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PART 8

Additional Supplements Part 1:

MSM

&

CINNAMON

MSM is Broadly Anti-inflammatory and Helps Protect the Gut

MSM stands for methylsulfonylmethane or dimethyl sulf**one**. It is usually used as an anti-inflammatory supplement for joint pain and arthritis. It has been used for decades now with minimal to no side effects. In fact, in rodent studies, they couldn't find any concentration that caused harm.[1] **Thus, it seems to be one of the safest supplements one can take.**

MSM is a type of sulfur molecule that is found throughout nature. There are small amounts in fruits, vegetables, and rain water.[2] DMSO (dimethyl sulfox**ide**) is another sulfur molecule that is naturally found in tree pulp and MSM is what you get when you oxidize DMSO.

DMSO has an unfortunate side effect in that part of it will oxidize to MSM, but part of it will oxidize to DMS (dimethyl sulfide), and DMS - while safe - makes your body give off a potent and strange garlic smell.

MSM does not have this effect at all.

MSM has been shown to help **decrease oxidative stress** in a variety of conditions,[3,4,5] **lower multiple regulators of inflammation**, and reduce the **NLRP3 inflammasome**, a core part of the innate immune system responsible for the activation of inflammatory responses![6]

In general, MSM has shown powerful anti-inflammatory effects in both animals and humans. It is typically used for arthritis and joint pain, but it decreases inflammation in many other parts of the body as well - including the colon!

MSM Strongly Protects the Colon From Inflammation

In a rat study, researchers induced colitis by putting a liquid solution of vinegar right into the colon. Vinegar is very acidic, and when inserted directly into the colon causes profound inflammation, destruction, and immune cell activation. This is a typical way to induce colitis in rats.

They gave the rats the human equivalent of 4-6g of MSM a day by mouth at the same time.
"*Results showed that MSM decreased macroscopic and microscopic colonic damage scores caused by administration of acetic acid [i.e. vinegar].*"
They also found that MSM decreased oxidative stress and reduced IL-1b, a powerful pro-inflammatory cytokine.[7]

(See pictures on the next page)

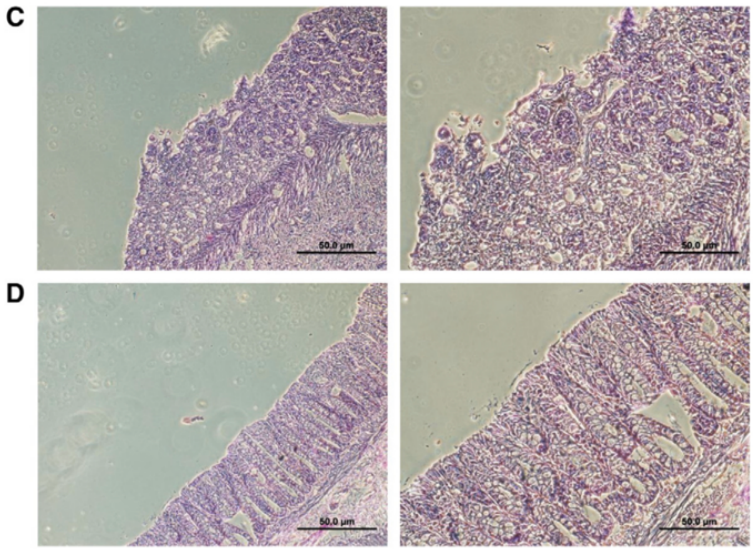

Fig. 1. Effects of MSM on the severity of acetic acid-induced colitis. Histological appearance of colonic tissue sections in (A) normal, (B) MSM, (C) colitis, and (D) colitis + MSM rats. Treatment with MSM (400 mg/kg/day, po) reduced the histological alterations caused by acetic acid administration. Magnification of the first column is × 100 and the second column is × 200.

In the image above, the two microscopic images from (C) are from the colitis-induced rat's colon. You can see that the edges are jagged, and there overall structures are less organized and well-formed.
The two microscopic images from (D) show the colon of a rat that got the MSM with the colitis. **You can see that the edges are smoother, and the structure is more parallel and more organized!**

In two very similar studies, researchers gave the human equivalent dosage of either 3-6g[35] or 8-14g[34] of MSM per day to rats with experimentally-induced colitis. After a week, they examined the colon tissue from all the groups.

