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PROBIOTICS DATABASE

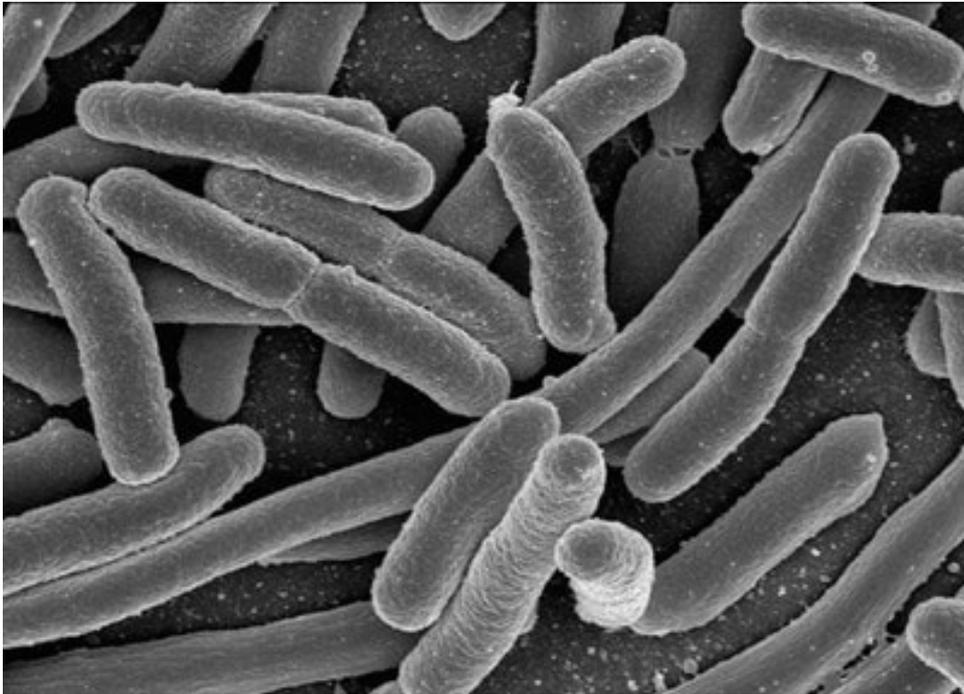


Lactobacillus acidophilus NCFM®

The most clinically researched strain of acidophilus
Especially trialled for IBS related pain & bloating

Often studied alongside ***B. lactis* BI-04®** and ***B. lactis* Bi-07®**

This strain can be found in Optibac Probiotics **Every Day EXTRA** and **Every Day MAX.**

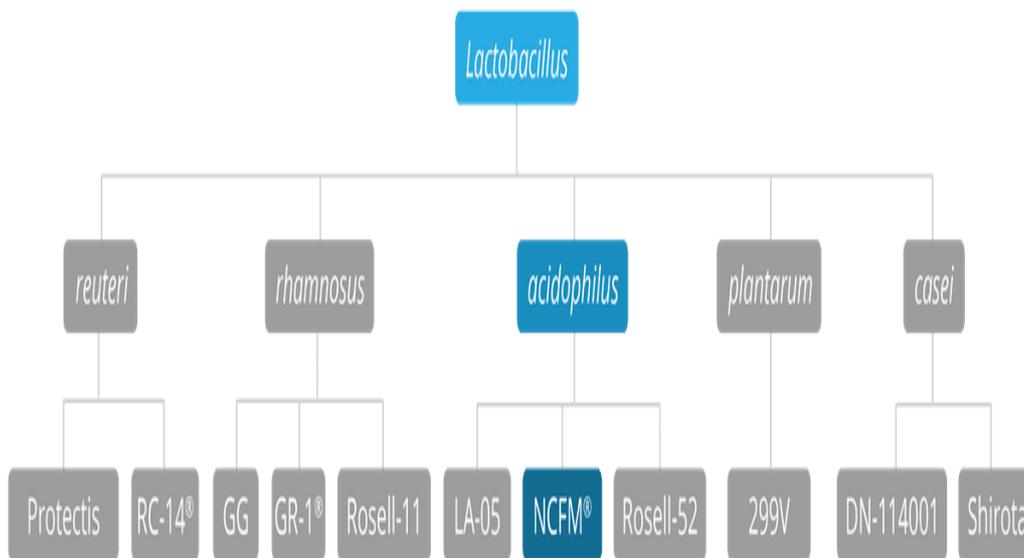


Under the microscope: *Lactobacillus acidophilus* NCFM®

Lactobacillus acidophilus NCFM® is a very well-researched strain - certainly the most researched strain of the acidophilus species - which has been extensively tested in vitro,

and also in both animal studies and in human clinical trials. There are actually over 45 clinical trials on this strain, a fact which confirms its position as one of the best probiotic strains in the world, with a well-deserved and a secure place in this database of the most well-researched probiotics on the planet. It has been used in a broad range of studies focusing on its potential to support many areas of gastrointestinal and general health, including immune function, antibiotic-associated gut disturbances, and the symptoms of Irritable Bowel Syndrome (IBS). The NCFM[®] strain is a member of the *Lactobacillus acidophilus* species.

