

## Motion Medicine – Executive Summary

Motion medicine is an effective and safe topical cream indicated for the relief of aches and pains associated with inflammation of muscles, tendons, ligaments and joints.

### **Motion medicine may be used to treat:**

- **pain associated with muscle strain and/or inflammation**
- **overworked and cramped muscles**
- **joint pain including arthritis**
- **tendon and ligament strain, sprain and/or inflammation**

Motion medicine contains many active ingredients and at least 5 have been scientifically proven to ease pain and improve movement. These claims have been validated by scientific review under Health Canada's Natural and Non-Prescription Health Product regulations (see Table 1).

**Motion medicine is highly effective.** This is underscored by the use of effective concentrations of active components in the formulation. Attention has been placed on developing a fast absorbing formula that soothes the skin, maximizes penetration and quickly alleviates pain.

**Motion medicine is safe.** It is a Canadian-made product and meets all regulatory safety and quality specifications. It has been in the North American market for decades, with an estimated 75 million doses delivered to thousands of regular patient users. There have been no adverse event reports filed with Health Canada or the US FDA due to the use of motion medicine.

Additional safety considerations come from an assessment of the potential toxicity of individual components, and the potential exposure level from the use of Motion Medicine. In toxicology, it is the 'dose that makes the poison'. The concentration of each component in Motion Medicine is at a level that ensures adequate safety from repeated use over a short period of time. For longer term use, consultation with your family doctor is recommended. Additionally, Health Canada is reviewing domestic substances for safety from their consumer use. These risk assessments have addressed some of the substances in Motion Medicine and were found to be safe (available: <https://www.canada.ca/en/health-canada/services/chemical-substances.html>).

## **Motion Medicine Components and Their Biological Effects**

### **Camphor (4.8%)**

- reduces pain (anti-nociceptive effect)
- reduces leukocyte infiltration (mediators of inflammation and tissue damage)
- camphor is found in exotic plants that are used in medicinal pain relief

See references: <https://www.ncbi.nlm.nih.gov/pubmed/28556808>,  
<https://www.ncbi.nlm.nih.gov/pubmed/26792321>, <https://www.ncbi.nlm.nih.gov/pubmed/25973506>,  
<https://www.ncbi.nlm.nih.gov/pubmed/26703556>

### **Menthol (4.75%)**

- Anesthetic; inhibits nerve compound action potentials (i.e. blocks pain signals)
- smooth muscle relaxation (smooth muscle is found in the walls of blood vessels, thus dilation can improve circulation in strained/tight muscles)
- anti-inflammatory effects (menthol is the predominant component of peppermint oil)
- skin penetration enhancer

See references: <https://www.ncbi.nlm.nih.gov/pubmed/23352972>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25553684>, <https://www.ncbi.nlm.nih.gov/pubmed/29372567>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25557808>

### **Eucalyptus oil (0.5%)**

- anti-inflammatory activity (inhibits release of pro-inflammatory mediators)
- skin penetration enhancer
- may promote wound repair (currently being implemented in nanoparticles intended to repair tissue)

See references: <https://www.ncbi.nlm.nih.gov/pubmed/25553684>,  
<https://www.ncbi.nlm.nih.gov/pubmed/29343956>, <https://www.ncbi.nlm.nih.gov/pubmed/29141025>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25557808>

### **Thymol (0.22%)**

- inhibits nerve compound action potentials (e.g. blocks pain signals resulting in anesthetic effect)
- skin penetration enhancer

See references: <https://www.ncbi.nlm.nih.gov/pubmed/23352972>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25557808>

### **Methyl salicylate (0.5%) (oil of wintergreen)**

- anti-inflammatory and analgesic properties
- rubefacient/counterirritant properties
- skin penetration enhancer

See references: <https://www.ncbi.nlm.nih.gov/pubmed/15105325>,  
<https://www.ncbi.nlm.nih.gov/pubmed/2543169>, <https://www.ncbi.nlm.nih.gov/pubmed/15033879>  
<https://www.ncbi.nlm.nih.gov/pubmed/25557808>

### **Grape seed oil (0.5%)**

- strong protection against oxidative damage (strong anti-oxidant activity)

see references: <https://www.ncbi.nlm.nih.gov/pubmed/28914789>,  
<https://www.ncbi.nlm.nih.gov/pubmed/24007424>

### **Tocopheryl acetate (0.5%) (vitamin E)**

- potent anti-oxidant activity
- wound repair

see references: <https://www.ncbi.nlm.nih.gov/pubmed/29348770>,  
<https://www.ncbi.nlm.nih.gov/pubmed/29399897>

### **Chondroitin sulfate (0.02%)**

- Improves/prevents symptoms of arthritis (acute and chronic)
- Reduces pain and improves joint function

See references: <https://www.ncbi.nlm.nih.gov/pubmed/22173958>,  
<https://www.ncbi.nlm.nih.gov/pubmed/29451036>, <https://www.ncbi.nlm.nih.gov/pubmed/28533290>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25589511>, <https://www.ncbi.nlm.nih.gov/pubmed/25629804>

### **Glucosamine sulfate (3.03%)**

- Improves/prevents symptoms of arthritis (acute and chronic)
- reduces pain, stiffness, functional limitation and joint swelling/effusion

