**Probiotics and their Effect on Necrotizing Enterocolitis**

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**Probiotics have been used throughout the scientific community and by common consumers for many decades since their discovery. Probiotics themselves are considered biological dietary supplements that have living microorganisms present that will change the hosts gut microbiome in a positive way, aiding in the digestion of foods. This aid in digestion is a popular effect since digestive issues can become a negative problem for patients. It has been known that these probiotics have a large effect on the gastrointestinal tract of individuals who consume them on a regular basis with at home use. With newborns especially, probiotics could significantly impact their gut microbiome. There are multiple different types of probiotics, but the most commonly found and used types are *Bifidobacterium, saccharomyces* and *lactobacillus.* Also, there are many other forms of probiotics, but these have been found to have the most positive effect when used.Under normal circumstances the combination of the three is seldom used to treat common issues that arise inside of the human gastrointestinal tract. However, there are certain conditions that can form where the use of all three of these probiotics, or two in conjunction can create a cure or beneficial treatment as opposed to death of the patient that is seen in some cases. Necrotizing enterocolitis is this such condition that was studied during this research. Necrotizing enterocolitis is a prevalent issue specifically in premature newborns, especially in third world countries. The use of probiotics to treat necrotizing enterocolitis can greatly reduce the occurrence of death from the condition while also minimalizing side effects that can arise from other treatment plans. Using a combination of probiotics has only recently been studied and experimented but does seem to have a lasting positive effect.**

**Introduction**

Necrotizing enterocolitis is an issue that affects a very large percentage of premature infants all around the world. As defined, necrotizing enterocolitis is a disease that affects the intestinal tract with an invasion of bacteria which can then cause the destruction of the bowel wall. This is almost 100% fatal for infants and will prevent them from growing into adulthood. It is understood that it is brought on by an imbalance in the gut microbiome, due to lack of maternal nutrition of the mother or just overall ill health of the fetus during pregnancy. As a whole, necrotizing enterocolitis is not quite well understood as far as its pathogenicity. Therefore, prevention is not much of an option but hopefully, the treatment will be. The use of probiotics in combination with one another has been shown through this research to have a positive effect on the symptoms of necrotizing enterocolitis. Most importantly, it will also not have as many negative lasting effects as other treatment options. There is also a correlation between ethnicity and response to this newly explored treatment option. Certain ethnicities respond better to treatment than others according to the research. For example, the research stated that groups of Asian descent were much more responsive to the treatment than those who were not of Asian descent.

The use of one probiotic for treatment was a common practice, but this study found that the use of a mixture of probiotics will be very helpful and beneficial for the progressive cure for necrotizing enterocolitis. Probiotics are commonly used by many different people with varying diseases or issues, but this is one use that could mean life or death for young children. Probiotics are a cure for necrotizing enterocolitis that will not have as many life-threatening consequences as other options. Before this research was conducted, it was unknown what probiotics would work most effectively. This is important because there are many different combinations that can be tested for maximum effectiveness.

**Recent Progress**

 The research done in this study is the most recent progress on the pathogen necrotizing enterocolitis. The belief that multiple probiotics being used will help with necrotizing enterocolitis is one of the most recent fields of thought when it comes to battling necrotizing enterocolitis. Probiotics have always been known to have effects on overall gut health, and the exploration of the combination of drugs was something that could be explored further.

 In the recent publication of The Journal of Pediatric Surgery, it continues to talk about how necrotizing enterocolitis could be one of the leading causes of premature newborn death around the world. This is because all of the clinical features of necrotizing enterocolitis can be very broad-spectrum and can show up without much of a warning. Death from necrotizing enterocolitis is also one of the leading causes of death among premature newborn infants. Because of this, knowledge and testing of cures and treatments have been fairly widely tested in the medical field. With many cases comes a lot of interest, and that is shown through the intense study of probiotics and their effect on necrotizing enterocolitis.

**Discussion**

 There are many different treatment options for necrotizing enterocolitis available in the medical field today. In this study, a few options are presented and explained. Treatments include antibiotics, parenteral nutrition, resection of the bowel that has become necrotic, and ventilator support. There are pros and cons of each of these that differentiate options on a case by case basis. The differences in each of the treatments create choices for patients, but in the long term it can still be seen that the option of probiotics really does seem like the most viable way of treatment for many reasons.

Each of the additional treatment options come with great risk in comparison to the use of probiotics instead. Antibiotics are a viable option, but the issue with broad-spectrum antibiotics is that they tend to kill both positive and negative bacteria. This could completely collapse the microbiome of the intestine which will take longer to recover. With necrotizing enterocolitis, time is crucial for survival. Lacking a microbiome in the intestine keeps foods from being digested and the body absorbing crucial nutrients, leaving this option very risky for survival. Parenteral nutrition is basically nutrition that bypasses the first portion of the intestine, which is affected by necrotizing enterocolitis. This can cause long term issues because the patient will not eat food regularly, instead it is pumped directly into the patient’s body in the unaffected area. In the long term this is not viable because of its complexity making it only a temporary solution. The next possibility for treatment is ventilator support which is an extremely short term option. Ventilators are designed to only support life, not allowing the patient to do any normal activities. It is also often a “last resort” option, and not recommended for younger patients with other treatment choices. Since many of the necrotizing enterocolitis patients are premature infants, ventilators with this short term effect would not be recommended in most cases. Bowel resection treatment is one of the more invasive options. It is exactly how it sounds and involves removal of the infected bowel. After removal, there is no re-growth or option for the addition of bowel. With this being said, it can greatly reduce the digestibility of foods for the rest of the patient’s life. This can cause many future complications as well, like malnutrition and malabsorption of nutrients. It is beneficial to stop the spread of necrotizing enterocolitis if only a small portion is infected, but often this is not the case. Therefore, the risks outweigh the benefits.

Each of these treatment options creates a future occupied with abnormal bowel function, complicated feeding methods, and also often a longer hospital stay which can end up costing a small fortune in medical bills. Considering all of this, the thought of a less stressful and more effective option is more appealing to families. This is where probiotics can fill in the role. Overall, probiotics do not have any reported disadvantages in comparison to other treatment options. They are relatively inexpensive, and medically tested to be effective while fighting necrotizing enterocolitis. The future of treatment for necrotizing enterocolitis will still be forever changing because of its prevalence in premature newborns and its increasing interest in the medical field. Studies like this provide a deeper understanding of a treatment option that could be available for individuals at any level. For example, individuals in third world countries where necrotizing enterocolitis in premature infants is high may not have access to or funds for a lengthy hospital stay. The option of probiotics for treatment shows a bright future for the thousands of premature infants who become affected by this disease.

**References**

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