

P1-10

Bifacial aspects of ethanol: antibacterial effect and carcinogenic effect by metabolism to acetaldehyde depend on ethanol concentration

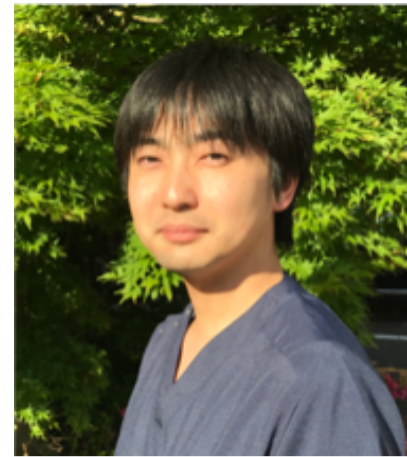
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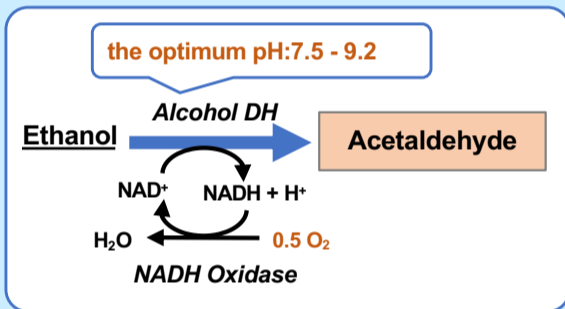
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Introduction

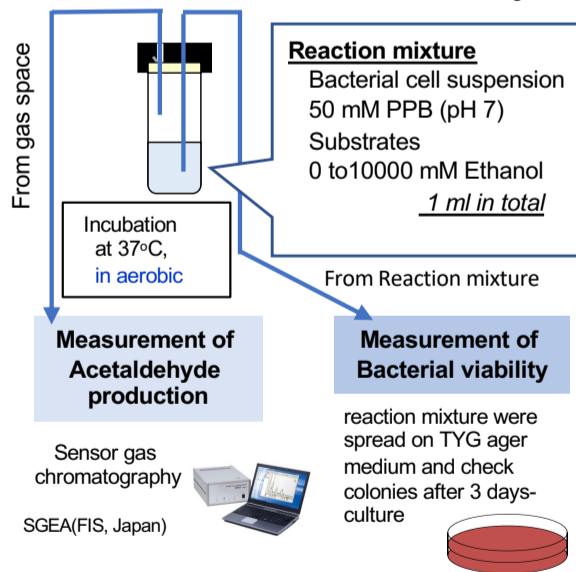
Alcohol consumption and poor oral hygiene are considered as risk factors for oral cancer. Because the acetaldehyde produced from ethanol by the indigenous oral bacteria, such as *Streptococcus* species, is carcinogenic. We have already elucidated that *Streptococcus* species efficiently produced acetaldehyde from ethanol at neutral to slightly alkaline pH under aerobic conditions. Meanwhile, it is well known that ethanol has bactericidal effect. Thus, we tried to clarify the relationship between these two effects at the wide range of ethanol concentrations.



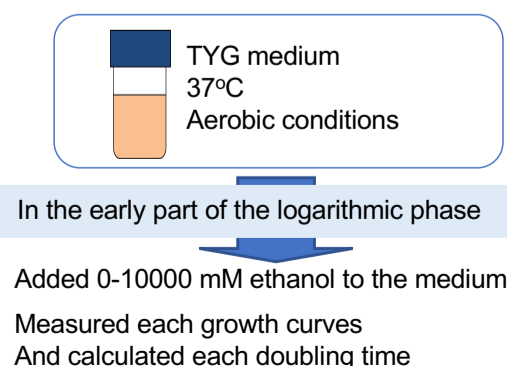
Materials and Methods

We used *Streptococcus mitis*, *mutans*, *salivarius*, *gordonii*, *sanguinis* and evaluated bacterial acetaldehyde production, growth, and survival abilities under a wide range of ethanol concentrations.