See references: <https://www.ncbi.nlm.nih.gov/pubmed/22173958>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25589511>, <https://www.ncbi.nlm.nih.gov/pubmed/29446485>

### **Methyl sulfonyl methane (6%)**

- enhances skin permeability (facilitates absorption)
- Improves/prevents symptoms of arthritis (acute and chronic)
- may facilitate burn tissue healing
- safe to use at this concentration (it is used in a common haemorrhoid cream)

See references: <https://www.ncbi.nlm.nih.gov/pubmed/26392023>,  
<https://www.ncbi.nlm.nih.gov/pubmed/24509160>, <https://www.ncbi.nlm.nih.gov/pubmed/22173958>,  
<https://www.ncbi.nlm.nih.gov/pubmed/22492249>

### **Natural Lavender oil (0.2%)**

- smooth muscle relaxation properties
- may promote wound healing
- skin penetration enhancer

See references: <https://www.ncbi.nlm.nih.gov/pubmed/28579958>,  
<https://www.ncbi.nlm.nih.gov/pubmed/12112282>,  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4880962/>,  
<https://www.ncbi.nlm.nih.gov/pubmed/25557808>, <https://www.ncbi.nlm.nih.gov/pubmed/17722522>

**Table 1. Scientific evidence backing the regulatory approval of Motion Medicine.**

<b>MOTION MEDICINE</b>			
<b>Ingredient*</b>	<b>Approved Scientific Claim**</b>		
	<b>Eases Pain</b>	<b>Improves Movement</b>	<b>Is Highly Effective</b>
Camphor (4.8%)	1,2	1,2	Effective concentration
Thymol (0.22%)	1,2	1,2	Effective at this concentration in combination <sup>a</sup>
Menthol (4.75%)	1,2	1,2	Effective concentration
Eucalyptus oil (0.5%)	1,2	1,2	Effective concentration
Methyl salicylate (0.5%)	1,2	1,2	Unknown for statements 1+2 <sup>b</sup> ; effective anti-inflammatory agent (metabolite is salicylic acid)
Methyl sulfonyl methane (6%)	3	3	unknown for statement 3; solvent with effective skin-penetrating activity

\*All ingredients meet acceptable limits specified in Health Canada’s Natural and Non-Prescription Health Product ingredient database

<sup>a</sup>Thymol is considered a counterirritant in combination with clove essential oil

<sup>b</sup>Methyl salicylate is considered a counterirritant at a concentration of 10-30%

**\*\*Health Canada NNHPD approved statements applicable to Motion Medicine that support package claims**

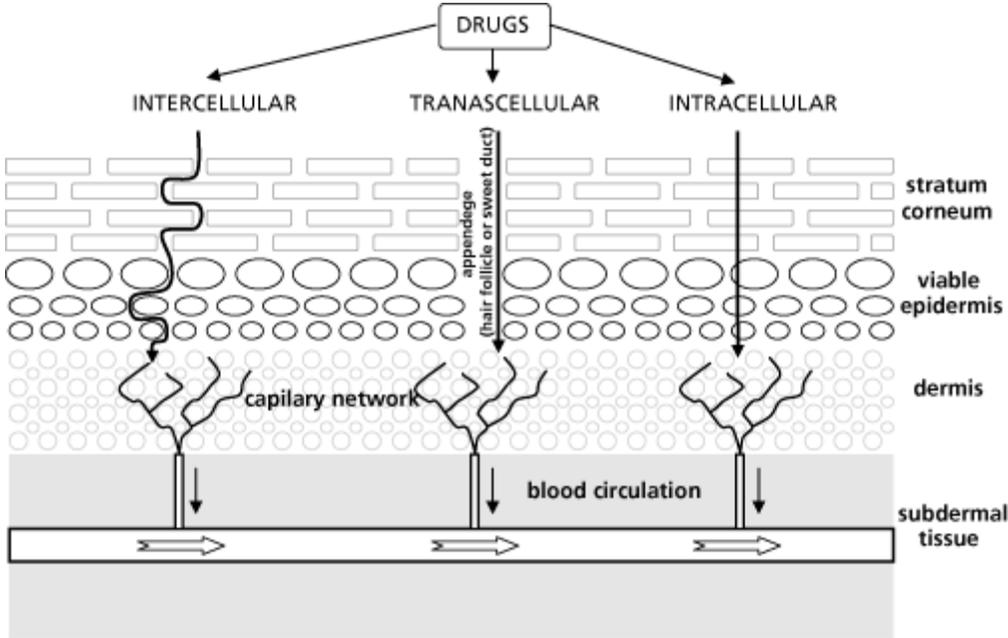
1) Temporarily relieves aches and pains of muscles and joints associated with one or more of the following: Simple backache, lumbago, strains and sprains (involving muscles, tendons, and/or ligaments), and arthritis.

2) An externally applied substance that causes irritation or mild inflammation of the skin for the purpose of relieving pain in muscles or joints by reducing inflammation in deeper adjacent structures (Medline 2012; MediLexicon 2012; US FDA 1983).

3) Helps to relieve (joint) pain associated with osteoarthritis (of the knee) at 1500 mg (in oral form).

- Dermal application of 10 grams of motion medicine would deliver a maximum of 60 mg of MSM to the local tissue at the application site

**Figure 1. Potential Routes of Permeation of Motion Medicine Components through the Skin**



(from Herman and Herman, 2014)