

Title: Efficacy of High-Pressure Medical Cryotherapy for Pain Alleviation

Subhead: Leveraging temperature to target and manipulate the body's inherent healing capacities

By: New York Cryogen, Inc. January 2022 – March 2022

{Abstract}

Objective: The primary aim of this investigation is to assess the safety and effectiveness of high-pressure medical cryotherapy {HPMCT} as an intervention for pain management in individuals experiencing chronic and acute pain.

Methods: A trial was undertaken involving a cohort of 30 subjects diagnosed with chronic or acute pain. All participants underwent HPMCT utilizing a specialized delivery system. Pain levels, functional outcomes, and adverse events were evaluated prior to the intervention, immediately afterward, and during follow-up intervals.

Results: The study results revealed a notable decrease in pain levels among participants who underwent HPMCT. Moreover, improvements in functional outcomes, such as enhanced range of motion and reduced disability, were observed. Noteworthy adverse events were not reported during the study duration.

In the realm of clinical observations, it has been discerned that there exists a significant correlation between the reduction in pain levels and the subsequent decrease in skin temperatures, as evidenced by the thermographic images captured prior to and following each medical intervention. These findings signify the successful alleviation of inflammation within the internal structure of patients who manifest localized pain in a specific anatomical region.

Discussion: These findings suggest that HPMCT yields favorable outcomes in managing pain among individuals with chronic pain. The utilization of HPMCT delivery system allows for better tissue penetration and enhanced therapeutic efficacy, consequently facilitating effective pain relief. It is postulated that the modulation of nerve conduction and reduction of inflammation are the mechanisms underlying the analgesic effects of high-pressure cryotherapy. These results indicate that HPMCT holds promise as a non-invasive and well-tolerated intervention for managing chronic and acute pain.

Conclusion: HPMCT exhibits efficacy in reducing pain levels and improving functional outcomes for individuals with chronic pain. These findings support the incorporation of high-pressure cryotherapy into pain management strategies for patients experiencing chronic pain. Further research, encompassing larger-scale trials and long-term follow-up, is necessary to substantiate these findings and optimize treatment protocols. The implementation of HPMCT has the potential to enhance the quality of life for individuals afflicted by chronic and acute pain.

Keywords: High-pressure medical cryotherapy, chronic pain, acute pain, pain management, randomized controlled trial, analgesia, functional outcomes, non-invasive treatment.

Pain: An Emerging Public Health Issue

In contemporary America, the approach to addressing chronic pain has undergone a significant shift among healthcare professionals. Painkillers are no longer the primary solution, given the rampant abuse and overuse associated with them. There is a growing recognition of the need to break the cycle of pain, prescription, abuse, and addiction, which often persists long after the initial pain has subsided.

Pain is commonly perceived as an inevitable consequence of aging. Many individuals dismiss their pain as a natural outcome of the aging process or a chronic ailment. Consequently, numerous people find themselves grappling with pain and its subsequent repercussions, which can profoundly affect their quality of life and mental well-being. When pain is disregarded in this manner, the available treatment options seem to dwindle, leaving individuals to endure their suffering. They are often advised to adopt a stoic approach and simply endure the pain.

The Baby Boomer and Generation X cohorts represent substantial generations, and they are the first aging populations to have widespread access to and familiarity with the internet. Consequently, they are more inclined to question traditional healthcare models and explore alternative therapies for pain management. As these large segments of the population continue to age, they will likely be more inclined to seek out and consider options such as cryotherapy. Furthermore, they will be better informed about the various alternatives available to them.

TYPES OF PAIN

- Acute pain refers to a transient or short-term pain experience that typically lasts for a duration of four weeks or less. It is characterized by its sudden onset and is often described by patients as sharp and intense, with periodic fluctuations in intensity.
- Chronic pain, on the other hand, is defined as pain that persists for a duration exceeding three months. Unlike acute pain, chronic pain may be present continuously or intermittently, appearing and disappearing over time. This persistent nature of chronic pain can significantly impact an individual's daily life and functionality.
- High-impact chronic pain refers to a severe form of chronic pain that persists for an extended period, generally lasting six months or longer. It has a profound impact on a person's ability to engage in regular work or participate in various activities of daily living. Individuals experiencing high-impact chronic pain often find that their pain significantly limits their ability to perform routine tasks on most days.

It is crucial to accurately diagnose and differentiate between these pain types to provide appropriate treatment and management strategies. Healthcare professionals play a critical role in assessing and addressing the specific needs of patients based on the type and severity of their pain, aiming to alleviate symptoms and enhance their overall quality of life.

