

The Parkinsonian Athlete: Beyond the Limits

Thoughts, ideas and practical advice on the concept of "functional biomechanics" in Parkinson's disease

*To Mom Valeria and Dad GianLuca,
Light of our hearts,
for the patience, perseverance, dialogue, endless Love for each other
and for raising us as the Men we have become.*

Index

<i>Preface</i>	13
<i>Introduction</i>	17
<i>To begin...</i>	23
1. <i>Anyone can be an Athlete</i>	27
1.1 The concept of "Athlete"	27
1.2 The Parkinsonian Athlete	30
2. <i>An effort that is never wasted</i>	34
2.1 Functional training	34
2.2 First big difference: aerobic training VS anaerobic training 38	
2.3 Diversity of aerobic and anaerobic training in Parkinson's disease	42
2.4 The concept of "forced exercise"	58
3. <i>Overview of Physics Applied to Body Movement</i>	66
3.1 The center of gravity, the balance, and Parkinson's disease 67	
3.2 The equilibrium: neutral, stable and unstable	71
3.3 Pendular activity of upper limbs and correlations with balance 75	
3.4 We are all "tightrope walkers"	79
4. <i>Biomechanics of Parkinson's disease</i>	81
4.1 Overview	81
4.2 On Phases and Off Phases	82
4.3 The Trapezius muscle: a key player	83

4.4	An illustrious "unknown" (so far): the Iliopsoas muscle	90
4.5	Like the Tower	91
4.6	"Why am I shaking?"	96
4.7	Thought-movement synchrony	98
5.	<i>Practical advice for movement and training.....</i>	<i>101</i>
5.1	"If my feet are glued to the ground, I start marching"	102
5.2	A bug or a laser?	107
5.3	Is it really "the wand that chooses the Wizard"?.....	110
5.4	Useful asymmetry.....	114
5.5	The wall: a great tool for training	117
5.6	"Newton's Third Law: the only way humans have ever figured out of getting somewhere is to leave something behind" ..	121
5.7	"To learn how to get back on our feet".....	124
5.8	"I know how to get up, but my hip hurts...or maybe it's the gluteus?"	127
5.9	A little extra strength and endurance in the legs never hurts... 133	
5.10	Strengthening the abdomen in a...comfortable way!	142
5.11	Let's get out of bed quickly	151
5.12	That uncomfortable stiffness in the arms.....	154
5.13	Learning to lift yourself - even - with the "only" strength of your arms!.....	161
5.14	One exercise, many benefits: "Angel's Wings" (and its effect on the Upper Trapezius)	166
5.15	A hypothetical training program	175
5.16	A (quick) biomechanical consideration.....	178

5.17	"Biomechanics of expression"	182
6.	<i>...So, let's say it out loud!</i>	187
6.1	Some basic techniques typical of "Professionals in speech" 189	
7.	<i>Physical performance and climate</i>	197
8.	<i>A brief historical overview: Dr. Gustav Zander and the legacy of his pioneering theories</i>	200
8.1	Dr. Zander's thought and its evolution over time ...	201
8.2	The importance of "coded" physical activity.....	203
9.	<i>The Angel's Wings device</i>	205
9.1	Angel's Wings for posture	206
9.2	Usefulness of Angel's Wings in Parkinson's disease	209
9.3	State of the art of Angel's Wings+.....	215
10.	<i>Tips for the psychological approach to Parkinson's disease</i>	217
10.1	"The will is everything"	218
10.2	The importance of comparison.....	220
10.3	Considerations for the 'caregivers'	221
11.	<i>The brain is like a muscle: the more you train it, the fitter you keep it!</i>	223
11.1	Neuroanatomy of cognitive processes.....	225
11.2	What happens when one of our "circuits" gets damaged? 236	
11.3	Assessment of Cognitive Processes	246
11.4	"All very interesting. However, I have Parkinson's disease: what can I do in the daily and practical?"	256
12.	<i>Some stories</i>	263

M., the Nurse.....	265
F., the Hunter	268
G., the Poet	271
R., the Textile Industry Worker	274
G., the Blacksmith who was reborn.....	276
P., the gentle Giant	277
A., the Scholar of the Mind.....	280
E., the Artist	283
<i>13. Final considerations</i>	<i>287</i>
13.1 Becoming "Engineered Athletes"	288
13.2 An ending or a new beginning?	290
<i>Afterword</i>	<i>293</i>

Preface

by Antonio Bernardi,

Vice president of Parkinson's Association Siena

Parkinson's disease is degenerative and progressively disabling; thus juxtaposing it with the noun "Athlete", which presupposes a tendency toward constant physical and mental improvement and overcoming one's limitations, may seem like an oxymoron, and writing a preface to a book with this title speaks highly about the temerity of those who will try and about the confidence the Authors place in myself.