The *L. acidophilus* NCFM[®] strain was first identified when isolated from a human source back in the early 1970's. Its strain name, NCFM[®], is derived from an abbreviation of the “North Carolina Food Microbiology”, which is the name of the research laboratory at North Carolina State University (NCSSU) where the strain was first discovered. You may also see *Lactobacillus acidophilus* NCFM[®] referred to as *Lactobacillus acidophilus* ATCC 700396, NCK56, N2 as well as NCFM[®]. This strain is often used in clinical trials in combination with *Bifidobacterium lactis* Bi-07[®].



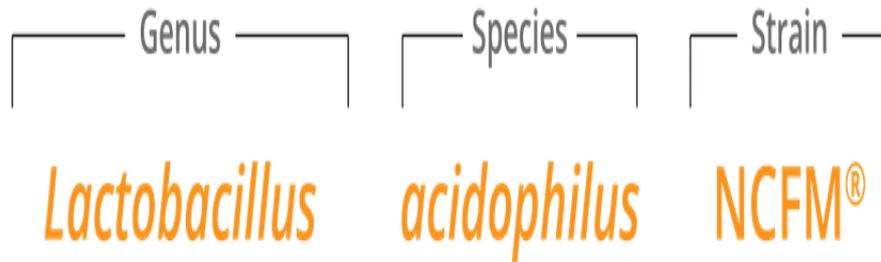
You are here: The NCFM[®] strain is part of the acidophilus species and the Lactobacillus genus

***Lactobacillus acidophilus* NCFM[®] - Safety and Survival**

Lactobacillus acidophilus NCFM[®] is a food supplement with research demonstrating its safety and survival to reach the gut alive. In a study by Morovic, W. et al., (2017), *L. acidophilus* NCFM[®] alongside *Bifidobacterium lactis* Bl-04[®] and *Bifidobacterium lactis* Bi-07[®] was assessed for its safety in vivo. The results across a variety of parameters including antibiotic resistance, genomic risk factors, and acute toxicity confirmed all three strains to be safe for human consumption.

Lactobacillus acidophilus NCFM[®] has been isolated in stool samples after oral administration indicating survival through the gastro intestinal tract. This was recognised as early as 1978, as described in a paper by Gilliland, S. W. et al., (1978). More recently, in a study by Mai, V. et al., (2017) different types of capsule were used for administration, and regardless of the capsule type used *L. acidophilus* NCFM[®] was recovered in stool samples.

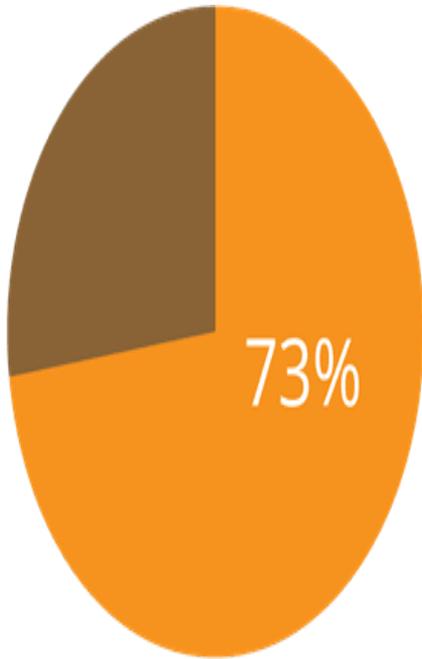
This strain has numerous studies to support its ability to improve overall wellbeing. Ringel-Kulka, T. et al., (2014); Ringel, Y. et al., (2008) and Lyra, A. et al., (2016).



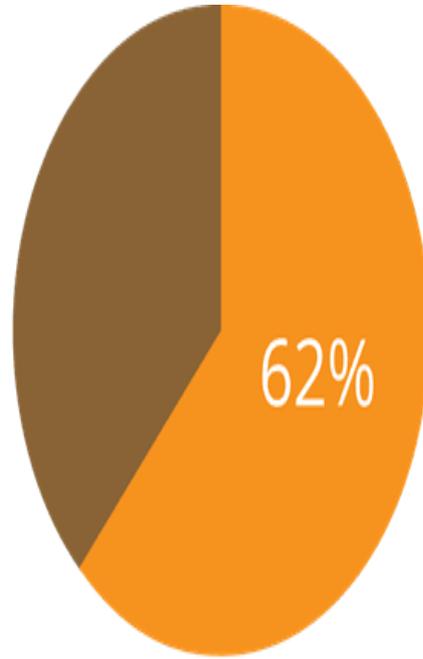
***Lactobacillus acidophilus* NCFM[®] and IBS-Related Pain and Bloating**

Lactobacillus acidophilus NCFM[®] has been shown in multiple studies to help relieve the symptoms of pain and discomfort that are so typical in **IBS** sufferers. Clinical trials were able to measure a statistically significant improvement in symptoms, and also to determine the mechanism of action by which the improvement was achieved.