Main cause of Pain	Duration of Pain in weeks (Sum)
Accident/Surgery	1043
Wear and tear	1040
Working Out	418
Cervical Degenerative Disc	416
Accident	282
Car Accident	263
Hereditary/Surgery	260
Fall Injury	246
Age/Overexertion	157
Arm Wrestling	105
Trauma/Hereditary	105
Trauma	104
Bulging Disc	52
Jumping and Hanging Neck	36
Overexertion/Work/Exercise	27
Multiple Stenoses	26
Heavy Lifting	21
Strain from Weightlifting	8
Unknown	8
Overuse/Wear and Tear	3
Rolled Ankle	3
Basketball Injury	2
Sleeping Position	1
Surgery	1
Hereditary/Exercise	0
Grand Total	4627

In 2016, an estimated 20.4% of adults in the United States experienced some form of persistent discomfort. Whether resulting from injury, illness, or the natural process of aging, pain can have a profoundly negative impact on the overall well-being of millions of individuals. Chronic pain is a prevalent reason for adults to seek medical attention and has been associated with various complications, including anxiety, depression, dependence on opioids, and a perceived decline in health.^{2, 3, 4, 5.}

Moreover, approximately 8% of adults in the United States suffer from high-impact chronic pain, which refers to severe and constant pain that significantly restricts their daily activities and work engagements.

Demographic Factors of Chronic Pain:

1. Older Adults
2. Women
3. Adults in Poverty
4. Unemployed Adults
5. Rural Residents
6. Adults with Public Health Insurance

Frequent pain is now recognized as a distinct and standalone health burden rather than merely a common symptom of other chronic conditions. Its escalating prevalence and detrimental consequences for individuals and their families contribute to its status as a significant public health concern. Furthermore, societal stigmas associated with frequent or chronic pain often led individuals to suffer silently and turn to both legal and illicit substances in search of relief, resulting in a detrimental cycle of substance abuse and addiction.

Treating chronic pain presents considerable challenges. One major obstacle is the reliance on patients to self-report their pain levels. Patients frequently choose to endure their pain silently, as society sometimes stigmatizes those who complain: "Just tough it out," "Stop being so sensitive," "You'll be fine," or "Deal with it."

Many individuals suffering from chronic pain feel that their pain is unworthy of complaint, despite its significant and unavoidable impact on their lives. Some may fear appearing weak, while others worry that acknowledging their pain could lead to job-related problems. In certain cases, doctors may doubt the extent of a patient's pain, further hindering the patient's ability to receive adequate treatment.

Most cases of pain, especially severe pain, are managed with opioids or high-potency pain relievers. However, these medications carry the risk of addiction and drug dependency. Misuse of opioids occurs in 21-29% of chronic pain patients who use them. Given the growing concern surrounding this issue, there is a pressing need for alternative pain relief methods that are equally effective as opioids but without the potential for addiction.

The impact of pain on quality of life is significant, affecting various aspects of physical and mental well-being. Pain contributes to disability, morbidity, mortality, and places substantial demands on healthcare systems. Furthermore, the number of individuals suffering from chronic pain is expected to continue rising. Chronic pain has far-reaching consequences, both physically and mentally. Physically, it impairs an individual's ability to fulfill their familial, professional, and social responsibilities due to reduced functional capacity. Yet, perhaps more significantly, chronic pain can have a profound impact on one's

mental and emotional well-being, and in severe cases, may lead to mental health disorders such as anxiety and depression.

The ramifications of chronic pain extend to all aspects of life, including:

1. Professional Life
2. Physical Functioning
3. Social Life
4. Relationships and Family Life
5. Mood
6. Sleep

A study conducted in 2018 compared the quality of life between individuals with chronic pain and those in the general population. The findings revealed that patients with chronic pain experienced lower quality of life across six domains: professional life, physical functioning, social life, relationships and family life, mood, and sleep. Moreover, these results were even worse when compared to patients with other long-term health conditions, highlighting the pervasive nature of pain in every aspect of an individual's life. Understanding the physiological basis of pain is crucial. While everyone is familiar with the sensation of pain, most people are unaware of the cellular processes that underlie this experience.

Pain serves a fundamental purpose as nature's warning system, alerting individuals to potential harm and discouraging repetition of actions that caused the pain or further aggravation of an injury. For example, when someone stubs their toe and experiences a surge of pain, they become more cautious to avoid future toe stubbing incidents. Chronic pain cases can provide patients with valuable information about underlying issues in their bodies. However, chronic pain is less effective in preventing specific actions since it often occurs regardless of the activities undertaken. When examining the occurrence of pain, it is essential to understand its origin, specifically the source and cause of inflammation in cases of chronic pain.

The Process of Pain: An Insight into the Mechanism

1. Initiation of Pain: When a body part sustains an injury, it triggers the activation of the immune system.
2. Inflammatory Response: The immune system responds by dispatching inflammatory cells and cytokines to the affected area.
3. Dilation of Blood Vessels: Immune cells facilitate the dilation of blood vessels and release inflammatory mediators.
4. Irritation of Nerves: The presence of inflammatory mediators irritates the nearby nerves.
5. Transmission of Pain Signals: The irritated nerves transmit pain messages to the brain.

Understanding the Inflammatory Process

Inflammation often serves as a major source of chronic pain. It occurs when the immune system is triggered upon encountering harmful agents like bacteria, viruses, or toxic chemicals. In response, the immune system activates inflammatory cells and cytokines, initiating an inflammatory response. This response aids in the elimination of the inflammatory agents and promotes the healing of injured tissues.

