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Review Article

Electrocide Case Study on *E. coli* Food Borne Infection

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Abstract

As demand for food increases with ever growing populations, agriculture and indeed nature is being stressed to its limits, and with this environmental pressure comes the additional rise of pathogens. Pathogens, unchecked can spread through the food supply chain and threaten severe consequences for human health. Oftentimes treatments for pathogens include heavy doses of antibiotics which may have long term consequences on the health of the human gut microbiome. Recent studies have shown that Electrocide is very effective in reducing pathogen load of Staphylococcus aureus, Streptococcus pyogenes, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Proteus mirabilis/vulgaris strains of bacteria and indeed with regard to known antibiotic testing the Electrocide has been shown to be equally or more effective. In combination with microbiome testing the use of Electrocide with inoculation of stool of E. coli has shown to improve healthy bacteria after overnight exposure. In this case study, a 30-year-old who contracted a virulent form of food poisoning and was hospitalized with symptoms of HUS including high fever, skin reddening, bloody diarrhea and elevated kidney and liver metabolites and was treated with high doses of antibiotics for 5 days without significant blood chemistry nor symptom reduction. The patient was given all-natural mineral based Electrocide supplement along with Activated Carbon (Super Detox) and returned to normal levels within 14 days including no diarrhea, normalized white blood cell and neutrophils, liver and kidney metabolites, proving in this case an effective supplement use to normalize gut icrobiome including significant pathogen reduction.

Keywords: Haemolytic Uraemic Syndrome (HUS), Electrocide, *E. coli*, Food safety, Public outbreak, Severe abdominal cramps, Diarrhea, Vomiting, Fatigue, Fever, Undercooked Ground Beef, Unpasteurized Products, Super Detox

Abbreviations: CMM: Cubic Millimeter; EHEC: Enterohemorrhagic Escherichia Coli; HUS: Hemolytic Uremic Syndrome; IDSA: Infectious Disease Society of America; NPO: Nothing by mouth; STEC: Shiga toxin-producing Escherichia coli

Haemolytic Uraemic Syndrome

Haemolytic Uraemic Syndrome (HUS) is a form of thrombotic microangiopathy affecting predominantly the kidney and characterized by a triad of thrombocytopenia, mechanical haemolytic anaemia, and acute kidney injury [1]. HUS encompasses disorders such as shiga toxin-induced and pneumococcus-induced haemolytic uraemic syndrome, haemolytic uraemic syndrome associated with complement dysregulation or mutation of diacylglycerol kinase ε, haemolytic uraemic syndrome related to cobalamin C defect, and haemolytic uraemic syndrome secondary to a heterogeneous group of causes (infections, drugs, cancer, and systemic diseases). Previously, genetic, experimental, and clinical studies have helped to decipher the pathophysiology of these various forms of haemolytic uraemic syndrome and undoubtedly improved diagnostic approaches. Moreover, a specific mechanism-based treatment has been made available for patients affected by atypical haemolytic uraemic syndrome due to complement dysregulation. Such treatment is, however, still absent for several other disease types, including shiga toxin-induced haemolytic uraemic syndrome [1]. According *Riley, et al.,* [2], it is over thirty years since Shiga toxin-producing *Escherichia coli* was recognized as a human pathogen after the first outbreak investigated as haemorrhagic colitis in 47 patients in Oregon and Michigan. This *E. coli* O157:H7 strain was then considered to be rare, but the 1993 multistate outbreak from undercooked hamburgers at a fast-food chain gained national attention for this newly emerging pathogen [3].

