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Physical treatment by individuals with dementia. Exercises Phase 4 ( Rakt-scheme ) for individuals with dementia.

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## Abstract

*In this phase of the “Rakt scheme” people have still the ability to walk. Maybe not without an aid outdoor but there are a lot of possibilities to exercises. This is an very important phase because the people with dementia has an limited capacity of their brain and in this phase the possibilities of movement are still good possible. The fact that the need an aid outdoor give an border on that capacity of the brain and we must try to exercises against that border.*

*But without overstep that border. That will have an negative effect on especially people with dementia. Let this people never fail but let them always feel that they have done well . We translate that often in : “Let them win !” This message give also to the others in their environment because that makes life easier. In this phase is often the greatest problem to get “in the Home” and accepted. In the Netherlands we use the EDOMAH approach and go with the people in an conversation in their home and ask what they want. And through this approach will the start be small but when the therapist is “one of them”, is influence can be very great.*

*Therefore make never the mistake to change things without consulting the people living in that home/residency or nursing home. Be sure that you start with their wishes and that is often not that what you want but accepted this, later on you can give explanation and let the people see why. That ask also for an therapist who always comes by this people and created an connection with them.*

*This is the most difficult part, but so necessary to get an base that can copy with this disease and make it possible that everyone can carry the burden so long as possible .*

*Exercising older people must always have to components ; Aerobe to improve the cardio vascular system but also the cognition. In the literature is this –aerobe exercising- the best treatment to slow down the cognition loss with cognitive exercises. Anaerobe to hold the muscle pattern and coordination on the highest level. Dementia is an neurological disease, thus there will be loss of coordination and selectivity and it is our job to brace that so long as possible. Still there is growing evidence that an combination of aerobe and anaerobe is best way to slow down the disease with an cognitive demand. **Authorship credit :** “Criteria authorship scientific article” has been used “Equal Contribution” (EC) **Citation.** Jan van de Rakt, Steve McCarthy-Grunwald Physical treatment by individuals with dementia. Exercises Phase 4 ( Rakt-scheme ) for individuals with dementia. Ita. J. Sports Reh. Po. 2022; 9 (20); 2;2; 2054 -2091 ; ISSN 2385-1988 [online]; IBSN 007-111-19-55; CGI J OAJI 0,101]. Published online. Open Access (OA) publishing. Correspondence for author.: Jan van de Rakt e mail : jan@vanderakt.nl*

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## Introduction.

### “Rakt”- scheme[1].

To get grip on the capacity of the damage brain, it is necessary that we know what this individual can on cognition area[2,3,4,5,6,7,8,9,10] and on the physical area[11,12]. That we do, by making an good assessment and try to composite an treatment plan.

Always hold in your mind that dementia is an degenerative disease, that will go further and it isn't so that the cognition loss is even with the physical loss.

Phase 4 is the phase that the most people are home and that this individual has an “minor” problems. Cognition is the greatest problem and that lay an burden on the caregivers. But in this phase we see the first problems with the balance [13,14] and mostly in the lateral direction. The trunk movement isn't capable to make an good elongation and that created not enough time to place the leg over that leg or along is and make than an great step and restore the balance[15]. In the home situation there are so many point he can support himself and he “knows” that. It is an mistake to do an room rearrangement because there is more room for walking with an rollator frame. It is very difficult for an individual with dementia to “re-learn” walking in his own house with an rollator frame. That created always problems. Is there an corridor than start there and be aware that an toilet visit with an rollator frame is very difficult .

Often is the “rollator frame- solution “ for the balance-problem, is an solution, that can be worse than the situation before in their home. That toilet is small and much caregivers find it too small because they cannot manoeuver on that toilet is correct, but the stand-up and stand stability is much larger and balance can be fast restored. There is always an wall.

Walking outside with the rollator frame is an aerobe exercise but be aware that the heart rate must be increased [3]. But realized that supporting on an rollator frame (inside) will led to an fast loss of the coordination and power of the keypoints of the diagonals on hip height [16].

In this phase is often an lot of possibilities to exercise on aerobe level and on anaerobe level and especially pointed on the balance. Start with an assessment, know what is possible and what not.

Be aware that the capacity of the individual with dementia is far more smaller and he will refuse to exercise when go over that border.

### Phase 4.

The dominant problem is often balance and especially lateral. That means that this one of the most important items are that must be exercises and when possible cooperated in the ADL. But everyone and in every situation must try to avoid this border because this will trigger people with dementia in what they cannot do anymore ( capacity)! And capacity borders, that where cross will always give to important negative reactions[6] ;

1. The tone will increase, that means in this phase maybe an neurological tone[13] increase but when the tone is still normal, will this “normal tone” increase that correspond with our tone increase when we are afraid or scared.
2. The behaviour will therefore be simple flee or hide[17]. This can be very aggressive, not cooperative but also sitting on the floor or hiding behind someone.

And then is functioning through the day very difficult !!



Picture 1



Picture 2



Picture 3



Picture 4

**Picture 1- 4**

Gives an image what there must be done when someone falling lateral. That means that the impact-speed must be brace to get time to place the free foot on the right spot and create a new stability. But lateral is different with balance reaction to the front or back. There we see the ankle and the trunk/hip react together and older people will need both to get enough amount of time to create an weight shift and place the free foot properly.