<u>MSM significantly decreased macroscopic damage scores (image below), increased glutathione levels (a master antioxidant of the body), and prevented cell death (necrosis).</u>

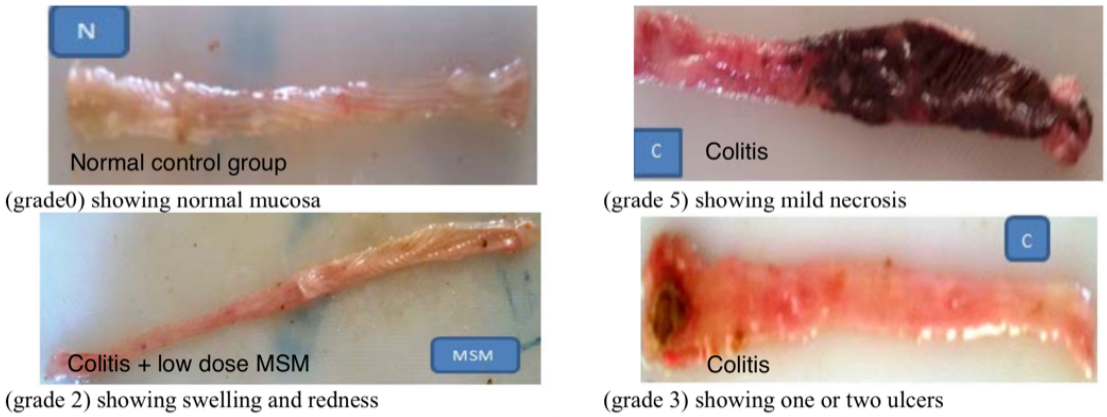

Figure 2: Macroscopic appearances of colons, N; normal group, MSM group, C; acetic acid group.

The higher dosage worked a lot better, though.

Below, you will see graphs signifying the amount of "damage" the researchers found when they examined the colon tissues. The top graph is from the study in which rats that got the human equivalent dose of 3-6g per day and the bottom graph is from the study in which the rats got the 8-14g per day human dose.

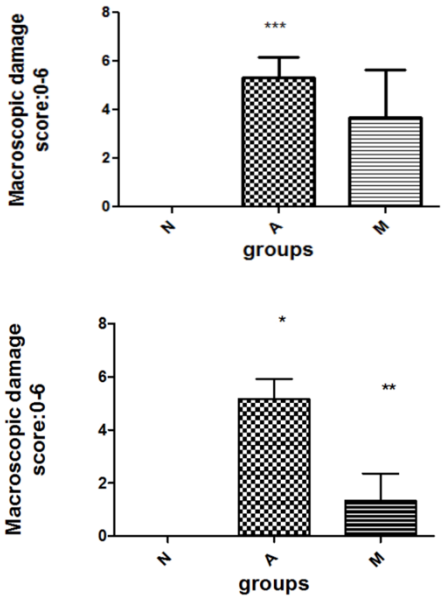

Fig. 3: The effects of MSM on the macroscopic changes in Acetic Acid-induced ulcerative colitis in rats. Parametric data were expressed as mean±S. D (n =6). (N); normal control, (A); colitis control, (M) MSM groups, *Significant difference as compared to normal control group at p<0.0025, **Significant difference as compared to A group at p<0.0044

As you can see, the higher dose took the tissue damage way down.

From the high dose study, the authors said, "So, treatment of rats with the MSM (1000 mg/kg) for 6 d, for the first study, **cured the tissue damage** in rat model of colitis induced by acetic acid as confirmed from its effects, as evidenced by **lowered the incidence of diarrhea**, improved food intake by increasing the body weight, and decrease the colonic weight/length ratio contraries the ulcerative colitis induced by acetic acid. Also, the macroscopic features in MSM group exerted upgrading the extent and severity of inflammation **by treating ulceration and necrosis that has been very obviously significantly different from the acetic acid control group**.
Besides the anti-inflammatory effect to the MSM, **there is the antioxidant effect.** Treatment with MSM in this study inverted colonic GSH [glutathione] depletion and restored the levels toward the normal value suggesting an antioxidant action of MSM."