It accomplishes this by dilating the blood vessels in the affected area, which leads to redness and warmth. Additionally, increased blood flow brings more immune cells to facilitate the healing process. During the inflammatory process, immune cells release specific hormones called inflammatory mediators. These mediators enable the movement of immune system cells in and out of the blood vessels, directing them to the injured or inflamed tissues. As immune cells enter the inflamed skin, they cause swelling by increasing fluid retention. Simultaneously, the inflammatory mediators can irritate nearby nerves. Consequently, pain receptors are stimulated, releasing chemicals that carry pain messages to the spinal cord. These messages are then transmitted to the brain, where they are interpreted as the sensation of pain.

The Challenge of Chronic Inflammation:

While the inflammatory response is vital for combating external infections and promoting healing, chronic inflammation can lead to an immune system attacking its own tissues and cells. This continuous self-targeting results in chronic inflammation and persistent pain.

Body Parts Prone to Chronic Inflammation:

1. Endocrine Glands
2. Blood Vessels
3. Muscles
4. Connective Tissues
5. Skin
6. Red Blood Cells
7. Joints

Moreover, chronic pain can cause alterations in the nervous system, increasing sensitivity to pain and lowering pain tolerance in patients. Even gentle touch may be perceived as painful. Magnetic resonance imaging (MRI) scans have revealed abnormal brain stimulation in individuals experiencing chronic pain. This phenomenon might explain the colloquial saying, "It's all in your head," though it does not diminish the reality of the pain experienced.

{HPMC}: Targeting the Pain Source

HPMC treatment involves the use of extreme cold to freeze and eliminate abnormal or injured tissue, both internally and externally. Argon gas or liquid nitrogen are commonly utilized in extreme cold therapies, with other cryotherapy tools including ice packs, ice baths, or ice massage. Traditionally, HPMC has been employed for healing purposes, particularly in addressing abnormal or cancerous cells. The application of extreme cold disrupts the functioning of cells, ultimately causing their demise, a process known as necrosis. In non-medical settings, cryotherapy is popularly used in spas to enhance the appearance of the skin.

While traditional cryotherapy, which utilizes liquid nitrogen, has various applications in the medical field, it cannot penetrate deep tissues effectively to provide pain relief. Consequently, most of the benefits observed with traditional cryotherapy are limited to surface-level cells or those accessible using probes.

HPMC: The Mechanism Behind Its Effectiveness

While conventional cryotherapy is gaining popularity, it may not be the optimal choice for individuals seeking relief from chronic or acute pain. For a more profound alleviation of pain by reaching deeper tissue layers, HPMCT is required, offering a completely non-invasive approach. The process of HPMC begins by reducing the skin temperature to approximately 33^o- 42^o F or 0.55^o- 5.55^o C. This temperature drop prompts the constriction and tightening of blood vessels and tissues, which is the body's natural response to cold. This response serves the purpose of redirecting blood flow towards the core, helping to minimize heat loss. Once the skin temperature has been lowered, a handheld device is used to administer liquid CO₂, which can effectively penetrate deep into the muscles due to the redirected blood flow. Subsequently, the body gradually returns to its normal temperature level, facilitating the restoration of blood flow to all parts of the body.

Conditions Treated by HPMC:

1. Lumbar pain (e.g., spinal stenosis, sciatica, and soft tissue pain)
2. Cervical pain
3. Knee pain
4. Shoulder pain
5. Plantar fasciitis
6. Hamstring pain and strains

At New York Cryogen, we prioritize patient care by utilizing 3M Tegaderm and 3M Ioban as the standard protective measures for all patients undergoing HPMC. These medical-grade sheathings effectively shield patients from the shock of cold gas while safeguarding the skin against potential irritation or burns. Adhering to these high standards of care allows us to administer aggressive treatment to the problem area, providing significant pain relief and minimizing any adverse effects on the patient's skin. These sheathing materials are made of 100% cryo-lucent substances, enabling the passage of CO₂ without acting as an insulator. This ensures that the treatment remains fully effective.

Thermal Shock: Immediate Corrective Reflex

When the skin temperature is rapidly reduced, it triggers a response known as thermal shock. This reflex acts as an immediate corrective mechanism by activating the autonomic nervous system, which is often compromised in individuals with chronic pain. Activation of the autonomic nervous system yields several beneficial effects. Firstly, it reduces the activity of sodium pumps, thereby inhibiting pain receptors. Furthermore, it activates the vasomotor reflex, stimulating the lymphatic and vascular systems, which contribute to the healing process. Additionally, thermal shock promotes increased endocrine and enzymatic production, while also relaxing targeted muscles and alleviating stiffness.