One of the earliest studies into this aspect of the strain's potential, a double-blind, randomised, controlled clinical trial using 26 participants with **IBS**, yielded intriguing results and prompted further research to be done. At the beginning of the test period, subjects were given a questionnaire and a stool test, where low levels of beneficial bacteria and high levels of pathogens were noted. They were then given a supplement containing a combination of bacteria including *Lactobacillus acidophilus* NCFM[®], which was followed up by a second assessment of stool tests and questionnaires taken 4-6 weeks after taking the probiotic. The participants saw a 73% improvement in bloating and 62% improvement in pain and cramps (Faber, SM. 2000).



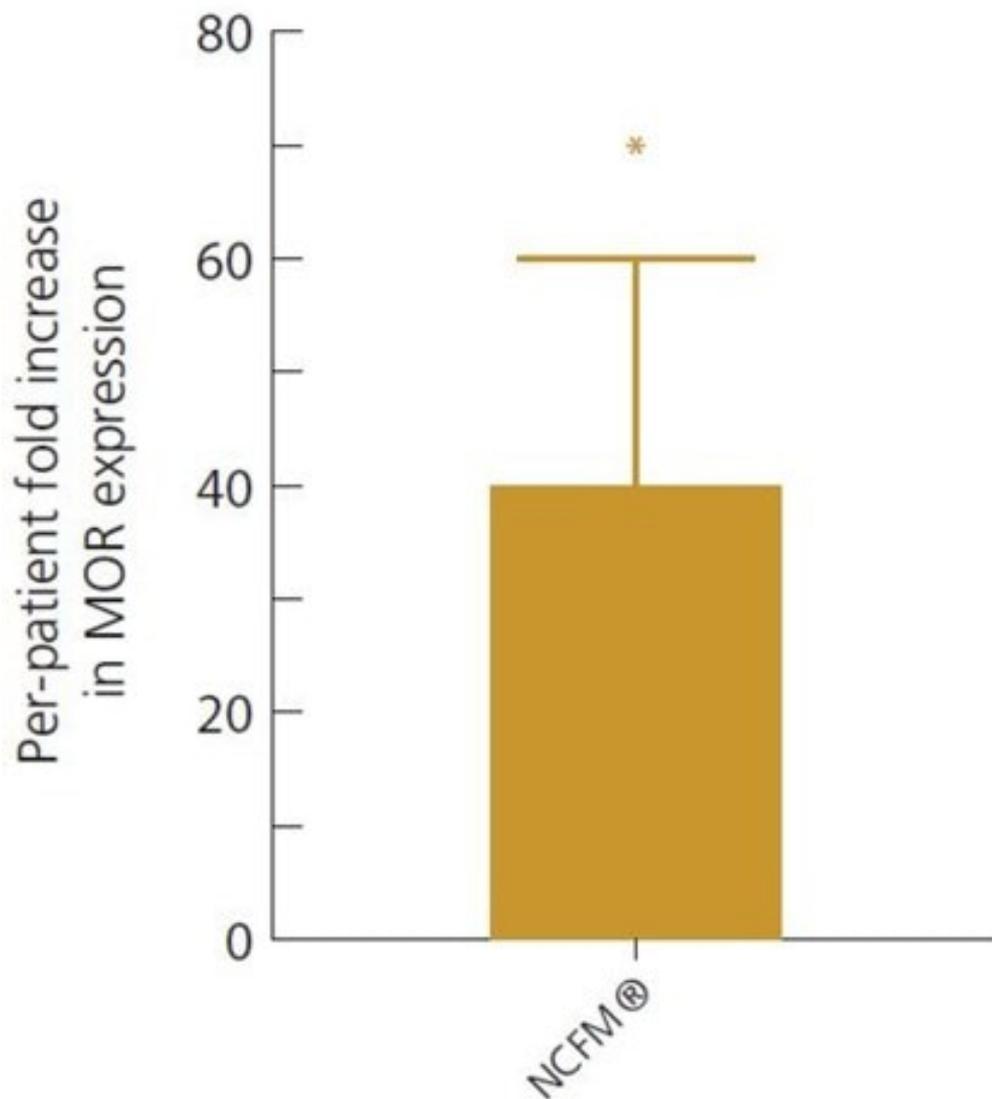
Participants who saw
an improvement in bloating



Participants who saw an
improvement in abdominal
pain / cramps

Graph 1 - shows the percentage of participants who saw an improvement in IBS-related pain and bloating when supplemented with *L. acidophilus* NCFM[®]

In a 2007 study, a potential mechanism of action for this pain-relieving effect was determined. *Lactobacillus acidophilus* NCFM[®] was shown to induce expression of μ -opioid and cannabinoid receptors in intestinal epithelial cells, leading to an analgesic effect similar to that of the pain-killer morphine, and resulting in a measurable reduction of colonic pain (Rousseaux, C et al., 2007).