MSM Can Also Help Protect From Colon Cancer

Besides helping to reduce damage and inflammation in the colon, MSM might also be a

great supplement to help ward off colon cancer!

This is great news, because both **U.C. and Crohn's are well known to have an increased risk for colon cancer later in life.** The increased risk comes mostly from the fact that the colon is repeatedly damaged over and over throughout the person's life, and this repeated damage can increase the chance of cancerous tumors forming.[8]

MSM has been shown to induce "apoptosis" (cancer cells essentially killing themselves) in the colon in 2016. Importantly, it did this in a "p53 independent manner".

p53 is a factor that is usually responsible for making cancerous cells kill themselves. Most people develop cancerous cells every year, but it is no problem because the body / immune system recognizes these as abnormal cells and kill them off. The p53 factor is there to assist with this process, allowing the cell to kill itself before it can grow and spread.

The problem is that over 50% of established cases of colon cancer are defective in p53. This means that the cancer cell will no longer kill itself, and this allows it to grow and spread. This study showed that MSM was able to induce "apoptosis" in the cancer cell regardless of whether or not that cancer cell had a working p53 nuclear transcription factor![9]

The above study is further supported by an older 1988 study that showed that giving rats **MSM significantly prolonged the time it took for the rats to develop colon cancer** after they were injected with a carcinogen![10]

It shouldn't really be surprising that MSM helps reduce the risk of colon cancer, because MSM has been getting pretty profound results in cancer research with virtually every type of cancer it has been studied with. **Multiple studies have shown that MSM may help reduce the risk / increase the resistance to**:

- Breast cancer[11,12,13,14,15]
- Prostate cancer[16]
- Liver cancer[17]
- Oral / Mouth cancer[18]
- Skin cancer[13,19]
- Bladder cancer[20]
- Lung cancer[21]
- and general Gastrointestinal cancers[22]

While there isn't enough evidence to say that taking MSM *will* protect you from cancer, considering its overall complete lack of toxicity to normal cells, it definitely seems like a very good supplement to include in a regimen for colon health!

How To Take MSM

MSM seems to be one of the safest supplements one can take. It has a very low toxicity. That being said, a minority of people do experience negative effects at first, which can sometimes be due to "die off" from assisting the body in killing off unwanted pathogens.

The only type of MSM I recommend is OptiMSM™. This is because this is the type of MSM used in the majority of the research, it is very pure without contaminants, and it is less bitter than some other brands if you get the powder. Currently, Jarrow MSM (which uses OptiMSM) is the best price on Amazon.

If using OptiMSM, there are options for both pills and powder. They are the same in terms of effectiveness, but the powder is a better price for the amount you get. MSM is very bitter when mixed in water, so I usually recommend mixing it either in juice or just dumping the powder straight in your mouth and washing it down with some water. This allows you to not taste a lot of the bitterness.

I always advise people to start our low, around 500mg - 1g (or 1/8th of a tsp) and see how they respond before moving up the dose. Eventually, one can move up the dose within a couple weeks. The usual dose used in human research is between 4-6 g a day split in two servings, yet as we've seen, higher doses work better, so you can experiment with up to 10-20g per day in split servings. Many people used doses this high for joint pain.

You will need to increase your water intake when you start MSM, and it can make you more thirsty. This effect eventually goes away with time. Drink a full glass of water every time you take MSM. For some extra benefit, add some fresh juice of a lemon to the water! (Vitamin C and MSM work very well together.)

Make sure to discuss with your treating physician before making any changes or adding any new supplement to your regimen. This information is for educational purposes only and is not medical advise in any way!

Cinnamon: A Natural Immune Regulator For The Gut

Within many different types of whole foods, there are a multitude of various phytonutrients / polyphenols that have anti-inflammatory and immune-regulating effects throughout the body. Specifically with gut health and auto-immune diseases, cinnamon comes out as a shining star that is filled with particular types of these polyphenols.