The Advantages of HPMCT for Pain Management

Reduction of Inflammation:

Inflammation is a common contributor to chronic and acute pain, particularly in conditions like arthritis. A study revealed that individuals with rheumatoid arthritis and other autoimmune diseases experienced significant pain reduction after undergoing traditional cryotherapy. This implies that HPMC with its ability to penetrate deeper into affected tissues, would yield even better results. HPMC possesses the

capability to decrease inflammatory processes, including the levels of mRNA for NF- κ B, TNF- α , MMP-9, TGF- β , and macrophages. Consequently, pain is diminished in inflammatory conditions. The reduction of inflammatory markers is believed to be attributed to cryotherapy's stimulation of the sympathetic nervous system, leading to the release of norepinephrine. This hormone exhibits anti-inflammatory properties and may contribute to pain reduction in inflammatory conditions. Studies indicate that norepinephrine binding to specific receptors can suppress cytokines, resulting in reduced inflammation. Since inflamed receptors can irritate nerves and transmit pain signals to the brain, reducing inflammation provides pain relief.

Enhances Muscle Regeneration Process

A notable discovery associated with cryotherapy is its ability to mitigate inflammatory markers without compromising the essential processes of muscle regeneration and extracellular matrix (ECM) remodeling. These processes play a crucial role in the recovery from injuries as they facilitate the repair and reconstruction of damaged tissues and muscles.

Diminishes Swelling

In HPMC, the application of intense cold to an injured area of the body prompts the constriction of blood vessels, redirecting the flow of blood and bodily fluids away from the targeted region. Consequently, this therapeutic approach effectively reduces swelling, as demonstrated by a 2021 trial involving individuals with postoperative facial swelling following mandibular angle osteotomy.

Shortens Recovery Time

Muscle soreness resulting from intense physical exercise is a common cause of discomfort as the muscles undergo the repair process and strengthen themselves. HPMCT presents a potential avenue for reducing the duration of recovery. A study conducted in 2020 revealed that cryotherapy was more effective in promoting post-workout recovery compared to cold-water immersion and contrast-water therapy, which are other commonly employed recovery methods among athletes. Additionally, the study indicated that cryotherapy mitigated the decline in muscle performance, thereby further facilitating muscle recovery.

Examining Pain Relief Using HPMCT: A Study

To delve deeper into the pain-alleviating benefits of HPMCT, New York Cryogen Inc. conducted a clinical trial involving 30 patients to assess the changes in pain perception resulting from cryotherapy treatment. The patients were presented with the following inquiries:

1. How long have you been experiencing pain?
2. What is the underlying cause of your pain? (e.g., accident, surgery, hereditary factors, etc.)
3. Describe any improvements in terms of mobility, sleep quality, overall well-being, and daily productivity.
4. Did the pain temporarily subside after treatment? If so, what factors contributed to the subsequent increase or return of pain to its original levels?
5. Has the treatment reduced your reliance on over the counter or prescribed pain medication?

6. How does this treatment compare to alternative methods of pain management?

Through a comprehensive range of questions, the patients' pain duration, source, severity, and the treatment's efficacy in pain management were assessed, along with its impact on medication requirements. The trial results, based on the provided questions, are summarized as follows:

Pain Duration

The patients were asked to indicate the duration of their pain, measured in weeks. Analysis of the responses revealed that 19 out of the 30 participants were classified as high-impact chronic pain sufferers, as they had been experiencing pain for more than six months. Among the participants, the individuals with the longest duration of pain had been suffering for approximately 1043 and 1040 weeks, which is equivalent to around 20 years. Additionally, the trial included three participants with acute pain, lasting only one week at the time of the study.

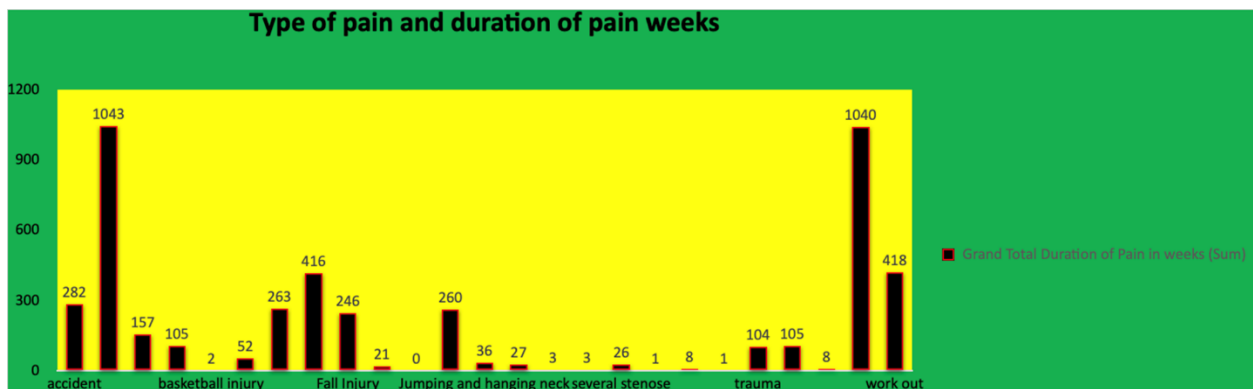


Figure 1

Another crucial aspect to consider is the underlying causes of patients' pain and the necessity for this particular form of medical care. The graph below provides a detailed overview of the causes of pain and their duration in weeks.