The behaviors we as Parkinsonians enact, with others, with family first and foremost, often denote a tendency toward self-indulgence, an expectation of continued attention, a progressive and precocious dependence on those around us.

We often feel afraid to leave our domestic hiding place, as if going out into the world was to go into an unknown against which we feel inadequate.

We tend to reduce areas, to remove occasions when we feel challenged, to give up "doing" because: *last time it went wrong, I struggled, I fell, I felt embarrassed, I couldn't do it, I don't feel good.*

Working on our weaknesses as parkinsonians means accepting the challenge with the limitations imposed by the disease but first of all with ourselves.

We must move from being *parkinsonians* and *cared for* to being ***athletes*** and then ***trained*** by defining targets for improvement without indulgences of any kind.

Personally, I was fortunate enough to know one of the authors and to use, under his coaching, ***Angel's Wings***. But it was not only the machine that changed my relationship with the disease, it was the strong drive for the "athletic" approach that Luca Valerio was able to instill in me, the understanding and adherence to his vision of "Parkinsonian Athlete" that helped me recognize my limitations and learn to overcome them.

This vision of him is well explicated in the text.

Finally, a hint for the use of this clear, streamlined book with some interesting and understandable references to Physics, Biomechanics in particular.

I suggest reading it in pairs, that is Parkinsonian athlete and caregiver in order to have, from the very beginning, a common and shared feeling about the path to be taken together.

The person who will accompany us on this path should then become a "coach" precisely, and no longer and not only a caregiver, but a kind of all-around coach without indulgences, who will help us to check our improvements and/or difficulties by jointly proceeding toward the expected results and helping us to extend this approach to other aspects of life as well.

Because we are not athletes only in performance but in every day-to-day sphere.

If you have resisted reading this far, stay quiet and shrewd: the good stuff comes now.

Happy training to all.

Antonio Bernardi
Vice president Parkinson's Association Siena
November 2020

Introduction

by Dr. Claudio Paradiso, M.D. specialized in Neurology and Neurophysiopathology

I have participated in a part of the "gestational" and "weaning" period of the *Angel's Wings*, ever since that day many years ago when in the middle of an afternoon of work in the laboratory I received from Luca Valerio the proposal to help him and Enrico Matteo to study with surface electromyography (sEMG) the behavior of the activity of muscles possibly involved in the use of this device.

The idea immediately fascinated me and I enthusiastically agreed.

The story continued and the time came when the period of presenting the results obtained at congresses began. In those contexts the preliminary results of our findings on the behavior of muscle actions were appreciated as *original* and *not found* in other work on the same subject in the literature. All because of the revolutionary simplicity of the principles of mechanics and of *Angel's Wings* applicable in Neurophysiopathology.

I also recall with pleasure the further stages of study at the University of Genoa, a city I attended in the early 1990s to take my Specialization in Neurophysiopathology as I was fascinated by the study of the Peripheral Nervous System (PNS). Even as a Specialist in Neurology, I believe that

the study of the PNS is fundamental to understanding the neurological patient in his or her entirety...because...*it is always about people.*

Not only that, but at least as far as I am concerned, the study of the PNS also succeeds in providing a better understanding of the functioning of the CNS, and indeed the contents of this book may be an example of that.

Coming straight to the book, in fact, one of the first good feelings I was left with after reading it is that it refers more to *people* than to *patients*. The telling of the stories of some of the patients set forth at the end of the book (yes, I'll start from the end!) is a demonstration that our authors have been in close contact with them and their *caregivers* for a long time, so much so that they also understand aspects of their personalities, what the real problems are in their daily lives, and, I'm sure, understand their psychology. Those stories sound like a sincere expression of affection toward them.

Quite different from following parkinsonian patients through ambulatory follow-ups with at most minor changes in therapy or drug substitutions. In fact, medical research in the field of Parkinson's is inherent in the study of the alteration of *neurochemical*, *neuroanatomical*, and *neurofunctional* mechanisms of the structures involved, and predominantly for *neuropharmacological* purposes.

