



ALIVE!

THE MIGRATING MOTOR COMPLEX

THE TERM *MIGRATION* IN the animal kingdom refers to a phenomenon that portrays rhythmic cadence, routine, and structure. Whether of butterfly, bird, or fish, the intent of migration is typically to ensure healthy survival in response to changing climates, shifting environments, or threats. For much of the animal kingdom, migration is instinctive and seasonal. Disruption of animals' normal migratory patterns results in tragedy to the species. While throughout history man has voluntarily migrated in response to changing weather, environment, or threat, there is a natural instinctive migratory rhythm within the human body. This inner migratory pattern is found in the digestive tract and is called the *migrating motor complex* (MMC).

The migrating motor complex is a cyclic pattern of movement that occurs in the stomach and small intestine, stimulated by electro-chemical cues. Four phases have been identified in the MMC. Phase I appears to be a quiet, restful stage without muscular contraction in the stomach and small intestine. Random contractions begin in phase II. Then these contractions increase to "bursts of contractions of maximal amplitude and duration" in phase III.¹ Phase IV brings the concerto to an end with a rapid decrease of contractions. The MMC is a recurring event that happens over a period of one hour and a half to two.

The purpose of the MMC is not to digest food, it's function is not yet fully understood. Peristalsis is the muscular action of the gastrointestinal tract that occurs during digestion, ensuring that food is conveyed from mouth to stomach. In the stomach, muscular action mixes the contents with gastric juices and then transports the mixture into the small intestine. The wave-like movement in the small intestine allows for maximal contact with the carpet-like walls. This contact provides optimal nutrient absorption.

The MMC is interrupted by eating.

The MMC has been likened to a housekeeper. A housekeeper comes in after the feast and cleans up the place, restoring the environment. It has been suggested that the MMC may exist "to clean the digestive tract of residual food, secretions, and cellular debris."² An increase in secretions from the stomach, gall bladder, and pancreas is also seen in conjunction with the motor activity. These secretions probably aid in the cleansing activity of the MMC and assist in preventing a buildup of bacterial populations in the small intestine. It is during the fasting state that the MMC is put into action. For many, the term *fasting* implies skipping meals and enduring long periods of abstinence from food. In this case, the specific periodic migrating contraction pattern we are referring to takes place when significant time occurs between meals. The MMC is interrupted by eating. For example, you

ate a lovely breakfast. The food spent its time in the stomach and intestine and is making its way down the canal. The stomach has completed its work and the migratory pattern can begin first with rest, then with muscular contractions, then—the MMC is halted. A snack has been eaten. More food is coming down the pipe. It's time to digest again. Now the process of digestion must begin again and the MMC will have to wait. The housekeeping role of the MMC, including sweeping residual undigested material through the digestive tube, can only resume when the "Do not disturb" sign is removed and the room is empty.

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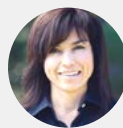
While the MMC is incompletely understood, its absence is associated with gastroparesis, delayed gastric emptying, and intestinal pseudo-obstruction. As mentioned previously, the MMC can prevent bacterial growth in the small intestine. People with small intestinal bacterial overgrowth (SIBO), with its bloating, gas, and mal-digestion, were found to have non-functional or depressed function of the MMC. Those with irritable bowel syndrome have been found to have disruption in the working of their MMC. A disturbed MMC predisposes to symptoms of bloating, gas, diarrhea, or constipation and may aggravate dyspeptic symptoms. "The physiological importance of gastric MMC is a mechanical and chemical cleansing of the empty stomach in preparation for the next meal. The impaired gastric MMC may aggravate dyspeptic symptoms following food ingestion."³ The researcher goes on to state that maintaining gastric MMC in between meals is an important factor to prevent symptoms after a meal. An altered MMC has also been associated with obesity.

The common habit of snacking and eating six meals a day for the purpose of losing weight, maintaining steady blood sugars, or gaining muscle mass is at conflict with this foundational part of our physiology. It matters not whether it's nuts, carrot sticks, fruit, or Cheetos; snacking impedes the housekeeping process. Through ignorance we have ignored the MMC and, as a result, have become out of sync with its tempo. Apparently, we were not designed to graze.

You may be wondering how long is needed between meals to ensure adequate digestion and give time for the MMC to do its thing. There is a considerable amount of variability in transit time between healthy individuals. Composition of the meal, mental state, and gender are factors to consider. Studies indicate that approximately half of the meal has left the stomach two and a half to three hours after it has been consumed. It may take another hour or two to be completely empty. "After the regular meal is eaten, the stomach should be allowed to rest for five hours. Not a particle of food should be introduced into the stomach till the next meal. In this interval, the stomach will perform its work and will then be in a condition to receive more food."⁴ Five hours between meals gives the stomach time to recover from the labor of digesting the preceding meal.

There is a rhythm in nature designed by the Master Composer, a rhythm that includes all creation. Its cadence takes the details of our lives into consideration and works to meet our needs. Blessed is the land when those who live in it "eat at a proper time" (Ecclesiastes 10:17, NIV). "The eyes of all look to you, and you give them their food at the proper time" (Psalms 145:15, NIV). 🍌

1. E. DeLoose, et al., "The migrating motor complex: control mechanisms and its role in health and disease," *Nature Reviews Gastroenterology and Hepatology*, May 2012, <http://www.nature.com/nrgastro/journal/v9/n5/full/nrgastro.2012.57.html>.
2. S.K. Sarna, "Cyclic motor activity; migrating motor complex: 1985," *National Center for Biotechnology Information*, 1985 Oct, <https://www.ncbi.nlm.nih.gov/pubmed/3896912>.
3. T. Takahashi, "Mechanism of interdigestive migrating motor complex," *National Center for Biotechnology Information*, 2012 Jul, <https://www.ncbi.nlm.nih.gov/pubmed/22837872>.
4. E.G. White, *Child Guidance*, p. 389.



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