

# On Peristalsis

Kathrin Stauffer

My friend the scientist once asked me when I was talking about biodynamic massage: What is it you actually hear in the stethoscope? What makes the peristaltic sounds you are listening to? I remember being brought up short by this question and saying that I didn't really know, but thought it was a good question. The incident helped to make me go and read up on the physiology of the intestinal peristalsis. Another motivation for this project was my curiosity about the Boyesen family's papers on psychoperistalsis and its role in the vegetative discharge of startle remnants<sup>1</sup>, and I shall try and address this in a separate paragraph. First, what do we know about the intestinal peristalsis:

From the position we normally place the stethoscope on the abdomen of a client, we can conclude that there are two possible organs to produce sounds, the small intestine and the large intestine. In the small intestine, the process of breaking down foodstuffs and taking up nutrients into the blood happens. The large intestine finishes this job but mainly extracts residual fluid in order to compact the non-digestible matter. In the course of this process, vast amounts of water flow through the walls of the large intestine in both directions, i.e. both from the blood stream into the lumen (the inside) of the gut and from the lumen of the gut into the bloodstream; on balance this tends to result in a net water flow of about 2 millilitres per minute out of the lumen of the intestine into the bloodstream<sup>2</sup>. This process happens on a "microscopic" level and is chemically mediated; it requires no physical movement of the gut itself. We can picture it like our mouth watering (i.e. like the secretion of saliva) which also doesn't involve muscular movement and makes no sound. There is a second type of fluid movement in both intestines, the movement of the contents along the lumen of the gut. This happens through the action of the intestinal peristalsis, by segments of gut contracting and squirting fluid in both directions. This "bulk" fluid movement is what we can hear.

I've found it fascinating to study what is known about the movement of the intestines. The walls of the gut are quite an intricate structure containing epithelial cells (the ones who transport nutrients and water between the lumen and the bloodstream), smooth muscle cells (the ones who produce contractions) and a complex array of nerve cells (the ones who coordinate both types of movement and connect the whole system to the rest of the nervous system). It turns out that even in the absence of food, the gut still continues to move, to produce little waves of contractions travelling from the pyloric muscle all the way down to the anal canal, at a frequency which is highly variable but typically every hour<sup>3</sup>- provided that we are reasonably relaxed and at ease. In other words we can say that the alimentary canal (Gerda Boyesen calls it the Id canal) has its own pulse!

I want to say a little more about the nerve cells. They come in two layers within the gut walls, each layer consisting of multiple plexi, or "knots", of neurones, forming a dense network which surrounds the whole of the alimentary canal. The network is called the Enteric Nervous System (ENS), and it is an important component of the nervous system.

Functionally it could be called an autonomic nervous system because it is not under voluntary control. The number of nerve-cells in the enteric system has been estimated to be of the same order as that in the brain, and all types of neurotransmitters found in the brain are found here too. So we have a structure which, although it looks nothing as well-defined and striking as the brain and is as yet very poorly investigated (compared to the brain), is potentially as complex and capable as the brain itself, that structure many of us think of as their mind<sup>4</sup>.

Now it is very tempting to go off into thinking aha, this is a sort of unconscious, vegetative mind that mediates self-regulation, and in fact I have heard a few people make all sorts of

allegations as to how powerful and wise this "belly-mind" is. Alas, Neuroscience knows nothing of this, and restricts itself to saying the ENS mediates digestion of foodstuffs. Personally I think enough attributions of particular emotional and mental functions to particular structures of the nervous system are already being made that don't really quite hold water. So for the time being I will restrict myself to saying that the alimentary canal has a very rich and complex nervous supply, and that we are not really in a position to say much about what this means.

One of the things that we know about the ENS is that it "talks" to the rest of the nervous system. It receives input from something called the prevertebral ganglia<sup>5</sup>, and these are in turn connected to the nerves arising from the thoracic and lumbar segments of the spinal cord. In addition, there are lots of connections with some cranial nerves, notably the Vagus. This means that the gut "knows" of almost everything that happens anywhere in our bodies and can be influenced by it.

In this rather hand-waving way, we can construct a chain of information, of nervous signals, from any tissue that's being massaged through the peripheral sensory nerves to the spinal cord and the brain, and from there through the autonomic nerves to the enteric nervous system to affect peristaltic movement of the gut. As yet, it appears to be largely unexplored what kinds of peripheral stimulation might produce what kinds of intestinal movements, and what this might imply about the emotional state of the organism. There is some information available about the effects that various kinds of physical and emotional stress have on intestinal movement<sup>6</sup>, but essentially none about what pleasure does. We probably know more about this than anyone else!