Mind you, all of this is fully shareable and commendable, we would miss it, but it runs the risk of making us physicians focus our research only on

this and make us forget about the *patient-person* and his or her real needs once outside the ambulatory observation.

Another consideration to be made, and one that gives additional value, in my opinion, to the work done, is that the authors are Biomedical Engineering Graduates with specific expertise in the field of Neurology and Physiokinesitherapy. I have often worked in the past with Medical Engineers, in the various Research Institutes I attended in the early days of the emergence of these professions. The relationship has always been difficult regarding the approach of various problems, as we did not understand each other in expressing each other's needs due to the lack of in-depth knowledge of each other's expertise and thus a unique language.

In the case of our authors, the effort made in deepening the knowledge of Parkinson's Disease from the scientific-medical point of view is evident, especially with regard to the macroscopic semeiological aspects of the disease effectively absorbing into a single competence the possibility of a problem-solving approach to research of the limiting conflict between professional figures I mentioned earlier.

Very humbly, however, the authors mention often in the text, as if never wanting to forget, that the intent of the book is not to write a scientific treatise on Parkinson's - and in this regard in fact even the classic scientific terms related to Parkinson's semeiotics (which are part of the common scientific neurological semeiological language) do not appear, or at any rate are reduced to the bone. Referring exclusively to the terms that define the person's "posture" perceptible from external observation.

In Neurology, the patient's posture and attitude is important and of immediate recognition for a large proportion of pathologies. Our authors, from the semeiological point of view, have chosen the terms, precisely, inherent in meticulous observation of the person and related exclusively to posture and this also helps to define the book as a "non-classical scientific treatise on Parkinson's", but as *an original and new attempt to provide advice for the solution of practical problems of the person not apart from clinical observation.*

That is not to say, however, that the inherent characteristics of the book can make us categorize it outside of a scientific treatise with regard to the aspects of the disease under consideration. This stems from the meticulousness, precisely scientific, with which each proposed motor activity is explained and in a very simple and clear manner, starting with the basics of Physics, Biomechanics and Neurophysiopathology that justify the choice of the proposed exercise. Also, and especially appreciable is the iconography with simple and explanatory figures that are, moreover, artistically pleasing and make the reading even more enjoyable by giving the book a kind of *lightness* and *immediate language*.

The scientific meticulousness, the research and correction of the small, seemingly insignificant and often taken for granted things I mentioned, as validating and deepening the principles of biomechanics underlying the proposed muscle re-education, elevates the book's work above the usual technique manuals found in bookstores or on the web that are often also contradictory, as is also pointed out by the authors in the text.

This is why the practical utility is *innovative*, because the book does not represent the usual gymnastics advice manual.

Personally, I gained a new vision from it and almost a sense of *confidence*, *completeness* and *assurance* of obtaining the expected practical results.

As for the writing style, the all-round culture (including humanities) of our authors shines through. I refer to the quotations of famous people inserted at the beginnings of chapters for better focusing of topics, which harmonize well with the text, but also to the quotation of popular sayings that relate to the various problems addressed such as: "*He who hesitates is lost*".

How can we not say more words about *Angel's Wings*, whose use is essential in a motor rehabilitation program as an innovative element?

As I mentioned at the beginning, I joined the idea sight unseen because of my interest in the study of PNS but also because of *curiosity* related to the fact that really it was something new and I intuited that I could participate in a type of research that I had never done. When I tried the device (a prototype that the authors had developed together for initial testing), after the first round of exercises, I verified an intense and persistent action on the scapular girdle and paravertebral muscles at the cervical level that further increased my confidence in the device and my desire to understand it. The first results that led to the discovery that the Upper and Lower Trapezius actually worked as antagonistic muscles contrary to what had been the common belief until then, repaid the effort

made. It seemed like a small thing, but that was enough to trigger in me the idea of the uniqueness and originality of *Angel's Wings*, and in fact, with the studies carried out subsequently on various case histories and with the results obtained, the authors have fully validated scientifically its usefulness.

For all the above, I believe that this book can be very useful not only to patients but also to their caregivers. In fact, dealing with neurological disorders in my practice, there is an increasing demand for *advice* on how to behave from the *relatives* of the patients they have to care for.

