

# Dispersing the misconceptions of molecular iodine in medical uses

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## **There are many uses for molecular iodine (I<sub>2</sub>) for infection prevention. Dispelling misconceptions about its toxicity, Dr. Jack Kessler, Chief Scientist at I2Pure, discusses the reality of I<sub>2</sub> across medical indications and seeks to grow its application**

With a Ph.D. in biochemistry and an undergraduate degree in engineering, Dr. Kessler has a passion for iodine chemistry and has been working to unlock its properties for various applications, including therapeutics, medical devices, water purification, and agriculture.

He has encountered misconceptions about iodine and its usage throughout his career, rooted mainly in historic medical norms.

Physicians everywhere are familiar with iodine: But why is the knowledge wrong?

The current clinical use of “iodine” refers to aqueous solutions of many different iodine species. It is common knowledge that I<sub>2</sub> is the active biocide in these solutions. Based on this, the medical literature has too long supported the concept that I<sub>2</sub> must be the cause of all problems.

Povidone iodine is toxic, acidic and stains. With 1 to 8 parts per million (ppm) of I<sub>2</sub>, it also has specific and measurable rates of efficacy. When diluted 1 to 100 the amount of molecular iodine increases to approximately 20 ppm for a time. Efficacy goes up substantially while toxicity drops significantly. This inconvenient fact in iodine science has been overlooked for 50 years when trying to point a finger at the problems with I<sub>2</sub>.

The I2Pure manuscript published in the Journal of Hospital Infection in 2022 documents a test explicitly focused on the staining of skin from different iodine solutions – 10% povidone-iodine, 300 ppm I<sub>2</sub> in water, 7800 ppm pure I<sub>2</sub> formulation, Lugol’s solution, and USP tincture of iodine.

From this test, Dr. Kessler demonstrated no staining from the I<sub>2</sub> formulation but different degrees of staining from all the others.

### **A brief history of iodine and its trail of misconceptions**

Over time, “iodine,” as a term, has been applied to various chemical adaptations known as iodophors, used in medicine, industry, and agriculture. I2Pure researchers believe the broad use of the term constitutes an abuse of iodine’s nomenclature and leads to misconceptions falsely attributed to I<sub>2</sub>.

Using iodine in hospitals as an antibacterial often conjures images of toxicity and staining. For 200 years, observation, not controlled testing, has established a significant misconception of I<sub>2</sub>, leading physicians not to clearly understand it or its value.

Dr. Kessler recently shared, “Physicians can’t separate accurate information from noise, and the complexity of iodine chemistry constantly generated new noise. Once you put I<sub>2</sub> in water, a series of equilibria occur. You can’t prevent them from occurring.”

Povidone-iodine contains extremely low levels of I<sub>2</sub>. Therefore, it should be evident, that only small amounts of I<sub>2</sub> produce a highly effective biocide. Only one (1) ppm may need to be present in formulation to deliver an effective disinfectant.

## **Molecular iodine and the mechanics of its antiseptic properties**

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I2Pure research focuses on molecular iodine or I<sub>2</sub>, the active molecule in iodine solutions responsible for all antiseptic properties.

The stability of I<sub>2</sub> in aqueous solutions has been a challenge in traditional formulations, leading to limited effects, especially against biofilms. I2Pure stabilized I<sub>2</sub> to prevent the formation of other iodine species. The resulting higher I<sub>2</sub> concentrations increase microbicidal effects against pathogens and biofilms.

Building on the research of Waldemar Gottardi, I2Pure duplicated Dr. Gottardi’s test. After applying Lugol’s solution, the I<sub>2</sub> within the solution diffuses into the skin. The I<sub>2</sub> then slowly diffuses out, which in some respects converts the skin into an antimicrobial material. The I2Pure test was performed with pig skin in a controlled study using a diffusion cell. It documents I<sub>2</sub> diffusing through the outer layer of the skin at high concentrations.

This gradual release allows I<sub>2</sub>’s promiscuous electrons to attack and neutralize pathogens continuously and predictably over time. Additionally, I<sub>2</sub> has demonstrated an ability to act as an anti-inflammatory agent, stimulating wound healing. This characteristic makes it an asset in numerous medical applications.

In separate research, I2Pure highlighted the benefits of emollient topical iodine formulations over aqueous preparations in exploiting iodine’s antiseptic properties.

## **Molecular iodine’s potential in chronic wound care could lead to revolutionary new therapeutics**

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I2Pure’s highly efficacious and non-toxic chemistry makes a range of new applications possible throughout the medical practice and continuum of patient care. These include topicals, surgical lavages, and persistent biocidal medical devices. The most direct and apparent uses include wound care, infection prevention, and treatment of skin diseases. I<sub>2</sub> can play a pivotal role in effectively combating hospital-acquired infections. Ongoing studies have shown promising results with chronic wounds, suggesting revolutionary new therapeutic possibilities.

I2Pure has demonstrated that I<sub>2</sub> is neither toxic nor responsible for staining and could even help deter viruses such as SARS-CoV-2 which causes Coronavirus disease.

Dr. Kessler said: “During the COVID pandemic, we desperately wanted to reduce the infection rate. Every patient, visitor, and healthcare worker who enters the medical facility should have their nasal cavity swabbed with I<sub>2</sub> to serve as a preventative and again as they leave in case they’ve been exposed to any virus while there. Following such treatment, all viruses and bacteria in the nasal cavity become inactivated. We’ve essentially killed all the viruses and bacteria, and no viral resistance would have resulted.”

“When a virus enters the nasal cavity, it establishes itself in the nasal colony and replicates. That takes time. We suspected we could disinfect the nasal cavity of everyone entering and leaving medical facilities with I<sub>2</sub>. This approach could also reduce the rate of nosocomial infections – which would be a valuable study to generate data for.”

### **Chronic wound is an area where I<sub>2</sub> could and will have a dramatic effect**

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I2Pure won an innovation grant from SQM, the world’s largest producer of iodine. These funds aided research demonstrating that I<sub>2</sub> is entirely compatible with human skin.

I2Pure’s research aims to unlock the true potential of I<sub>2</sub> by dispelling misconceptions. Their work has significant implications for medical applications and may lead to more effective treatments and improved patient outcomes.

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