Pain Causes

Within the scope of this study, 30 patients experienced pain resulting from various causes, including:

1. Accidents (e.g., car accidents)
2. Surgical procedures
3. Sports injuries
4. Overexertion
5. Advancing age
6. Hereditary factors
7. Wear and tear
8. Physical exercise
9. Bulging discs
10. Cervical degenerative disc issues

As anticipated, the initial pain levels exhibited significant variation among patients, influenced by their age and the specific cause of pain. The intensity of initial pain values ranged from 5 to 10.

Pain Reduction

Prior to commencing treatment, the participants exhibited an average pain level of 7.21. However, following HPMC, this value decreased significantly to 2.14. Moreover, nearly 91% of the participants experienced a substantial decrease in pain, with 20 out of the 30 individuals no longer requiring pain-relieving medication post-treatment.

<i>Improvement On Body</i>	<i>Before Trial Pain Reduction (Sum)</i>	<i>After Trial Pain Reduction (Sum)</i>
<i>Average Improvement</i>	40	15
<i>Great Improvement</i>	137	26
<i>No Improvement</i>	16	13
<i>Slight Improvement</i>	16	8
<i>Grand Total</i>	209	62

The clinical trial yielded highly encouraging outcomes, demonstrating a notable alleviation of pain in ten participants, with one individual originally rating their pain intensity as a severe 10 prior to the trial. Remarkably, these participants experienced complete eradication of their pain. In relation to the patients' subjective assessment of the treatment and its impact on their pain, the majority of participants reported a significant reduction in their pain levels.

Evaluation of Treatment

The trial also considered the patients' perception of the treatment itself. The patients commonly described it as a "potent" and "rapid" intervention that was remarkably effective and safe.

Patient	Before Trial Pain Level	After trial Pain Level	Duration of Pain in Weeks	Main Cause of Pain	Improvement on Body	Pain Reduction After Treatment	Reduced Meds Need	Difference from Alternatives
Noah S	8	1	8	Strain From Weightlifting	Great Improvement	Reduced & sustained	Strong Yes	Powerful
Mila M	8	7	8	Unknown	No Improvement	Original Pain After Hours	Very Slightly	Powerful
Jessica L	8	6	1043	Accident/Surgery	No Improvement	Pain Levels Sustained	Yes/No Medication	N/A
Kadeja S	4	1	157	Car Accident	Average Improvement	No	Yes/No Medication	Powerful
Ray G	2	2	27	Overexertion/Work/Exercise	Great Improvement	Pain Subsided	No	Powerful

Stephanie G	9	7	105	Trauma/Hereditary	Slight Improvement	Yes	Yes/No Medication	Powerful
Michael G	8	4	157	Age/Overexertion	Average Improvement	Slight Increase In Pain Before Bed	No	Powerful
Kyle J	6	2	3	Rolled Ankle	Great Improvement	Pain Subsided	Yes/No Medication	Powerful
Mark P	6	0	1	Sleep Position	Great Improvement	Pain Subsided	Yes/No Medication	Powerful
Paul M	5	1	105	Car Accident	Great Improvement	Reduced	Yes/No Medication	Powerful
Dan S	10	0	105	Arm Wrestling	Great Improvement	Reduced	Yes/No Medication	Powerful
Stephanie H	7	3	1	Surgery	Great Improvement	Great Reduction	Yes/No Medication	Powerful
John C	7	1	3	Overuse/Wear And Tear	Slight Improvement	Slight Reduction	N/A	Powerful
Binny K	6	2	2	Working Out	Average Improvement	Very Minimal Reduction	Yes/No Medication	N/A
Billy K	7	0	N/A	Hereditary/Exercise	Great Improvement	Pain Subsided	No	Powerful
John M	7	0	36	Jumping And Hanging Neck	Great Improvement	Pain Reduced and Holding	Yes/No Medication	Powerful
Andrew K	7	3	2	Basketball Injury	Average Improvement	Pain Reduced and Holding	No	First Trial
Ida C	10	2	282	Accident	Great Improvement	Pain Subsided	Yes/No Medication	Powerful
Christian C	8	3	208	Working Out	Average Improvement	Pain Subsided	Yes	Powerful
Patricia E	8	0	1	Car accident	Great Improvement	Pain Subsided	Yes/No Medication	Powerful
Christian C	8	0	208	Working Out	Great Improvement	Pain Subsided	Yes/No Medication	Powerful
Richard R	7	4	1040	Wear And Tear	Great Improvement	Pain Reduced	Yes/No Medication	Powerful
Alexey L	8	0	260	Hereditary/Surgery	Great Improvement	Pain Subsided	No	Powerful
Anamika B	10	7	246	Fall Injury	Great Improvement	Slight Reduction	Yes/No Medication	Powerful
Aubry S	7	0	T	Trauma	Great Improvement	Pain Reduced	Yes/No Medication	Powerful