According to even recent literature, "*movement*" has been reevaluated as a *valuable therapeutic tool*, not only in Parkinson's but also in more everyday conditions such as radicular compression pain, tension headache, and I also see (I myself do) more and more prescriptions for physiokinesiotherapy directed at posture correction or even simply related to walking.

That is why I am sure that reading this book has generated in me further changes in the management approach of my patients and particularly Parkinsonian patients.

Dr. Claudio Paradiso

M.D. specialized in Neurology and Neurophysiopathology

December 2020

1. Anyone can be an Athlete

"Sport goes looking for fear in order to dominate it, exhaustion to triumph over it, difficulty to overcome it."

(Pierre de Coubertin)

What better way to begin this Chapter than with a thought borrowed from none other than the founder of the modern Olympic Games?

Practically all of us hear or commonly talk about **Athletes**. We hear this term on a daily basis if we turn on the television, just as we can read it with equal frequency in newspapers, in sections about sports.

But who, exactly, is an "athlete"?

1.1 The concept of "Athlete"

Let us pause for a moment on the word "athlete". What comes to your mind?

Most likely you are thinking of a famous soccer player, a cyclist, a Basketball player or perhaps the 100-meter dash record holder or Olympic Swimming champions. More generally, when we think of an athlete, it is natural and almost taken for granted to make the connection with a particular *sports discipline*.

In reality, the concept thus interpreted is only half true, because one remains somewhat confined to the thought of a *professional athlete*, that is, a person who makes sport *his or her job*.

In the most general sense of the term, then, what does "athlete" mean?

An **athlete**, by definition, is *a person engaged "assiduously" or with competitive intent in sports activities*.

Some questions then arise:

Who can be an athlete?

Anyone can be an athlete.

Why?

Simply because, based on the definition just given, to be an athlete it is enough to have a body and a mental disposition toward consistency and repetition of training.

On the other hand, as far as the *repetition of a movement* and the *constancy of workouts* are concerned, whether we are talking about "**classic**" sports (Football, Tennis, Athletics, etc.) or "**domestic**" sports or more simply even reiterated gestures because of activities that we are accustomed to performing assiduously, *different training strategies* will exist *to optimize what we need to achieve our goal*. This applies both in the case where we have to compete in a specialty at a competitive level and for any other situation involving movement, that is "a voluntary action performed to accomplish a purpose".

NOTE: regarding "activities that we are accustomed to performing assiduously", one of them could also be carrying grocery packages, and there may be more or less functional strategies for performing each of them; however we will return to this concept later, (see Paragraph 2.1 "*Functional Training*").

So, considering as "specialties" simple daily activities that involve some kind of body movement (taking a shower, setting the table, moving a desk...), we ask ourselves:

Do athletes from different disciplines follow specific training programs that are different and customized according to the type of specialty?

Undoubtedly yes.

And finally:

What lets us know what kind of specialty we are most predisposed for?

Simple: our *physical characteristics*. Exactly the same way that a very tall person with good elevation ability may be directed to take up **Basketball** with interesting results, or an individual with a low center of gravity, short upper limb levers and significant shoulder and pectoral development will be invited to take up **Boxing** expressing remarkable performance on short-range combat.

2. An effort that is never wasted

"I have no regrets. I would do it all over again, even more. And I would train eight hours a day. Fatigue is never wasted. You suffer, but you dream."

(Pietro Mennea)

We agree *in toto* with the words of one of the greatest Italian, European and probably world sprinters. Of course, his trainings were aimed at those competitions that consecrated him to multiple victories and to the History of Sport, giving him the nickname "Freccia del Sud" ("Arrow of the South"); however, we like to think and promote this concept: perhaps training may appear as a fatigue, a "suffering" (in the broadest sense!), but it is a dedication that then greatly repays our dedication with interest.

2.1 Functional training

As we have already mentioned, the concept of "training" concerns *an event that is constantly repeated over time*. The training, for an athlete, never has an "expiration date": one will never get to a point where the level reached by one's body is so high that one will totally "stop" training, stop improving in a discipline. This concept applies, among other things, in music, singing, manual labor, memory, computation, Sports (of course), and by extension in all kinds of physical activity. The training,

therefore, is something that is constant and that one should keep repeating forever.