Measure of Acetaldehyde production and Bacterial viability



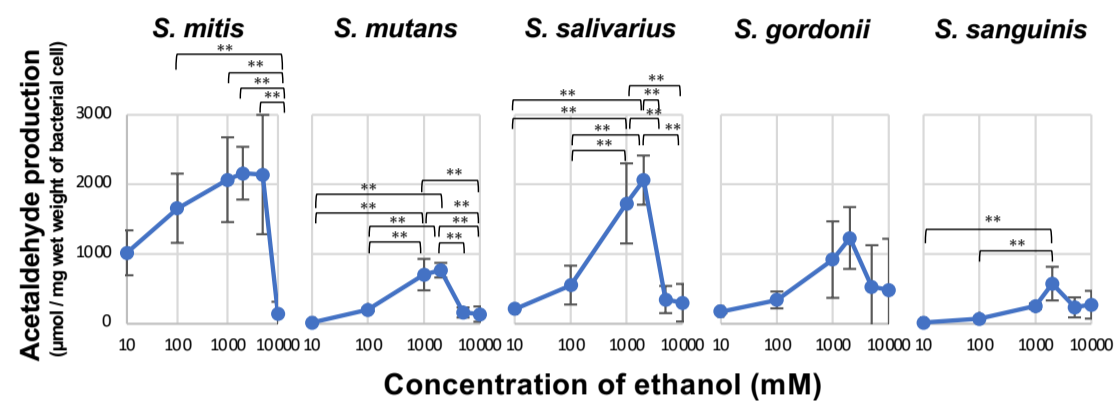
Measure of Doubling times for growth



Results

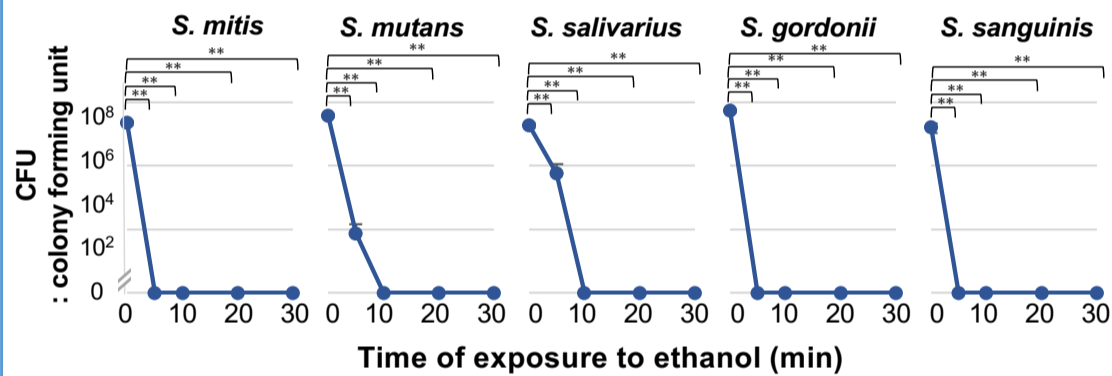
*p < 0.05, **p < 0.01; n = 3.

Acetaldehyde productions from various concentration of ethanol



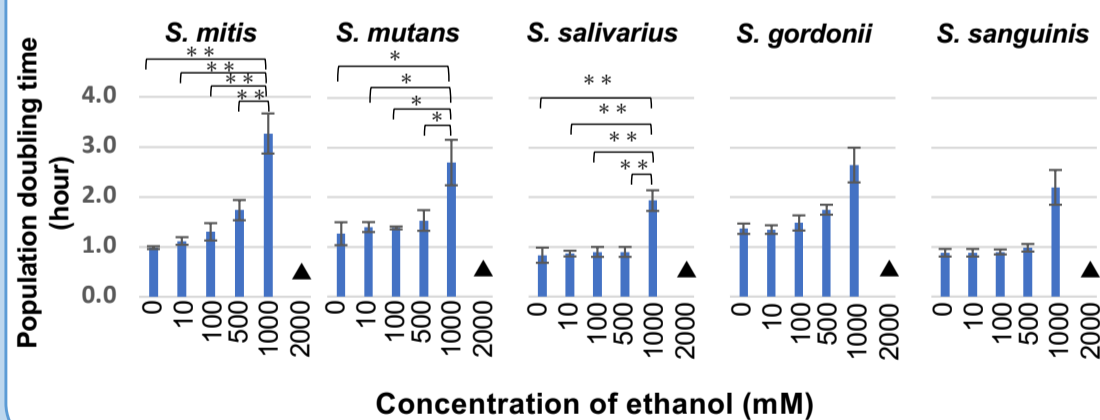
In all stains, the acetaldehyde production increased as ethanol concentration increased up to 2000 mM and decreased at 5000 and 10,000 mM. Especially, *S. mitis* produced high amount of acetaldehyde from low concentration of ethanol.

Bacterial viability after exposure to 5000 mM



After 5000 mM and 10,000 mM ethanol exposed to each stains, all stains lost viability or died by 10 minutes. In 0 to 2,000 mM ethanol exposure to each bacteria, CFU was not decreased.

Doubling times for growth in the presence of ethanol



▲, A doubling time of > 3.5 hours was considered to be indicative of no growth.

In all stains, ethanol above 1,000 mM increased their doubling times. The inhibition effects of each bacteria were different depending on the stains.

Discussion

Our results suggest that usual drinking of alcohols for a long time leads to the high acetaldehyde production by oral bacteria, since oral bacteria can produce acetaldehyde from ethanol at a wide range of concentration. At a high concentration of ethanol, bacteriostatic and bactericidal effects can be expected, but it should be noted that acetaldehyde is continuously produced from ethanol.

Bifacial biological effects of ethanol