Hector S	8	0	21	Heavy Lifting	Great Improvement	Pain Reduced	Yes/No Medication	Powerful
Jorge F	8	4	52	Bulging Disc	Great Improvement	Pain Reduced	No	Powerful
Mikhail T	5	0	26	Multiple Stenoses	Great Improvement	Pain Reduced	Yes/Medication	Powerful
Ronald G	7	2	416	Cervical Degenerative Disc	Average Improvement	Pain Subsided	No	Powerful

Data Analysis

Initially, a t-test will be conducted to determine the presence of a statistically significant disparity between patients' reports of discomfort and the decline in inflation as indicated by thermography images.

t-Test: Paired Two Sample for Means		
	<i>Before Trial Pain Reduction</i>	<i>After Trial Pain Reduction</i>
Mean	7.206896552	2.137931034
Variance	3.027093596	5.337438424
Observations	30	30
Pearson Correlation	0.303625513	
Hypothesized Mean Difference	0	
df	28	
t Stat	11.21563358	
P(T<=t) one-tail	3.60685E-12	
t Critical one-tail	1.701130934	
P(T<=t) two-tail	7.2137E-12	
t Critical two-tail	2.048407142	

Figure 2:

Comparing Discomfort Levels Pre- and Post-Intervention

The levels of discomfort were assessed before and after the intervention, and the results indicate a significant difference. Prior to the treatment, the average discomfort level was 7.2069, whereas it

decreased to 2.1378 after the treatment. This noteworthy reduction in discomfort following therapy should be acknowledged by the organization involved in this initiative.

Hypothesis

To arrive at a conclusive outcome, it is necessary to establish both a null and an alternative hypothesis.

Null hypothesis: At a significance level of $p < 5\%$, there is no observable difference between the two groups.

Alternative hypothesis: The difference between the two groups is statistically significant at a significant level of $p < 5\%$.

The research findings reveal a p-value of $3.60685E-12$, which is remarkably small compared to the significance level of 5%. This provides evidence that a change has indeed occurred, resulting in a reduction in pain after the treatment. The critical value is determined to be 1.70, and the initial t-statistic value is 11.21, further highlighting a substantial discrepancy between the two groups. Moreover, the correlation between the pre- and post-intervention values of the two important variables is 0.303625513, indicating a strong association between the two groups. This robust correlation serves as a clear indication of a significant link.

Thermographic Image Analysis: Examining Patient Photos in Depth

Upon careful examination of the patient photos utilized in this study, a striking observation emerges regarding the discernible average temperature variation before and after the therapeutic intervention. We have delved into the visuals capturing the subjects, employing a meticulous approach to unravel crucial insights. Notably, the disparity in mean temperature, ascertained by comparing the pre- and post-therapy images, becomes readily apparent. In order to comprehensively assess the efficacy of the treatment, we meticulously examined the photographs depicting the patients. Our meticulous scrutiny of these visuals led to an intriguing revelation: a remarkable disparity in average temperature was observed between the images captured prior to the therapy and those taken afterward. To truly grasp the effectiveness of the therapeutic measures employed, we undertook a rigorous analysis of the visual representations encapsulating the patients. In doing so, an intriguing observation emerged: a pronounced distinction in mean temperature, distinctly visible when comparing the images captured prior to and following the intervention.

Data Table

	Before	After
MEAN	7.206896552	2.137931
STDS	1.739854476	2.31029

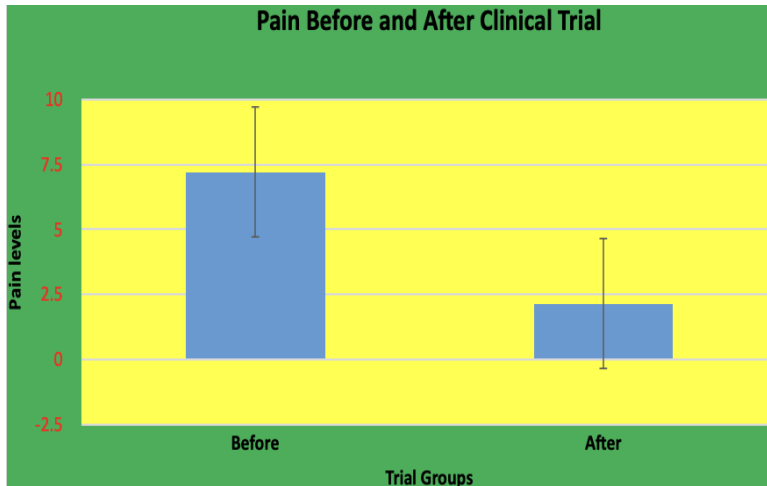


Figure 3

The bar chart presented above illustrates the mean value between two distinct groups, as indicated by the previously mentioned statistical findings. Additionally, error bars are depicted on the graph, further enhancing its visual representation. The chart effectively highlights the notable disparity between the two trial groups. The substantial dissimilarity observed between the two groups in this study is a significant and advantageous discovery. It signifies the potential of the instrument in question and suggests that it will have a substantial impact on the community. This notion is reinforced by the positive responses exhibited by patients, as demonstrated below. It is important to note that the data presented in this chart exclusively originates from clinical studies. Among the various categories, the highest count is attributed to significant progress, followed by average improvement, while the count for no improvement is the lowest. Consequently, a greater number of patients perceive this technology as efficacious and influential.