A journey or a book may have an epilogue, but *for an athlete, the training is a completely different concept: for an athlete, the training is endless.*

What one should do, when "training" to improve his or her results in an activity or discipline, is to aim for the attainment of *perfection*, and even if one is aware that he or she will never attain it, one should act knowing that he or she is *getting closer and closer*, infinitesimal after infinitesimal.

Generalizing, every workout can be done "in function" of something (and if we want it to, it will help us improve ourselves). Imagine a pianist who needs to practice performing his music to perfection: what will he or she practice in order to improve and/or maintain a certain level of "proficiency"? Surely, in addition to solfeggio exercises and multiple performances of his pieces, he/she will include special exercises to loosen up the joints of the fingers and to speed up the *fine movements* of the hand (depending on the performance he/she has to express, it is understood), for example by adding small weights on each finger during practice. It is intuitive that the moment he/she has removed the weights his/her fingers will seem lighter, faster and more controlled. Although, if adopted in the long run, this method may lead to degeneration of the finger joints, it is nevertheless effective and "functional" relative to the goal the pianist had set for himself/herself.

Yes, because "functional" is not always synonymous with "healthy": it all lies in the goal to be achieved, which may be related to a competition (in the case of a professional athlete), an artistic performance (in the case of a pianist), or one's own health and well-being (even in the case of an action of everyday life).

Let's give a couple more examples on *functional trainings*.

A sprinter who trains in running while wearing a 30 kg weighted jacket is doing an exercise that is very strenuous on his spine and knees; however, once he has "freed" himself of the excess weight he will be able to move with much more speed and lightness, and will therefore have performed an exercise that is *functional* for his purpose.

Or: if we consider a boxer who has to prepare for his next fight and have him practicing by swimming in a pool, he will definitely train his body, but not in a way that is *functional* for the intended purpose (i.e., to win the fight). In fact, a good boxer is the result of multiple *functional trainings* that enable him or her to express certain characteristics (speed, power, endurance, reflexes, footwork, etc.) for the purpose of prevailing over the opponent during ring fight. The boxer's most common and well-known functional workouts are *running, jumping rope, bag training, "sparring" in the ring*, and a focused program of *exercises with weights* (machines, barbells, or dumbbells); removing even one of these would most likely result in an "incomplete" boxer with weaknesses compared to his opponents. We will return to this concept later with a practical example when we discuss the *Angel's Wings* device in Chapter 9.

In some cases one may have the purpose of improving his/her motor skills or the quality of his/her movements in common, even everyday situations, for the purpose (we said this before) of regaining health or well-being, solving a problem or bypassing it. Think of a person who, because of his or her job, sits at a desk for many hours a day, or a dentist who, in order to attend to his or her patients, often finds himself or herself leaning forward: both may complain of pain or discomfort related to their posture, and in that case they will feel the desire to stretch their back muscles and "loosen up" their joints. Even a person who due to a loss of endurance in the lower limb muscles can no longer "climb stairs as he or she once did" may need functional training strategies for the purpose of regaining mastery of his or her movements. Here, in these cases one will follow *workouts* for which the term *functional* is actually synonymous with *healthy*, because these will *be aimed at improving one's quality of life*.

As mentioned above, we will discuss these strategies later by turning our attention to the characteristics and daily needs of people with Parkinson's disease.

It is important to remember that *an individual's ability to improve motor skills is preserved throughout his or her lifetime*, varying mostly in the speed with which this improvement is expressed. In other words, a young individual will learn a new movement or increase his or her strength *faster than* an older person will: in either case, however, progress can always be made in terms of **organic muscle skills** (strength, endurance, speed), **flexibility** (especially muscle

extensibility), **general coordination skills** (motor learning, motor control, adaptation to changes in external conditions), **special coordination skills** (balance, responsiveness, dexterity, orientation, ...). As a consequence to all this, of course, the possibility of accelerating *metabolism* and increasing muscle mass (*hypertrophy*) is also preserved regardless of age.

However, regardless of the *functionality* of a specific workout, which will be subordinate to the goal or needs of the individual person (indeed: the individual athlete), the first distinction to be made lies in the differences between these two categories: *aerobic and anaerobic training*.

2.2 First big difference: aerobic training VS anaerobic training

In movement, whether we are talking about *sports training* or any situation in daily life, two types of work are distinguished: that done with the supply of oxygen to the muscles (*aerobic*) and that done without the aforementioned supply (*anaerobic*).