As reported by *Wong, et al.,* [4], Haemolytic Uraemic Syndrome

(HUS) is a serious clinical complication of Enterohemorrhagic *Escherichia Coli* (EHEC) infection and the severity of a public outbreak is often discussed in terms of the HUS rate. HUS condition that can result from an infection by certain strains of *E. coli*, particularly *E. coli* O157:H7. This condition is characterized by a triad of symptoms; The destruction of red blood cells, leading to Haemolytic Anaemia, damage to the kidneys, often resulting in decreased kidney function and the need for dialysis in severe cases, and low platelet count (thrombocytopenia), which can increase the risk of bleeding [5]. HUS is a clinical composite of thrombocytopenia, hemolytic anemia and thrombotic microangiopathy that contributes to acute kidney injury, often requiring dialysis and can progress to acute renal failure and death. HUS often develops after a gastrointestinal infection caused by pathogenic strains of *E. coli*, which can be ingested through contaminated food or water. The bacteria produce toxins, such as Shiga toxin, which can damage blood vessels and lead to the symptoms associated with HUS. In addition to the classic triad, other symptoms may include severe abdominal cramps, diarrhea (often bloody), vomiting, fatigue, and fever. The risk factors include consumption of undercooked ground beef, unpasteurized milk or juice, and contaminated vegetables or fruits. Close contact with infected individuals or animals [6]. Epidemiology studies have shown that HUS typically develops in about 5%–15% of patients, but this varies between bacterial strains and geographic location. In terms of treatment, there is no specific treatment for HUS; care is generally supportive. Management may include fluid and electrolyte replacement, blood transfusions, and dialysis for kidney failure [7]. Preventive measures focus on proper food handling, cooking meat thoroughly, washing hands frequently, and avoiding unpasteurized dairy products [8].

As reported by *Safdar et al.,* [9], the use of antibiotics for treatment of *Escherichia coli* O157:H7 infection has become controversial since a recent small study found that it may increase the risk of HUS. However, other larger studies have reported a protective effect or no association. According to *Tajiri, et al.,* and *Michalopoulos, et al.,* [10,11], the use of antibiotics in Shiga Toxin-Producing *Escherichia coli* (STEC) infections has also been addressed in the Infectious Disease Society of America (IDSA) guidelines for the management of infectious diarrhoea. Their previous edition, published in 2001, stated that antibiotic administration should be avoided in suspected STEC infections, as their role remained unclear. The latest edition of the IDSA guidelines, published in October of 2017, strongly recommends against the use of antibiotics in infections caused by Stx2 producing STEC and considers the evidence insufficient for an analogous recommendation to be made for cases caused by non-Stx2 producing STEC strains. The assertions were further validated by a study by *Sonnenschein, et al.,* (2024) [12] comparing the efficacy of Electrocide and a known antibiotic (Ceftriaxone)on *E. Coli* population over time as shown in Table 1 below in an *in vitro* study.

Table 1: Comparing action of the Electrocide with Ceftriaxone on *Escherichia Coli*.

Timelines(hrs)	*E. Coli* BHI +Electrocide Population (CFU/ml)	*E. Coli* BHI + Ceftriaxone Population (CFU/ml)
0	29100	Uncountable
1	Uncountable	Uncountable
2	28200	Uncountable
4	15800	Uncountable
24	2300	1100
48	2200	35800

According to *Varma, et al.,* (2003) [13], since *E. coli* O157 can survive in the environment for more than 10 months, humans may be at risk of infection long after an environment is initially contaminated. Furthermore, outbreaks have been linked to contamination of surfaces regularly touched by animals, such as the soil of pastures or railings in petting zoos [14-16]. There is evidence supporting airborne dispersion of *E. coli* O157 including attendance at the dance as an independent risk factor, anecdotes of dusty conditions during the dance, and widespread contamination of the building, including the rafters, which were out of the reach of humans and animals. As reported by *Sonnenschein, et al.,* [17], the transmission pathways for health impacts of *E. Coli* contamination include food-borne illness which occurs when crops contaminated with *E. coli* are consumed raw or undercooked, they can cause gastrointestinal infections. *E. coli* can leach into drinking water sources from contaminated soil or runoff, posing health risks when ingested. Soil contaminated with *E. coli* can pose a risk, particularly for individuals who work in agriculture or live near contaminated areas [18]. The health risks range from gastrointestinal illness where pathogenic strains of *E. coli*, such as *E. coli* O157:H7, can cause severe diarrhea, abdominal cramps, vomiting, and fever [19,20]. In some cases, infections can lead to Haemolytic Uraemic Syndrome (HUS), a severe condition that can cause kidney failure. Certain strains of *E. coli* are a leading cause of Urinary Tract Infections (UTIs), which may arise from exposure to contaminated soil or water. Although rare, *E. coli* can potentially enter the bloodstream or other body systems, leading to more severe infections [21-23].

Case Study

Background, Results and Discussion

This study is based on a single patient admitted to the hospital diagnosed of a possible HUS. Based on interview, the patient exposure to improperly prepared food may have been the cause.

