/6 mouse. No histopathologic changes are observed in the antrum (A,  $\times 200$ ) and body (B,  $\times 100$ ).

**Fig. 3.** H&E stained gastric tissue from a C57BL/6 mouse infected with *H. pylori* SS1. A few neutrophils have infiltrated the submucosal layer 3 days after inoculation (A,  $\times 200$ ), and a crypt abscess is observed in the epithelium 4 weeks after inoculation (B,  $\times 200$ ).



**Fig. 4.** H&E stained gastric tissue from a C57BL/6 mouse infected for 8 weeks with *H. pylori* SS1. An atrophic change with the obvious glandular loss is observed in pyloric glands ( $\times 200$ ).

**Fig. 5.** H&E stained gastric tissue from a C57BL/6 mouse infected for 16 weeks with *H. pylori* SS1. An extensive infiltration of inflammatory cells including lymphoid cells with glandular destruction are observed in the lamina propria (A,  $\times 400$ ), and an intestinal metaplasia with goblet cells are observed in the corporeal mucosa (B,  $\times 200$ ).

12 SS1 *H. pylori* (Lausanne criteria) 100% colonization  
 C57BL/6 16  
 specific pathogen free *H. pylori* SS1  
 SS1 가 C57BL/6 *H. pylori*  
 II SS1 C57BL/6 *H. pylori*  
 가 colonization BALB/c colonization  
 가 *H. felis* C57BL/6, BALB/c, *Helicobacter*  
 C3H C57BL/6  
 가 B colonization  
 가 rapid urease test  
 SS1 *H. felis*  
 가 가  
 가 *H. pylori*  
 BALB/c .11 *H. pylori* 가  
 BALB/c SS1 6 *H. pylori* C57BL/  
 colonization C57BL/6 5% 가  
 가 C57BL/6 .11 colo- *H. pylori*  
 nization rapid urease test H&E Warthin  
 C57BL/6 가 *H.*  
 C57BL/6 *pylori* rapid urease  
 II BALB/c C57BL/6 test 2  
 가 10 가  
*H. pylori*  
*H. pylori*가  
*H. pylori* strain (SS1) cagA vacA가  
 C57BL/6 106-107 CFU/g tissue *H. pylori*  
 colonization , 20 Whitehead 14 가 가  
 , 8  
 .11

*H. pylori*

*H. pylori* 가 updated Sydney System

*H. pylori* mild, moderate, 16

marked updated Sydney System .15

*H. pylori* : *Helicobacter pylori* strain(SS1) 16

*H. pylori* 11 SS1 C57BL/6 : *H. pylori* strain (SS1) 6 C57BL/6  
3.5, 6, 8 6 , SS1 109 CFU/mL . SS1  
16 , 8 6 , 16 6 3 4 , 4 7  
3 urease H&E Warthin :  
4 urease H&E Warthin *H. pylori*  
. 8 1/3 urease가 *H. pylori*  
. 16 3 , 4  
7 *H. pylori* 14 plasma . 8  
 , crypt ,  
.16 3 가  
가 SS1 C57BL/6 : SS1 C57BL/6

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- : *Helicobacter pylori*,
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