Clearly these two types of work give a completely different neuromuscular and metabolic response. In fact, there are 3 types of muscle fibers, distinguished by speed of contraction and resistance to fatigue:

- Red fibers (slow-twitch)
- White fibers (fast-twitch)
- Intermediate fibers.

4. Biomechanics of Parkinson's disease

"Just because a problem has not yet been solved does not necessarily mean that it is impossible to solve."

(Agatha Christie)

And here we are finally trying to give a "mechanical" interpretation to what happens in the body of a person with Parkinson's disease. After all (we also talked about this in the Introduction) to deal with a problem it can be very useful to interpret it and give it a new interpretation. In some cases this can help make us see it from a different point of view, and at best even "smaller" than it seemed to us.

4.1 Overview

First, Parkinson's disease *stiffens the body* in the sense that it causes our muscles to be almost perpetually in a condition of ***isometric contraction*** (increased tension without varying length). Frequently, in fact, people with Parkinson's at the beginning of the onset of symptoms notice that they suffer from ***hypertonia***, which is the phenomenon whereby the muscles abnormally increase in tone. Intuitively, if we begin, for example, to keep our arm muscles in constant contraction for a few hours, it will be in a sense like "training" them specifically. Clearly, this will not be a healthy or functional workout; on the contrary: the muscle activity described will be highly *inappropriate* and will also lead

to an inability to fractionate the execution of a single movement (properly divide the work *specific* to a certain district and related to a certain gesture).

In addition, even the resulting increase in muscle tone will not be synonymous with vigor or well-being. There may also be an increase in the volume of some muscles (***hypertrophy***), also neither healthy nor functional.

Let us now go into more detail and see what other conditions are characteristic of those with Parkinson's disease.

4.2 On Phases and Off Phases

Every person with Parkinson's disease usually experiences, during his or her day, "***On Phases***", which correspond to the times when one feels better and has more efficient motor control, and "***Off Phases***", which (vice versa) correspond to the times of the day when one feels rigid and less in control of movement. These phases also alternate with each other through the administration of drug therapy (which generally "inhibits" duration and intensity of the *Off Phase* for the benefit of the *On Phase*). Of course, the time distance since taking the medication also affects: the more time that has passed since the last intake, the more likely a new *Off Phase* will appear.

In a few words being in the *Off Phase* means not having the mastery of certain actions, not being able to decisively start a walk, feeling more "rigid" in movements and also more agitated, nervous or depressed (in this regard there is a correlation with production, release and reception of *Dopamine*, but for this we send readers back to more specific texts).

Regardless of the type of drug therapy, which should never be discontinued or substituted with other kinds of therapies and which you should always discuss with your medical professional, there is always the possibility of intervening with **targeted exercises** even during the *Off Phases* to "speed up" and "optimize" the return to the *On Phase*, or even just to overcome to the best of one's ability the *Off Phase* itself (which cyclically recurs).

Remember: *your body is like a ship on the open sea, and you are and will always be its Captains.*

We can then use our knowledge of Mechanics and Biomechanics to better manage and counteract the disease and its symptoms.

4.3 The Trapezius muscle: a key player

Let's talk again about *muscle stiffness*: there are certain districts that suffer most from this particular symptom.

After years of study and research, it is possible to state that 100% of the population with Parkinson's disease has the highest expression of this

stiffness in the cervical-dorsal tract, particularly in the upper portion of the *Trapezius muscle*.