Graph 2 - *L. acidophilus* NCFM® increases receptors in the gut associated with pain relief

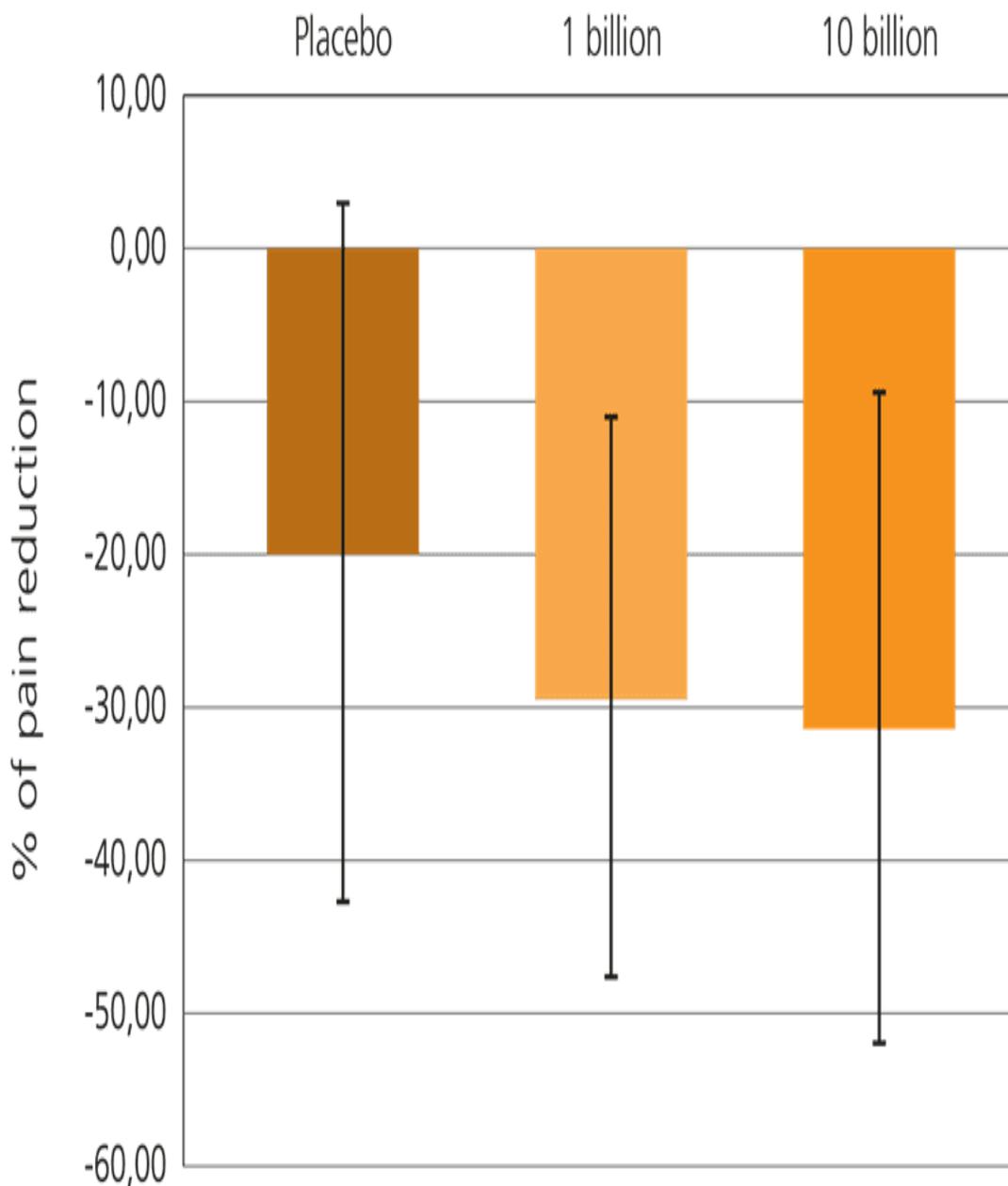
More recent studies appear to have confirmed this mechanism of action. It has been identified that the bacteria actually communicate with cells in the gut wall and help to modulate the signals which are involved in creating spasms, thereby alleviating cramps and associated pain.

This was again demonstrated in a double-blind, randomised, controlled clinical trial, where 20 IBS sufferers took either *Lactobacillus acidophilus* NCFM® alone or a combination of *L. acidophilus* NCFM® and ***Bifidobacterium lactis* Bi-07®** twice a day for 3 weeks. The cell-signalling pathways involved in IBS symptoms, such as the stimulation of the opioid receptors, were looked at by examining samples of gut tissue from each participant. Subjects in both groups reported an improvement in IBS symptoms, but it was noted that only those supplemented with the single strain of *Lactobacillus acidophilus* NCFM® had a significant decrease in levels of the pain perception signalling pathways in their tissue samples, suggesting that this strain has specific potential to modulate mu-opioid receptor (MOR) expression and activity.

Intestinal tissue samples showed *L. acidophilus* NCFM® is able to reduce pain in the gut by increasing MOR receptor expression 40-fold, when compared to pre-study tissue

samples (Ringel-Kulka, 2014).

This beneficial effect has been further explored recently, in a large triple blind, placebo controlled trial which included 391 subjects suffering from IBS-related pain. In this trial, participants were given either a supplement containing 1 billion CFU or 10 billion CFU of *Lactobacillus acidophilus* NCFM[®] every day for a period of 12 weeks, or a placebo.