One important polyphenol in cinnamon is called cinnamaldehyde. This molecule has been found to lower oxidative stress, reduce inflammatory cytokines, and inhibit the NLRP3 inflammasome (which we learned about above with MSM), all of which helped relieve rodents of developing colitis in an experimental study.[23]

In fact, there have been a plethora of animal studies that suggest that cinnamon can be a very powerful tool to assist with U.C. and Crohn's inflammation.[24,25,26,27,28]

One of the big ways that cinnamon helps the gut is by increasing T-regulatory cells ("Treg cells").[26] Treg cells, unlike other forms of T-cells, have profound anti-inflammatory activity and help induce "immunotolerance". This helps the body determine "self" from "not self". In disease conditions with an autoimmune component - such as U.C. and Crohn's - enhanced immunotolerance will cause the body to attack itself less often, **thus getting at the cause of the chronic inflammation**.[29,30]

Cinnamon has also been shown, mainly via its metabolite sodium benzoate, to reduce Th1 cells, lower IL-17, and decrease the production of pro-inflammatory cytokines.[33]

Clinical Trials

Cinnamon has successfully shown to help improve the severity of other autoimmune diseases, such as Rheumatoid Arthritis[36], and shows promise for Multiple Sclerosis[37]

While there is a lot of experimental evidence that cinnamon can benefit those with U.C and Crohn's, there unfortunately have not been any clinical trials done yet to be able to better ascertain its benefit.

However, considering its role in promoting microbial diversity and richness in the gut[24] (which is something that Crohn's and U.C. patients have less of and would benefit from more diversity[31,32]) and its overall lack of toxicity and side effects, it would be worthwhile to incorporate cinnamon into your daily meals.

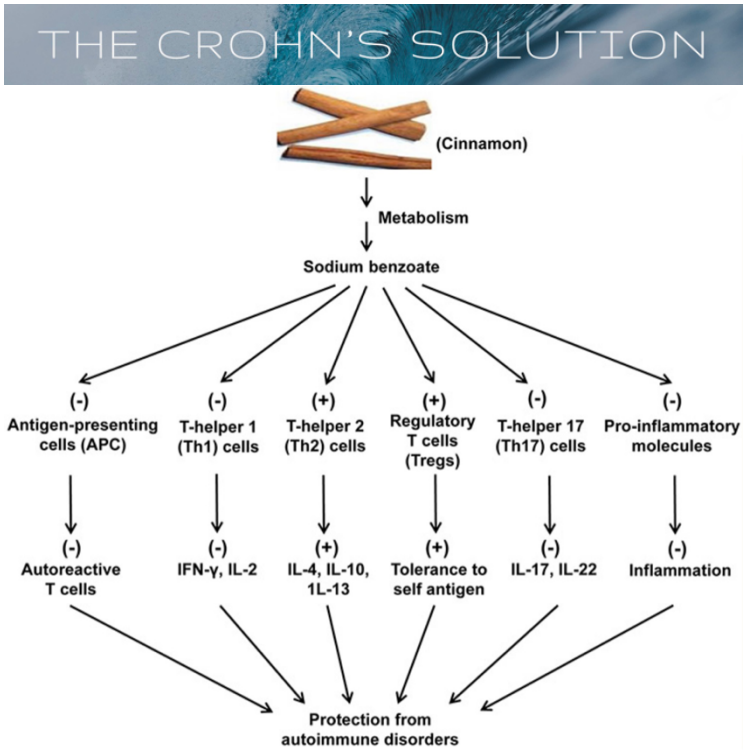

image from Pahan et. al. 2020[33]

How to Take Cinnamon

Converting mice dosages in to human dosages, we arrive at around 4-10g of cinnamon powder a day as a good starting point.[25] Each level teaspoon contains around 2.3g of cinnamon, so 2-4.3 tsp per day would be a great target intake.

Cinnamon can be mixed into food such as oatmeal or stirred into coffee or other hot beverages. Personally, I like mixing cocoa powder, cinnamon, and stevia together with hot water to make a delicious type of healthy hot cocoa drink!

Make sure to buy **Ceylon** Cinnamon, not Cassia, because Cassia contains a molecule that can be hard on the liver over time.

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