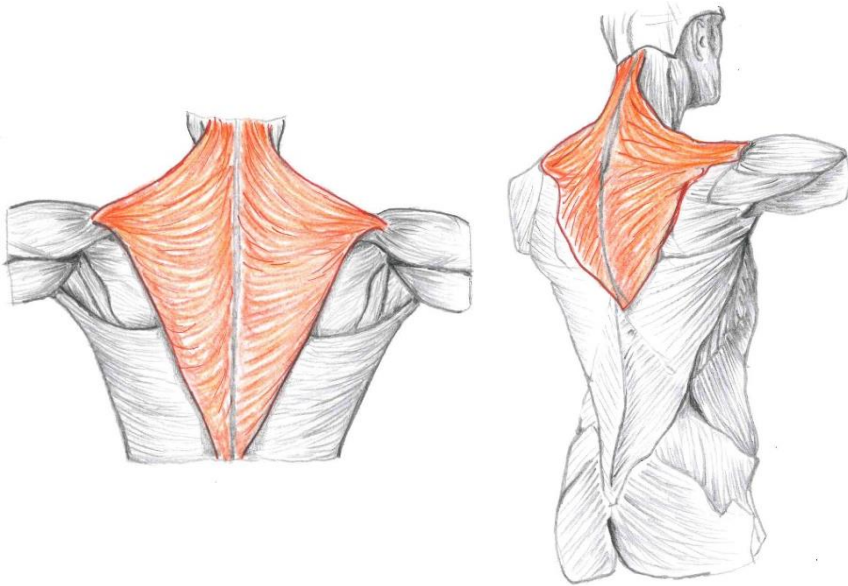


Figure 8. The Trapezius muscle

In general, the Trapezius muscle is the one that most somatizes the psychological and physical stresses of everyday life.

If we imagine a particularly nervous, anxious or depressed person, we immediately visualize him or her with a "gathered forward" posture, shoulders slightly raised and head bowed. From an emotional point of view, in fact, this "closed" posture makes us feel more "on guard" or even better "on defense". Completely different, on the other hand, is a

5. Practical advice for movement and training

"There is nothing that is not made easier through constancy and familiarity and training.

*Through training we can change;
we can transform ourselves."*

(XIV Dalai Lama Tenzin Gyatso)

We have said it before and we will say it again: this text is not intended to be a "dictionary of symptoms" nor a treatise on Neurophysiopathology. Those who suffer from Parkinson's disease know their condition well, and it would be superfluous to try to describe in detail the sensations experienced constantly and systematically by sufferers. However, as we have already done in previous chapters, surely it is useful to say at least the most relevant aspects about the symptoms and their consequences, and this for two main reasons:

- *in primis*, the solution we propose to bypass - or even mitigate - a physical-motor symptom at the time it arises (by being able to control it as best we can) will be more easily understood; and by using simple words, giving as clear a view as possible, and a rational perception of what is going on, the people concerned will best and automatically learn how to implement the strategies we suggest;

- *in secundis*, since this text is also addressed to the figure of the *caregiver* (who is the one who lives together with the person with Parkinson's disease taking care of him or her), a description, however essential, of the symptoms may be helpful in better understanding many implications (including emotional and psychological!) of Parkinson's sufferers.

We will then try to assign "titles" to the various methods/exercises that may be useful in many situations common to those who are in some way involved with Parkinson's disease, with the hope that the solutions we propose will be remembered when needed.

NOTE: every "little big" piece of advice we provide is the result of years of professional experience living side by side and for long periods of time with people with Parkinson's disease, both young and old, from the most severe to the least complicated cases.

5.1 "If my feet are glued to the ground, I start marching"

Feet "glued" to the ground: a very common situation, technically known as ***freezing***.

When it strikes, this symptom produces the feeling of not being able to control the movement of one's legs - even just to take a step forward and start walking. It usually begins with an increasingly pronounced "dragging" of the feet, until it becomes very difficult for the affected

11. The brain is like a muscle: the more you train it, the fitter you keep it!

"The brain: if you grow it it works. If you let it go and retire it, it weakens. Its plasticity is formidable. For this we must continue to think."

(Rita Levi-Montalcini)

This phrase by the very great scientist Rita Levi-Montalcini encapsulates a great meaning: the brain stops working when it is we ourselves who stop making it work.

There is more: again from statements by Levi-Montalcini herself, *"...contrary to current opinion, the brain does not fatally undergo an irreversible process of deterioration with the years. Both Tiziano and Michelangelo and many other artists of extraordinary creative ability - Picasso among them - continued to produce works of exceptional value until late in life."*

What does all this mean? That the process of deterioration is not irreversible and neither is it irreversible in the case of a disease such as Parkinson's. Undoubtedly - taking up a concept already expressed in this volume - "the will is necessary and fundamental", and this is precisely because the possibilities of maintaining a "young and active" mind exist in practice: it always depends on the type of approach.