Graph 3 - shows a higher dose of *L. acidophilus* NCFM[®] reduced discomfort in the gut to a greater extent than the lower dose

Both probiotic groups specifically showed a reduction in gut pain, but it was noted that the higher dose of live cultures yielded a more statistically significant

result: *Lactobacillus acidophilus* NCFM[®] at a dose of 10 billion CFU reduced discomfort in the gut by over 30% from the baseline. This trial is particularly relevant for sufferers of IBS who frequently experience spasms, cramps and abdominal pain (Lyra A. et al, 2016).

Further relevant studies: D'Souza et al. (2015), Faber (2003), Hong & Rhee (2014), Ringel, Y. et al. (2008), Ringel-Kulka et al. (2011).

***Lactobacillus acidophilus* NCFM[®] and Diarrhoea**

Diarrhoea is a disturbing digestive symptom that can be triggered by a variety of causes including bacterial infection, viral infection or Irritable Bowel Syndrome (IBS). Studies have shown that *Lactobacillus acidophilus* NCFM[®] may help to alleviate this symptom,

In a double-blind, placebo-controlled, randomised clinical study involving 243 children aged 12-36 months, *Lactobacillus acidophilus* NCFM[®] was given to subjects as part of a three strain formulation (also including *Bifidobacterium lactis* Bi-07[®]). During the 14-week trial, a statistically significant reduction in the incidence and frequency of episodes of diarrhoea was seen in the probiotic group versus the placebo (Ruiz-Palacios et al, 1996).

In another study using HIV-positive subjects with diarrhoea, it was found that a combination of *L. acidophilus* NCFM[®], *Bifidobacterium lactis* Bi-07[®], and soluble fibre significantly reduced the frequency and number of stools passed. The subjects had previously been using loperamide (also known as Imodium) to help manage their symptoms, but during the study found that they also needed to use less of the medication (Heiser et al, 2004).

***Lactobacillus acidophilus* NCFM[®] and Constipation**

Constipation is a widespread digestive disorder, particularly in western countries and so, as you will see from other pages in the database, the use of probiotics to help manage this symptom has been the focus of a growing area of research. *Lactobacillus acidophilus* NCFM[®] is one of the bacterial strains that has yielded encouraging results in for the alleviation of slow stool transit.

A recent study investigated this potential and yielded positive results. Subjects with constipation were randomly divided into two groups and given a yoghurt each morning for 14 days. The members of the treatment group were given a yoghurt containing a combination of a soluble fibre with the probiotic strains *Lactobacillus acidophilus* NCFM[®] and *Bifidobacterium lactis* HN019, and those in the control group were given a plain yoghurt.

Results indicated that those in the treatment group showed a significantly shortened colon transit time after two weeks (Magro et al., 2014).

Further relevant studies: Waitzberg et al (2013).

***Lactobacillus acidophilus* NCFM[®] and Lactose Intolerance**

Lactose intolerance is one of the most common food intolerances, caused by an inability to digest lactose, a type of sugar found primarily in milk and dairy products. This intolerance results from a deficit of the enzyme lactase, needed in the body to efficiently break down lactose into simpler forms which can then be more easily absorbed into the bloodstream. *Lactobacillus* bacteria possess lactase activity and so may help to aid digestion of lactose.