I now want to follow another train of thought, namely Gerda Boyesen's ideas of chemostasis and what happens when connective tissue is being emptied. When I first came across her papers on this, I felt it was potentially a wonderful way of thinking about neurosis, and wondered if I could make a bit more sense of it. The way I understand it now basically Gerda says that, when an impulse is prevented from being discharged through muscle action, the charge in those inhibited muscles causes extra blood supply to the tissue. If the feelings associated with the charge are not acceptable, the fluid pressure quickly becomes unbearable and we "deaden" the area. We do this by holding the inhibited muscles in a sort of semi-relaxed state, and because the muscles cannot move, the venous return of the extra blood is impaired so that it cannot just flow back through the blood vessels to re-join the circulation. Instead, it seeps out of the blood vessels and infiltrates the extracellular spaces in the connective tissue. Normally, this fluid would be removed from the tissue through the lymphatic system, thus draining the remnants of the charge. But by deadening the area we will also in time inhibit normal lymph drainage, and the tissue becomes swollen with fluid and at the same time dead. So when we massage such transudated tissue, we reverse the process: as the tissue comes alive again, the fluid is still there, and the pressure still reminds us of the unacceptable feelings we tried to suppress in the first place. Tissue that has long been dead and is brought to life will then feel the unbearable pressure and can get quite inflamed with it. This is what we call "full" tissue. Now we all know that when we massage such full tissue, we hear especially loud sounds from the peristalsis, and it feels as though we are hearing the intestine taking up all this old fluid, because at the end of the massage the clients feel relieved and emptied. It is as though we are directly encouraging the intestines to digest our old conflicts and neuroses.

So what happens in the body at this point? It seems clear that we are actually encouraging the body to withdraw fluid from the full area. What is less clear is how this process stimulates the peristalsis. Extracellular fluid can basically only get back into the blood stream, either directly or by way of the lymph. Once it is there, the body's mechanism for dealing with extra fluid will come into play. From what the textbooks say, it is mostly the kidneys that absorb

the fluid and discharge it through the bladder, whereas the intestine, as noted above, sends more fluid into the bloodstream than it absorbs. So it seems that the idea of listening to the intestine taking up and digesting our old conflicts ought to be taken as a metaphor rather than as literal truth. Having said this, I still don't believe that we can quite dismiss them as a mere epiphenomenon and basically unimportant:

I have tried to show how we might understand the effect of a massage on the intestinal peristalsis. What it boils down to is that it is easier to think of information making its way from the massaged tissue to the gut than of fluid making the same way. Certainly taking the speed into account at which the peristalsis responds to massage, I cannot imagine how fluid could flow over a distance of perhaps several feet within a split second, whereas the movement of electrical signals in the nervous system is of course much faster. So the gut does not, perhaps, react to extra water influx but to the information that extra water is being mobilised from the tissues. For all I know, it may be reacting by re-establishing a bit more of its own intrinsic pulse, by re-establishing a more harmonious and free-flowing state.

I have said above that the fluid that's being emptied goes back into the blood stream. When this happens, the blood vessels in this area have to expand to accommodate it. They can do this quite locally without involving more than a small bit of skin and connective tissue. However the constriction and expansion of blood vessels is also sensed by sensory nerves and regulated by the autonomic nervous system, a system that extends through the whole body and affects the physical, emotional and mental state of the organism. Thus I believe that when we elicit peristaltic sounds in a massage, this tells us that we are involving the whole organism and not just a few local capillary blood vessels. The difference is enormous and, I think, all-important for a holistic way of working. When we hear peristaltic sounds, we are not just working on a small area of the body, we are actually in contact with and affecting the whole person.

#### References:

1. M.-L. Boyesen, *Psycho-Peristalsis I. Energy and Character* (1974), vol. 5 no. 1; G. Boyesen, *Psycho-Peristalsis II* (M.-L. Boyesen ed.), *Energy and Character* (1974), vol. 5 no. 2
2. *Handbook of Physiology, Section 6: the Gastrointestinal System*. American Physiological Society, Bethesda MD 1989
3. J.H. Szurszewski, A migrating electric complex of the canine small intestine. *Am.J.Physiol.* (1969), 217:1757-1763; G. Vantrappen, J. Janssens, J. Hellemans, Y. Ghoois, The interdigestive motorcomplex of normal subjects and patients with bacterial overgrowth of the small intestine. *J.Clin.Invest.* (1977), 59:1186-1196
4. D.L. Wingate, Intrinsic and extrinsic neural control. In *An Illustrated Guide to Gastrointestinal Motility* (D. Kumar and D. Wingate eds), Churchill Livingstone 1993, p. 64-77
5. J. Christensen, The enteric nervous system. In *An Illustrated Guide to Gastrointestinal Motility* (D. Kumar and D. Wingate eds), Churchill Livingstone 1993, p. 10-31
6. F. Musial and P. Enck, Stress and gastrointestinal motility. In *An Illustrated Guide to Gastrointestinal Motility* (D. Kumar and D. Wingate eds), Churchill Livingstone 1993, p. 104-117