In any case, we believe that the topics we will cover in this Chapter can provide some useful information and insights to better understand some of the mechanisms of the brain, without a doubt one of the most fascinating and complex works in the entire Universe. In fact, it is commonly believed that, given the degree of evolution we have achieved as animals, due to the increase in the capabilities and complexity of our brains, the likelihood of incurring some "defect" (e.g., malfunctions of the Nervous System) has also increased, as well as the diseases themselves. Let's think about this for a moment: it is hard to believe that our primitive ancestors could have developed Parkinson's disease as we know it today, precisely because of the characteristics of the disease but also of their brains, which were more primitive than ours (in addition to the fact that their life expectancy was much lower than today's).

So, we try to give a general overview regarding the functions of our brain and its Rehabilitation, with some theory that we have tried to make (more) enjoyable for the general public as well.

For those who wish to explore further topics concerning the brain from an anatomical and physiological point of view, as always, we would refer to more specific and in-depth medical texts. We are about to cover topics of some complexity, but we find them useful for better thinking about what could be done to keep a mind active or to make it "rejuvenate" and make it faster and perform better: exactly as athletes proceed in their training programs.

12. Some stories

"[...]

Though much is taken, much abides; and though

We are not now that strength which in old days

Moved earth and heaven, that which we are, we are,

One equal temper of heroic hearts,

Made weak by time and fate, but strong in will

To strive, to seek, to find, and not to yield."

(Lord Alfred Tennyson - Ulysses)

While writing this text, we remembered the many people we have met over the years and with whom we have shared a piece of the road.

So we thought we would share memories related to some of them, to give the dimension of the small-big results that can always be achieved even in an unhoped-for way.

For reasons of space, we cannot talk about all the people we have met and worked with: what we will do is tell some stories that we think are very indicative and from which it is possible to take inspiration in dealing with the new condition imposed by Parkinson's disease. We make no secret of the fact that some of these stories always bring a smile to our faces.

People's names are "hidden" for obvious reasons.

The Angel's Wings device with related method had been selected to be tested on parkinsonian subjects, and we were devoting ourselves to studying its effects on posture and this disease...

A., the Scholar of the Mind

A. was definitely a "professional in the field" but, of course, coming to us he put himself in the role of a "patient-athlete". He was familiar with the medical environment since he had worked there all his life as a Psychiatrist, and although he was more interested in mental health-related subjects, he had returned to studying the organic basis of the brain again since he had been diagnosed with Parkinson's disease.

Always very smiling by nature, he had the ability to continuously joke without ever detracting from the level of the topics of a conversation.

There was one concept in particular that he often repeated: *"...in my experience, every neurological disease has its own characteristics that cause certain behaviors that have always been typical of the person who develops the disease to be latent. For example, if a person is introverted, when he develops a neurological disease he tends over time to become even more introverted and shy...in fact, I have always been nice and playful, so now I am even more so!"*

Apart from his personal description of himself - which we confirm in full - the concept was really interesting even if to this day it does not seem to be fully confirmed, i.e., it cannot (yet) be classified as a general rule for every neurological disease; however, it could generate insights as to why some people with Parkinson's disease become, for example, lazier or listless than others; and knowing this fact, one could try to counteract the negative attitudes potentially generated or highlighted by the disease

itself. A., for example, had a passion for watching cheerful movies and generally always analyzing things with good humor and optimism.

This cheerfulness, however, did not interfere with his ability to sometimes pose reasonable doubts and show some skepticism, of course always considering the possibility of changing his mind if the facts gave a fair and sufficient reason. So much so that when we first met, he said: *"...I am honestly a little skeptical about getting good results. This is essentially for two reasons: first, I am over seventy years old and I have never done any particular physical activity; second, although I am in a condition where I feel quite well, Parkinson's is a "central" disease while we are going to work on the physical level, that is, on the "peripheral" ... So as a professional, I ask myself, will the results be so noticeable?"*.

Our response to this was simply to try it, asking only for perseverance and commitment. In fact, as we expected, it happened that A. changed his mind, that he was also very happy with the results deciding to continue with the inclusion of the *Angel's Wings* device in his lifestyle, and that, as an expert in the field, he greatly appreciated the scientific results that had been obtained with a desire on our part to publish and disseminate them.

In our opinion, for a person who throughout his or her life has studied the brain so deeply and then incurs Parkinson's disease for some reason by finding himself or herself participating in an evaluation program of a particular rehabilitation-functional technique, the results may have a double validity: on the one hand there is the practical aspect, that is, one that undeniably allows for an improved quality of life; on the other hand there is the professional interest as a physician and scholar of the brain and its innumerable functions.