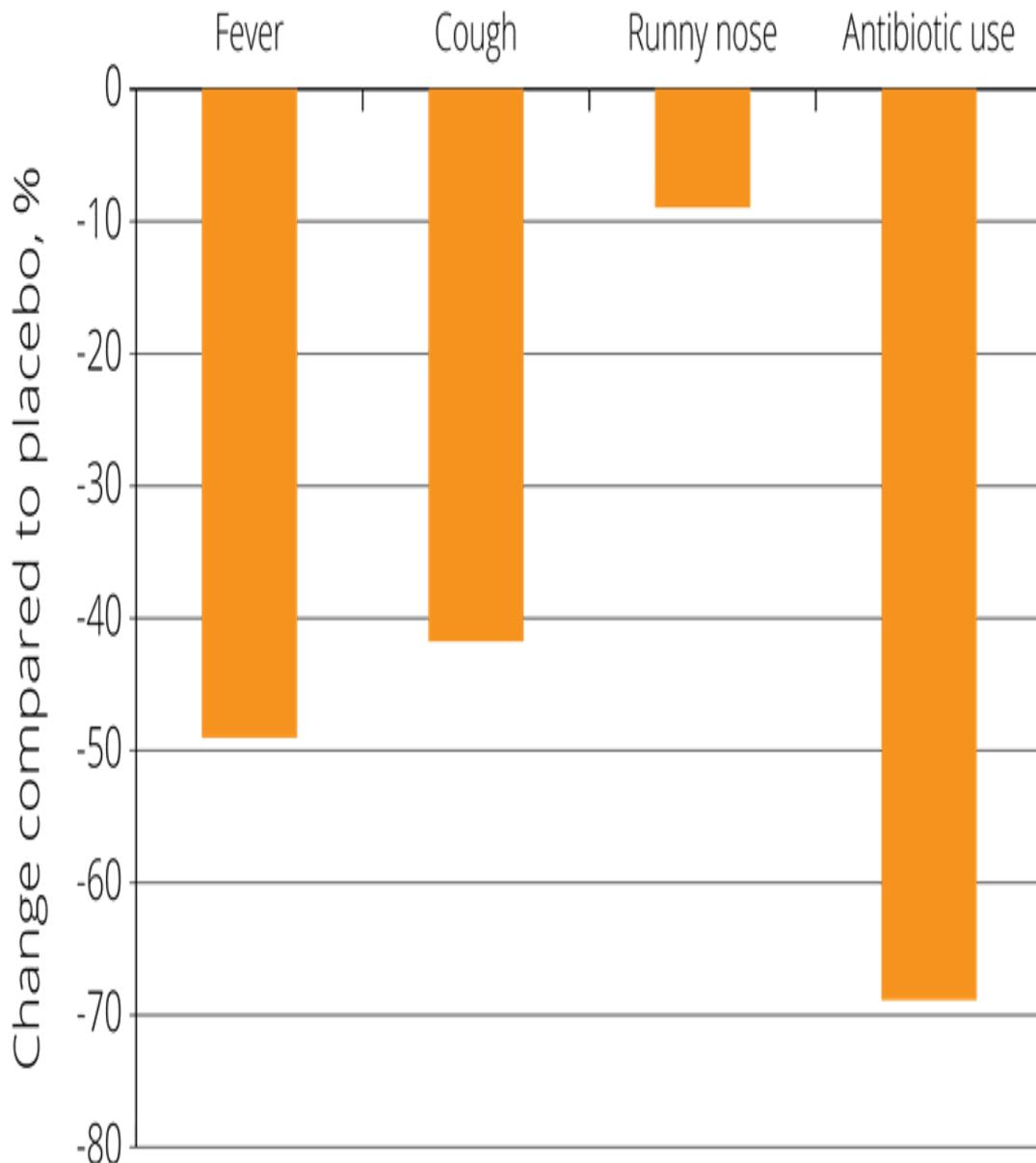
There has been a small amount of research into the particular potential of *Lactobacillus acidophilus* NCFM[®] to relieve the symptoms of lactose intolerance. In a small study from 1995, nine out of ten lactose-intolerant subjects experienced a reduction in symptoms following ingestion of milk which had been inoculated with *Lactobacillus acidophilus* NCFM[®], compared to when they consumed un-inoculated milk (Montes et al., 1995).

***Lactobacillus acidophilus* NCFM[®] and Immunity**

Emerging research suggests a role for the gastro-intestinal microbiota as a vital part of the immune response in humans and all other vertebrates. *Lactobacillus acidophilus* NCFM[®] is one of the strains that has been studied to determine its role in immune function.

A study showed positive effects of *Lactobacillus acidophilus* NCFM[®], on serum immunoglobulins in healthy adults following vaccinations, with an increase in levels of serum IgA and IgM. Immunoglobulin A (IgA, also referred to as sIgA) is an antibody known to play a vital role in the immune response of mucous membranes, and Immunoglobulin M, or IgM, is the first antibody to be stimulated on initial exposure to an antigen. Although the precise mechanism by which the bacteria may affect these immunoglobulins is not yet fully understood, this is a strong indication that this strain can modulate, or have a positive effect on our immune responses (Paineau, D. et al., 2008).

These positive results have prompted further studies into the effects of probiotics on immune function, and *Lactobacillus acidophilus* NCFM[®] has also been studied in combination with other strains. In one double-blind, placebo-controlled study, 326 eligible children from 3 to 5 years of age were randomised to receive placebo, *Lactobacillus acidophilus* NCFM[®], or *Lactobacillus acidophilus* NCFM[®] in combination with *Bifidobacterium lactis* Bi-07[®]. The children were given the supplement twice each day for a period of 6 months.



Graph 4 - shows a reduction in the incidence of cold symptoms of children supplemented with *L. acidophilus* NCFM[®]

The results showed a statistically significant reduction in the incidence of cold symptoms such as fevers, coughs, and rhinorrhoea (runny nose) and associated use of antibiotics in both of the probiotic groups compared to the placebo group, resulting in fewer days absent from school due to illness - see right (Leyer G.J., et al. 2009).

In another randomised trial of 47 children with hay fever (triggered by birch tree pollen), the effects of the same probiotic combination on allergy symptoms were assessed. The children were either given a supplement containing *Lactobacillus acidophilus* NCFM[®] in combination with *Bifidobacterium lactis* BI-04[®], or a placebo. In peak hay fever season, tests revealed that those taking the two strain probiotic combination showed a significantly reduced presence of eosinophils (the white blood cells involved in controlling allergies) in the nasal area, compared to the placebo group. It may be important to note that all the participants were also given oral antihistamines to ease their symptoms. This undoubtedly reduced the possibility of properly observing a treatment effect on all pollen allergy symptoms. (Ouweland, AC et al., 2009).