Data Table:

Row Labels	Sum Of Before Trial Pain Reduction	Sum Of After Trial Pain Reduction
Average Improvement	40	15
Great Improvement	137	26
No Improvement	16	13
Slight Improvement	16	8
Grand Total	209	62

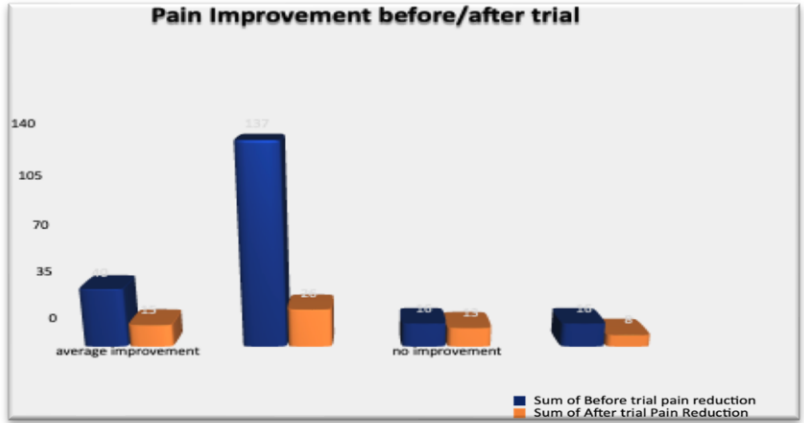


Figure 4

In this particular scenario, I endeavored to gather feedback from the patients regarding the clinical trial and its distinguishing features compared to the other groups. Based on the pie chart presented below, it is evident that a significant majority of respondents expressed their appraisal of the clinical study as highly efficacious, remarkable, expedient, remarkably successful, and secure.

Row Labels	Count Of How Trial Is Different from Alternatives
First trial	1
N/A	2
Powerful	27
Grand Total	30

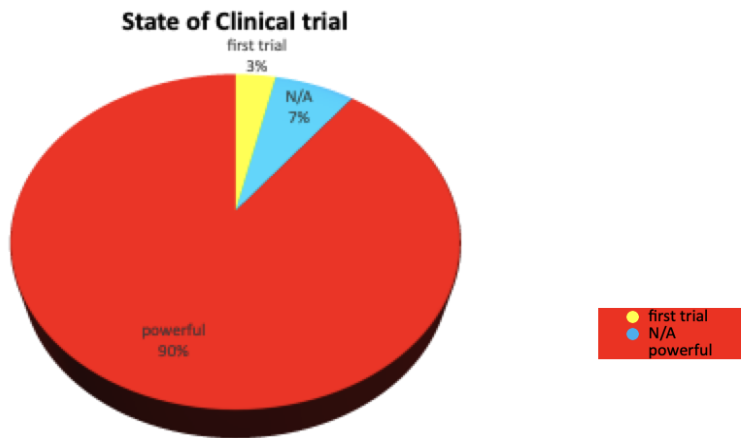


Figure 5

In this particular case, I endeavored to gather feedback from the patients regarding the clinical trial and any notable distinctions it may have had compared to the other groups. According to the data depicted in the pie chart provided below, a significant number of respondents expressed their perception of the clinical study as being remarkably effective, outstanding, expedient, remarkably successful, and secure.

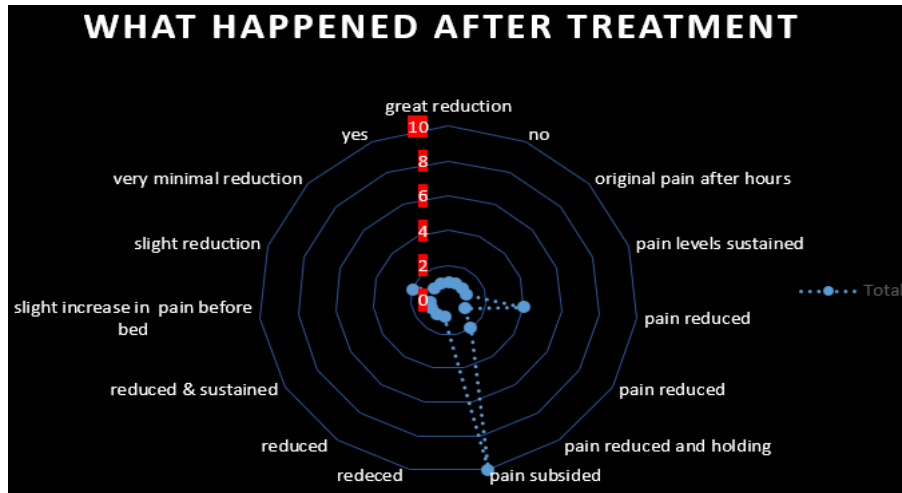


Figure 6

What Occurred Following the Treatment?