In this study a 30-year-old who contracted a virulent form of food poisoning and was hospitalized with symptoms of HUS including high fever, skin reddening, bloody diarrhea and elevated kidney and liver metabolites and was treated with high doses of antibiotics for days without significant blood chemistry nor symptom reduction. The patient was hospitalized on July 4, until July 9, 2024 when the patient was released without being able to resolve the symptoms or make any difference to the blood chemistry results. The all-natural mineral based Electrocide supplement and Super Detox (activated carbon) was administered to the patient beginning July 10, 2024. The all-natural mineral based Electrocide supplement was administered 3X a day at 2ml concentrate diluted into 30ml of water, NPO for 30minutes. The Super Detox (Activated carbon) was administered 2X a day (morning and evening), two- 650mg capsules twice a day, NPO for 30minutes. The patient data was collected on 24 and 30 July, 2024 where WBC (/CMM) and Neutrophils (%) were compared as shown in Figure 1 and 2 respectively. The patient blood chemistry returned to normal levels within 14 days including no diarrhea, normalized white blood cell and neutrophils, liver and kidney metabolites returned to normal levels proving in this case an effective supplement use to normalize gut microbiome including significant pathogen reduction (Sonnenschein et al., 2021, Sonnenschein et al., 2024)

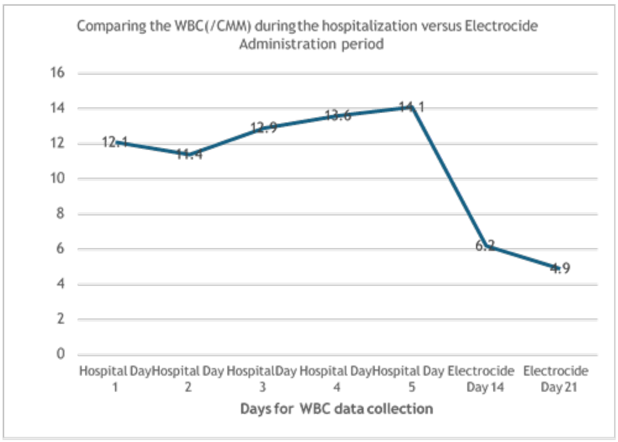

Figure 1: Comparing the WBC(/CMM) during the hospitalization versus Electrocide Administration period

The white blood cells levels were noted to be increasing during the hospitalization period as shown in Figure 1. After being released from hospital and introduced to Electrocide and Super Detox, the levels of White blood cells reduced significantly to normal levels as recorded in days 14 and 21 after the introduction of the Electrocide and Super Detox as shown in Figure 1.

The neutrophils were high and fluctuating between 81.2% and 76.9 % during the hospitalization period. This levels significantly dropped to 53.9% as shown in Figure 2., 14 days after the patient was introduced to the Electrocide and Super detox.

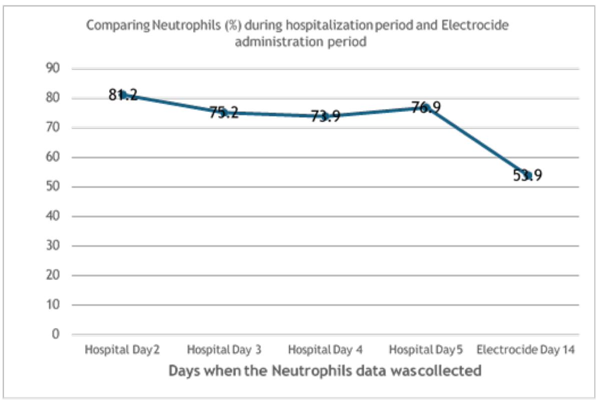

Figure 2: Comparing Neutrophils (%) during hospitalization period and Electrocide administration period

Conclusion

In regard to healthy microbiome testing the use of Electrocide has shown to improve healthy bacteria after overnight exposure. In this case study a 30-year-old who contracted a virulent form of food poisoning and was hospitalized with symptoms of HUS including high fever, skin reddening, bloody diarrhea and elevated kidney and liver metabolites and was treated with high doses of antibiotics 5 days without significant blood chemistry nor symptom reduction. The patient was given all natural mineral based Electrocide supplement and Super Detox (activated carbon) returning to normal levels within 14 days including no diarrhea, normalized white blood cell and neutrophils, liver and kidney metabolites returned to normal levels proving in this case an effective supplement use to normalize gut microbiome including significant pathogen reduction.

Acknowledgement

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Conflict of Interest

None.

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