Preventing Traveller’s Diarrhoea
Inhibition of pathogens using Winclove Travel

Travelling to areas such as Africa, Asia and South America is often accompanied by unpleasant occurrences of travellers’ diarrhoea (TD). This phenomenon is so well known and prevalent that popular travel destinations have given the condition special names, such as Bali belly. Even though symptoms usually only last for about two days, it can bring a high level of inconvenience, disrupting vacations and business trips. Probiotics have shown to prevent TD by inhibition of growth of bacteria (pathogens) that cause the problem. Research at the University of Urbino, Italy, investigated the potential of the individual bacterial strains present in Winclove Travel against 5 known pathogens (S. enteriditis, L. monocytogenes, E. coli, C. sakazakii, C. jejuni), as well as combinations of these strains. Several distinct inhibitory functions of the investigated strains were found against these pathogens. These include:

- antimicrobial activity
- interference of adhesion of the pathogen to the intestinal wall
- growth competition/exclusion

Treatment of TD

TD is defined as three or more loose stools in 24 hours affects about 40% of travellers to ‘high risk’ areas such as Africa, Asia and South America [1]. Even though symptoms usually only last for about two to three days, it can bring a high level of inconvenience, disrupting vacations and business trips especially if it is accompanied by abdominal cramps, nausea, fever and vomiting. In addition, in children and the elderly one should be aware of dehydration, which can lead to serious complications. Most cases of TD are caused by bacteria. Overall, the most common pathogen is enterotoxigenic Escherichia coli, followed by Campylobacter jejuni, Shigella spp. and Salmonella spp. [2]. Although most cases resolve without treatment over several days, in about 10% the symptoms persist for more than a week, and in about 2% for more than a month. Treatment usually focusses on the prevention of dehydration, reduce the severity and duration of symptoms, and prevent interruption to planned activities. For this purpose oral hydration solution (ORS), Bismuth subsalicylate and loperamide are widely used.

Did you know:
Prevention of TD generally consist of the advice; “Boil it, peel it, cook it or forget it”. Yet this has not shown to reduce its incidence?

When travelling the best option is of course to not suffer from TD at all. Therefore travellers are often advised; “Boil it, cook it, peel it, or forget it”. However, studies have shown that despite this advice even persons who have strictly followed it developed TD. For this reason antibiotics are often given prophylactically to prevent TD. However, the use of antibiotics has several drawbacks and side effects. Most importantly, antibiotic use comes with the risk of
giving rise to resistant bacteria [3]. Moreover antibiotics offer no protection against nonbacterial pathogens and they disrupt the microbiota, which could make a traveller more susceptible to infection with resistant bacterial pathogens. For these reasons prophylactic antibiotics are not recommended for the prevention of TD.

Probiotics have shown to provide a safe alternative. They can prevent the onset of infection by inhibiting the growth of pathogens, neutralising and inhibiting toxins and reducing adherence and colonisation.

**Winclove Travel**

Winclove Travel is a multispecies probiotic formulation, containing seven strains of lactic acid bacteria. These probiotic bacteria have been selected on their pathogen inhibiting effects. Previous studies have indicated a decline in occurrence of TD from 40% to 19% when using Winclove Travel once daily.

**Studying the strain specific properties of Winclove Travel**

Although previous research has shown beneficial effects for the use of Winclove Travel, independent research is important for the validation of the effects and identification of specific strain properties. To this end research was conducted by the department of Biomolecular Science, at the University of Urbino [4]. For each of the strains the probiotic properties were investigated as well as their effect on the invasion of several pathogens often found in TD.

The study first investigated the suitability of the strains through means of survival in stomach and intestinal like conditions and the ability to colonize and persist in the gastrointestinal tract. Furthermore, the antibacterial properties and barrier function against five pathogenic microorganisms to colonize the intestinal surface was investigated. In a second phase, the capability of the lactic acid bacteria to compete with and exclude the pathogens was examined. This interference of pathogens prevents colonization and therefore infection. A confidence level of $\gamma=0.95$ was used.

**Strain properties**

Results indicate good survival of stomach conditions for all lactic acid strains, although survival of small intestine conditions has only been shown for four out of the seven strains. This could however be due to suboptimal replication of the intestinal conditions. Growth of all pathogens tested was inhibited by multiple strains, this demonstrates the antimicrobial activity of the lactic acid strains. The lactic acid strains showed different efficiencies of antimicrobial activity against different pathogens, illustrating the importance of using a multispecies probiotic to combat a variety of pathogens.

Auto-aggregation shows the ability of a strain to bind itself, making it possible to form and maintain a colony. Co-aggregation is the ability of strains to bind to the pathogens, thereby forming a barrier for the pathogens to colonize the intestines. All probiotic strains demonstrated higher auto-aggregation then the tested pathogens. Co-aggregation with all pathogens was observed. This shows the likelihood that the strains are able to persist in the intestines and prevent pathogens to infect the intestines. The ability of the lactic acid strains to adhere (bind) to the intestinal cell wall was also tested, this ranged from 51% to 10% for the different species.
**Interference of pathogen invasion**

The three strains demonstrating the highest adhesion to intestinal cells were further investigated for their ability to interfere with pathogen invasion. This was done for the strains individually and in the four possible combinations. Individual interference was observed for all pathogens. The salmonella species showed least interference by a single probiotic with 57%. Interference was notably increased by using a combination of probiotic strains. For all pathogens inhibitions of over 70% could be reached when strains were combined, with some pathogen growths even inhibited up to 98%.

The study is to our knowledge the first study to show the benefits of multispecies probiotics as compared to single species probiotics against intestinal pathogens. Although it would be beneficial to study the effect of the combination of all seven strains on pathogen inhibition, the results already show that through different mechanism and barriers the multispecies probiotic may prevent many different causes of TD. This shows great promise for Winclove Travel as a way for travellers to enjoy their time abroad to the fullest.

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**Educational Support**

We are happy to support you in how to communicate these results to your healthcare professionals and how to implement them into your educational materials. For this, please contact Karen Koning, Senior Scientist and Head of Education at Winclove Probiotics. [k.koning@winclove.nl](mailto:k.koning@winclove.nl)

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**References**