Further Relevant Studies: Bjorklund et al., (2011), Cai, M. et al., (2008), Foligne et al., (2007a), Foligne et al., (2007b), Konstantinov et al., (2008), Leyer et al., (2009), Ouweland

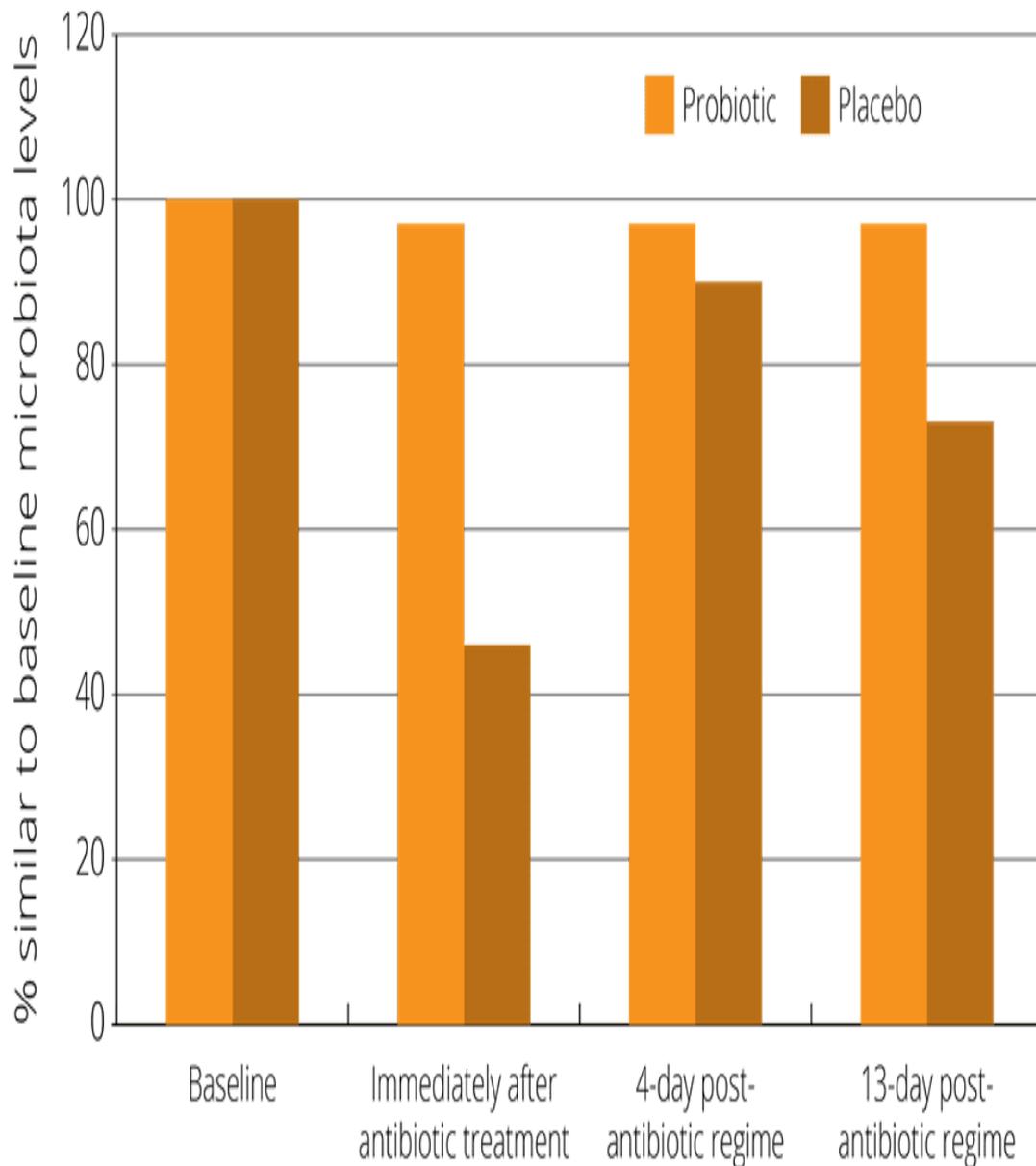
A., (2008), West, (2014), Zoumpopoulou et al., (2009).

***Lactobacillus acidophilus* NCFM[®] and Stabilisation of Gut Microbiota Post Antibiotics**

Antibiotics are medications used to treat bacterial infections; they are routinely used world-wide to treat a very broad range of diseases and infections including respiratory tract infections, urinary tract infections, skin infections and infected wounds. Though antibiotics often have life-saving effects, they can also have a range of unpleasant side effects including antibiotic-associated diarrhoea.

Antibiotics can have an indiscriminate effect, killing strains of beneficial bacteria in the body as well as those causing the infection. It can take the resident flora a long time to rebalance after antibiotic treatment because our bodily populations of beneficial bacteria form one of our defences against pathogenic strains. Antibiotic treatment may leave the body even more vulnerable to infection once the course of medication is completed (Engelbrekston AL et al 2009).

Scientists are therefore exploring ways of quickly restoring the resident microbiota after antibiotic treatment, and have focused on the use of probiotics to help minimise the side effects of antibiotics. *Lactobacillus acidophilus* NCFM[®] is one of the strains that has been studied for this purpose.



Graph 5 - shows a combination of strains including *L. acidophilus* NCFM[®] were found to minimise the side effects of antibiotics

In one such study, a probiotic supplement containing a combination of strains

including *Lactobacillus acidophilus* NCFM[®] was found to minimise the disturbance of faecal microbiota after antibiotic treatment. The study observed 51 healthy subjects who had been administered with antibiotics, and randomised to either receive a probiotic or a placebo at the same time. The subjects gave faecal samples both before and after the treatment in order to compare their gut microbiota at both stages. The results indicated that those subjects in the probiotic group showed less of a disturbance in their faecal microbiota, which then returned more rapidly to the pre-antibiotic baseline state - see right (Engelbrektsen, A.L. et al., 2009).

