

## Bacterial Adherence Inhibitors for *Helicobacter pylori*

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### Introduction

Human pathogen *Helicobacter pylori* adhere to the lining of the stomach and causes gastritis (inflammation of the stomach), duodenal or peptic ulcer, and gastric cancer (stomach cancer). Adherence of the bacteria to the mucous membrane of the gastroduodenum is the necessary initial step in the infection of the gastroduodenal tissue by the bacteria. Literature review showed that *H. pylori* uses adhesion molecules like AlpA, AlpB, BabA, HopZ, OipA and SabA to adhere to the epithelial lining of the stomach<sup>[1-4]</sup>. Reports showed that a class of sulfated glycolipids act as receptors for adherence of *H. pylori*<sup>[5-11]</sup>.

Slomiany et al.<sup>[5]</sup> identified and reported sulfated glyceroglucolipids and its related compounds in the lipid extract of the human gastric content. The human gastric content was from the alimentary tract. Sulfated glyceroglucolipids and its related compounds are probably involved in the attachment of the organisms to the gut mucosa<sup>[6]</sup>. Slomiany et al.<sup>[11]</sup> reported that *H. pylori* adhere to triglucosyl monoalkyl-monoacyl glycerol sulfate. Lingwood et al.<sup>[10]</sup> also reported that gastric glyceroglucolipid acts as a receptor for bacterial adherence in *H. pylori*. Thus, these studies demonstrate that sulfated glycolipids of the gastric mucosa have a role in adherence of *H. pylori*.

Medicinal chemistry can be applied to synthesize the analogues for sulfated glycolipids without changing the pharmacological properties of the compound<sup>[12]</sup>. Several groups have attempted to synthesize the analogues of sulfated glycerogluco-

lipids<sup>[13-15]</sup>. Gigg<sup>[13]</sup> synthesized seminolipid [3-O-( $\beta$ -D-galactopyranosyl-3-sulfate)-2-O-hexadecanoyl-1-O-hexadecyl-L-glycerol] an analogue for sulfated glycerogalactolipid. Ogawa and Horisaki<sup>[14]</sup> synthesized 2-O-hexadecanoyl-1-O-hexadecyl- $[\alpha$ -Glc-6SO<sub>3</sub>Na-(1-6)- $\alpha$ -Glc(1-6)- $\alpha$ -Glc(1-3)]-sn-glycerol an homologue for trisaccharide sulfated glyceroglucolipid.

Randall and Leunk<sup>[15]</sup> synthesized sulfated glyceroglucolipids with various R, R' groups, where R or R' is of hydrogen or C<sub>1</sub>-C<sub>24</sub> acyl or alkyl and M<sup>+</sup> is a cationic moiety. The pool of synthesized compounds were tested for adherence of *H. pylori* by two methods. First method tested the ability of *H. pylori* to adhere to the HeLa cells in the presence or absence of sulfated glyceroglucolipids. Second method tested the ability of *H. pylori* to establish infection in the neonatal gnotobiotic piglets. The sulfated glyceroglucolipids in combination with antimicrobials/anti ulcer medications were tested. Pharmaceutical component inhibited the adherence of *H. pylori* to the mucosal surface of the upper gastrointestinal tract. These sulfated glyceroglucolipids can be modified to improve the binding affinities so that these compounds act as a good inhibitor for adherence of *H. pylori*. Further, sulfated glyceroglucolipids can be encapsulated in nanocarrier using nanotechnology that acts as a gastroretentive delivery system for site specific delivery, slow release of drug with more half life and also bringing the stability to the compound<sup>[16]</sup>.

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