Subsequent to the treatment, almost 91% of the patients who participated in this scientific trial encountered a reduction in pain, with a majority of them experiencing significant pain relief. The presence of Level 10 on the chart serves as a noteworthy testament to this fact.

Trial Findings

The comprehensive outcomes of this clinical trial demonstrate the considerable advantages provided by HPMCT for individuals afflicted with various types of pain, often resulting in a substantial reduction or complete elimination of pain. Furthermore, the clinical trial participants experienced an absolute absence of side effects, and there was an overwhelmingly unanimous agreement regarding the potent and safe nature of cryotherapy compared to alternative pain relief methods.

<i>Before Trial Pain Reduction</i>		<i>After Trial Pain Reduction</i>	
Mean	7.20689655172414	Mean	2.13793103448276
Standard Error	0.323082865214393	Standard Error	0.429010024143208
Median	7	Median	2
Mode	8	Mode	0
Standard Deviation	1.73985447554073	Standard Deviation	2.31028968392393
Sample Variance	3.02709359605911	Sample Variance	5.33743842364532
Kurtosis	1.92189592990154	Kurtosis	-0.00641641063848875
Skewness	-0.909453214918398	Skewness	0.995725919882364
Range	8	Range	7
Minimum	2	Minimum	0
Maximum	10	Maximum	7
Sum	209	Sum	62
Count	30	Count	30

After treatment did pain reduce	After treatment did pain reduce (Count All)
Great reduction	1
No	1
Original pain after hours	1
Pain levels sustained	1
Pain reduced	4
Pain reduced	2
Pain reduced and holding	2
Pain subsided	10
Reduced	1
Reduced	1
Reduced & sustained	1
Slight increase in pain before bed	1
Slight reduction	2
Very minimal reduction	1
Yes	1
Grand Total	30

Row Labels	Sum of Duration of Pain in weeks
accident	282
accident/surgery	1043
age/overexertion	157
arm wrestling	105
basketball injury	2
Bulging disc	52
car accident	263
cervical degenerative disc	416
Fall Injury	246
Heavy Lifting	21
Hereditary/exercise	0
hereditary/surgery	260
Jumping and hanging neck	36
overexertion/work/exercise	27
overuse/tear /wear	3
rolled ankle playing	3
several stenose	26
sleeping way	1
strain from weightlifting	8
Surgery	1
trauma	104
trauma/hereditary	105
unknown	8
wear /tear	1040
work out	418
Grand Total	4627

HPMCT: Utilizing Temperature to Address Pain

Pain presents a formidable obstacle to public health, exerting a profound impact on an individual's overall well-being, whether it is acute or chronic in nature. The utilization of HPMCT provides a non-invasive approach to pain management, circumventing the potential risks of addiction often associated with pain medications. As a means of enhancing the body's innate healing mechanisms, HPMCT rapidly reduces the temperature of the skin, redirecting blood flow away from the injured area. This process stimulates the body's autonomic nervous system, leading to pain relief and an increased ability of muscles to withstand future pain. The advantages of HPMCT encompass pain reduction, enhanced muscle resilience, and diminished inflammation. In our clinical trial evaluating medical cryotherapy, a remarkable one-third of participants experienced complete pain alleviation, while significant reductions were observed in the majority of other patients. Endorsed by the prestigious American Medical Association (AMA), the HPMCT treatment offered by New York Cryogen Inc. has demonstrated its efficacy in penetrating deep into the sites of pain, providing relief, and ultimately improving the quality of life for patients.

About New York Cryogen, Inc.

New York Cryogen Inc. is dedicated to a singular goal: promoting the well-being and vitality of patients. Our comprehensive range of services revolves around HPMCT, a distinctive and highly beneficial treatment that empowers our clients to optimize their performance and experience an enhanced state of well-being. The targeted application of cold therapy has proven to be one of the most successful modalities for fortifying and augmenting the body's immune system, aiding in weight loss, improving physical performance, and even alleviating chronic or acute pain. Traditionally, cryotherapy was exclusively sought after by elite clientele and athletes within specialized clinics. However, New York Cryogen Inc. aims to democratize the benefits of cryotherapy by providing a fully mobile HPMCT treatment service. Regardless of your location, you can now access our sessions at your convenience and reap their advantages.

HPMCT is endorsed by the AMA. It is crucial to recognize that not all cryotherapy methods are equal, which is why our HPMCT approach is the sole method endorsed by the esteemed American Medical Association for its exceptional benefits in pain management.

Founded in 1847, the American Medical Association has steadfastly upheld its mission to advance the science and art of medicine, thereby improving public health. This organization actively works to eliminate barriers that impede patient care, champions medical progress in addressing significant healthcare challenges, and leads the fight against chronic diseases. The endorsement by the AMA serves as a testament to the remarkable benefits offered by high-pressure medical cryotherapy, as provided by New York Cryogen, and its scientifically supported advancements in the treatment of acute and chronic pain.

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