In another randomised, double-blind, placebo-controlled, parallel group

study, *Lactobacillus acidophilus* NCFM[®] was given in combination *Bifidobacterium lactis* Bi-07[®] to 111 healthy subjects, during and after antibiotic treatment.

The faecal microbiota was monitored by real time-polymerase chain react to assess the effects of the probiotics, and it was found that the consumption of the probiotic combination led to an increase in the faecal levels of the probiotic species. The reduction

in *Lactobacilli* species that was observed in the placebo group was not noted in the probiotic treatment groups, and it was thought that consuming a probiotic containing a *Lactobacillus* strain may have helped to stabilise *Lactobacillus* populations in the gut (Forssten et al., 2014).

Further relevant studies: Ouwehand et al (2014), Schrezenmeir et al (2004), Engelbrekston et al (2006)

Lactobacillus acidophilus* NCFM[®] and *Candida albicans

There is a growing level of interest in the use of probiotics to help address the overgrowth of pathogenic yeasts, typically caused by the *Candida* family. These yeasts are natural residents in the human body, and are typically kept in check by the indigenous microbiome; however, they are opportunistic pathogens which may proliferate and cause fungal infections if conditions are favourable. To date, there has been a limited amount of research in this area, but *Lactobacillus acidophilus* NCFM[®] is one of the bacterial strains that has been studied for its effects against pathogens such as *Candida albicans*. Due to its antimicrobial activity against common intestinal pathogens and their toxins, it is thought that *Lactobacillus acidophilus* NCFM[®] may improve the composition of the intestinal microbiota. This may lead to a reduced risk of intestinal disorders and provide a protective effect against systemic infections caused by pathogens such as *Candida albicans* and *Citrobacter*.

The research has mostly been in the form of murine (mice) studies. One such study looked at how prior colonisation with *Lactobacillus acidophilus* NCFM[®] and other probiotic bacteria affected the antibody responses of immune-deficient mice. The study compared the results with the antibody responses produced by mice with an alimentary tract colonised only with *Candida albicans*. It was demonstrated that, although the probiotic bacteria did not appear to induce a strong antibody response to their own antigens, they altered the rodents' antibody response against *Candida albicans* (Wagner et al., 2000a).

Other relevant studies: Chen et al (2009), Lahtinen, S.J et al (2012), Wagner et al (2000b). Wagner et al (1998).

***Lactobacillus acidophilus* NCFM[®] and Food Addiction and Binge Eating**

Eating disorders after bariatric surgery are difficult to assess and may be under-reported. The use of probiotics as a facilitator in the treatment of eating disorders has already been investigated as a means of modulating the microbiota-gut-brain axis.

In a randomised, double-blind placebo-controlled trial, 101 patients received either probiotic supplementation of *Lactobacillus acidophilus* NCFM and *Bifidobacterium lactis* Bi-07 or placebo for 90 days after bariatric surgery, starting on the seventh postoperative day. The Yale Food Addiction Scale (YFAS) and Binge Eating Scale (BES) were applied to assess food addiction and binge eating, respectively.

Before surgery, one-third of the patients presented with a food addiction and binge eating diagnosis. After surgery a significant effect of treatment with probiotics was observed 1 year on. Both the number of symptoms of food addiction and the binge

eating score were lower in the probiotic group than in the placebo group (p=0.037 and p=0.030, respectively). (Ramos et al., 2022)

Authors: Information on this strain was gathered by Joanna Scott-Lutyens BA (hons), DiplON, Nutritional Therapist; and Kerry Beeson, BSc (Nut.Med) Nutritional Therapist.

Last updated - 12th May 2020

As some properties & benefits of probiotics may be strain-specific, this database provides even more detailed information at strain level. Read more about the strains that we have included from this genus below.

Lactobacillus acidophilus strains: **[Lactobacillus acidophilus LA-05](#)**, **[Lactobacillus acidophilus Rosell-52](#)**.

Lactobacillus casei strains: **[Lactobacillus casei Shirota](#)**, **[Lactobacillus casei DN-114001](#)**.

Lactobacillus plantarum strains: **[Lactobacillus plantarum LP299v](#)**.

Lactobacillus reuteri strains: **[Lactobacillus reuteri Protectis](#)** and **[Lactobacillus reuteri RC-14](#)**®.

Lactobacillus rhamnosus strains: **[Lactobacillus rhamnosus LGG](#)**®, **[Lactobacillus rhamnosus HN001](#)**, **[Lactobacillus rhamnosus GR-1](#)**® and **[Lactobacillus rhamnosus Rosell-11](#)**.

Lactobacillus paracasei strains: **[Lactobacillus paracasei CASEI 431](#)**®.

For products containing this strain visit the **[Optibac Probiotics shop](#)**.

For more info and the latest research on probiotics, please visit the **[Probiotic Professionals](#)** pages.

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