

## Key Points

- Chronic pain has been known to advance impairment and facilitate suffering within the body.
- Pharmaceutical treatments for chronic pain (e.g. opioid, adrenergic, and calcium channeled drugs) are the current methods to alleviate continual discomfort; however, the medications may provide insufficient pain relief.
- Adenosine is naturally released when the body encounters unfavorable circumstances resulting in tissue trauma and pain—as a result of this, it provides effective, long-lasting pain elimination without altering or impairing the natural functions of temporary pain (e.g. injury).
- MRS5698, a response agent somewhat similar to morphine, has a vast therapeutic scale with a lack of sedation and physical deficits. It also does not facilitate addictive habits, such as stimulant abuse.
- Dr. Little et al. concluded that adenosine can be effectively used to treat chronic pain because of its therapeutic abilities and lack of negative side effects.

## Source

[Endogenous adenosine A3 receptor activation selectively alleviates persistent pain states.](#) Little JW, Ford A, Symons-Liguori AM, Chen Z, Janes K, Doyle T, Xie J, Luongo L, Tosh DK, Maione S, Bannister K, Dickenson AH, Vanderah TW, Porreca F, Jacobson KA, Salvemini D. *Brain*. 2015 Jan;138(Pt 1):28-35. doi: 10.1093/brain/awu330. *Epub* 2014 Nov 19.

## Adenosine: the Potential Key to Managing Chronic Pain

**January 2015** - Those who are diagnosed with symptomatic Chiari are often burdened by chronic pain. This frequent discomfort has been known to further advance impairment as well as increase one's suffering according to many specialists. Currently, pharmaceutical treatments for chronic pain include opioid, adrenergic, and calcium channeled drugs; however, the unfavorable side effects associated with these medications often result in insufficient pain relief, discontinued use, and an overall decrease in a patient's quality of life. In the hopes of finding better ways to manage persistent pain medicinally, Dr. Joshua W. Little and his team observed rodents suffering from various types of *neuropathic pain*. During their extensive study, the group potentially discovered an alternative method to manage chronically ill patients.

Before delving into the research, it is important to explain the role of adenosine as well as its scientific history, since it is the main component that is examined within this study. Dr. Little et al. report that naturally, adenosine is released when the body encounters circumstances such as tissue trauma and pain. It is understood that adenosine provides effective and long-lasting pain elimination, yet understanding how to utilize it for pain management has not been fully obtained for decades. The report also states that when science discovers a way to securely use the adenosine system to divert pain, chronic pain sufferers will at long last have relief.

In an exciting turn of events, Dr. Little et al. demonstrate that an adenosine receptor, known as A<sub>3</sub>AR and ADORA3, may be the key to producing a powerful non-narcotic that provides comfort for those with chronic pain without altering or impairing the natural functions of temporary pain (e.g. injury).

To test the team's hypothesis on A<sub>3</sub>AR, 364 rodents (301 male rats and 63 female mice) with various types of persistent pain were observed. Five main categories of chronic pain were recognized in the study: chronic constriction injury, nerve injury, spinal nerve ligation, chemo-therapy induced peripheral neuropathy, and cancer-induced bone pain. By gauging and monitoring the rodents' reactions, Dr. Little et al. were able to collect sufficient results for different aspects of A<sub>3</sub>AR-based medicinal treatments.

The team first explored A<sub>3</sub>AR's ability to reduce the rodents' sensitivity to pain. By using adenosine kinase, an enzyme responsible for regulating concentrations of adenosine, the analysts produced a long-lasting blockage of neuropathic pain which spanned up to eleven hours.

Next, they observed the effects of MRS5698, a response agent that is similar to morphine. However, unlike morphine, MRS5698 has a vast therapeutic scale with a lack of sedation and physical deficits in the rodents examined. It also takes a short amount of time (less than 30 minutes) to take effect and achieves full potency within an hour.

Lastly, the team analyzed the parallels of neuropathic pain associated with neuropathic conditions. They understood that relieving ongoing pain could potentially facilitate addictive tendencies via the mesolimbic reward circuit, which is found within the brain. However, in conclusion, they found that using MRS5698 for its therapeutic benefits does not encourage stimulant abuse.

From the results collected, Dr. Little et al. were able to identify the therapeutic abilities of A<sub>3</sub>AR without impairing the body's natural pain receptors or triggering the brain's reward centers. Furthermore, no serious side effects have been recorded in A<sub>3</sub>AR agents in multiple clinical trials. Within the study, adenosine receptors reduced the rodents' sensitivity to pain as well as illuminated the therapeutic abilities of MRS5698.

Through utilizing and understanding the analgesic properties of adenosine, scientists may soon be able to effectively treat chronic pain. The team's findings suggest that future endeavors focusing on adenosine agents, such as A<sub>3</sub>AR, are needed to study its capability to manage the various aspects of chronic pain.

**Ed. Note:** *The opinions expressed above are solely those of the author. They do not represent the opinions of the editor, publisher, or this publication. Ms. Eubanks is not a medical doctor and does not give medical advice. Anyone with a medical concern is strongly encouraged to seek professional medical care.*



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Ms. Eubanks is a professional writing and researching scholar from Purdue University Northwest. After being diagnosed with a Chiari I Malformation in 2011, she quickly decided that being conquered was not an option—she was committed to fight and pursue a budding love of healthcare/medical writing. Spreading awareness and hope to others battling Chiari is her largest motivator alongside educating others who have not heard

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