Lateral will the reaction come first from the trunk and hip and much later from the foot. And the attitude of the trunk is very important ! The trunk must be erect! And most older people have an trunk inclination and will have troubles to move to lateral side by balance problems.

*Figure 1,2,3,4 published with the responsibility and permission of the author by j.v.d.Rakt.*

Trunk/hip by older people is one of the first parts that will suffer through pain in the hip (arthrosis) and will lose strength and coordination. The Statiek Test [18] on hip and shoulder level will reveal this very quick because the individual is not capable to restraint the resistance at once. Every time he will counter the pressure with his other leg and that means that homolateral structures [19,20,21] are not capable to give the right counter pressure and that the other leg this must do with his adductors! But that will also means that the attitude of the trunk will be wrong. Now we have an shortening when the individual stand on that leg and that will give an abduction in the free leg and no possibility to cross or closed the free foot to the standing foot and make an step strategy.

The use of the foot possibilities is restricted because this ask an controlled inversion in the ankle and that will be impossible when the free leg goes to other side in abduction. And often the ankle isn't stable in this movement.

But the most important movement is elongation of the trunk and lateral movement in the hip over the standing foot (picture 1 and 3), only an elongation makes it possible to get the free leg across the standing leg.

But then we have still no stability! From this position the free leg is now the standing leg and now we have need of an shortening of the trunk (picture 3) to place the free foot far away in abduction and created an stabile support ( picture 4) ! .

This is very difficult to restrain therefore start on time and when someone is walking with an rollator frame an lot of harm is done on muscles and perception thus coordination of the body[16]. But Always think on : Don't let them fail !! .



Design photo 1



Design photo 2

**Designphoto 1 and 2.** First item what we see is that the trunk is in an flexed position and that makes trunk movements lateral more difficult. Crossing of the right foot isn't complete because the elongation isn't enough. Therefore is the placing of the right foot not far lateral enough and can he not brace the movement to make an shortening on the left side and create an far step with his right foot [22,23]. *Design photo 1 and 2 published with the responsibility and permission of the author by j.v.d.Rakt.*

Observe further that there is an great amount of movement of the arms not in the lateral direction but in the front direction .

By Design Photo 1 . -The left arm makes flexion to help the right foot to flex but in the front direction and not lateral/abduction. And the right arm makes an retroflexion to help the back diagonal to make more extension all away to the left leg but no adduction that stimulated the right trunk hip to make an elongation ( Design photo 1 and 2) [24,25,26,27] .

By Design photo 2.- As we look what the arms do, than is the right arm still in action with the left leg and with extension –back diagonal and the left arm is now changing from an anteflexion direction into an abduction direction to brace the fall. The trunk flexion makes that the trunk reaction isn't there on time. On both photo's the sideway reactions aren't good, the trunk and hip and the arm movement give therefore more aid for the performing of the front or back diagonal and never for the homolateral – keypoint structures.

In phase 4 is this among other elements an essential issue to train on it. And then is the bracing of the fall and the creation of more time the most important issue. Because than is there an possibility that there is an step strategy. Learn to brace an fall will be very difficult because the change that this will be automatic is very poor. But also is the power = strength × speed of the muscle pattern of the trunk /hip and shoulder is too little and then there isn't enough to learn an balance reaction sideway. We need the right possibilities to learn or re-learn motor pattern as balance.

### Phase 3.

In this phase will the alignment change, that can be dramatically through an fracture but it can also an effect of the disease in combination of growing age. That means that often the walking possibilities are less and that an aid is always necessary and of course is this an item that will must have our attention. But in this phase there is more and that is almost more important than the walking part. Standing up is an problem. In recent articles [28,29] was the outcome of an fall indexation that this often happen by leaving of sitting in an chair.

That give us two problems;

1. Standing up is difficult and there is an part in the standing up process that is vulnerable for losing the balance. That can mean that the power and coordination of the movement isn't correct anymore but...
2. There can also an contribution through the chair. When this chair make standing up and sitting down heavy but also insecure than is this chair not good for an ward or house where people with an dementia live. This surrounding elements are often not in the picture but should be because what we see in this article [28,29] that there are the most fall moments.

When walking is going to be difficult, than has an investigation [1] prove that also the movement in and out bed were difficult. And when the chair is an problem, how goes standing up on the toilet , douche etc. When the time for the Time Up and Go test [T.U.G.] [30,31,32] comes above the 14 sec you must consider that the Trunk Control Test [31,33] will be under the 100 point meaning that this person can no longer move independent in/out his bed. And again the bed and especially the edge can often be an obstacle instead of an helping issue.

Toilets. Most toilet stand in the mid of the room with on both side armrest. But standing up is still too much dependent on the arms and when someone stand in front of the toilet with an load on the armrest there is no point of support in front of him. We place there the rollator frame but still the load on the armrest must be eliminated before the support on the rollator frame can be taken. The toilet along an wall with in front the fountain makes standing up easier and according the "standing- up "rules but give at the same time an good support area in front of the person.

Why is the fountain in the toilet so favourite by older people to use for the standing up and stand procedure ?

Older people have often an upper trunk forward [11,12], because of lack of mobility in the thoracic spine. That means that the amount of exorotation in the shoulder is restricted and that makes grasping the support along the wall and along the mirror more difficult. The fountain ask not for exorotation, but for endorotation and that makes things an lot easier!! .

Standing up and his environment including toilet , douche and bed will be the items in phase 3. By the bed there are often restriction through the bed as the edge is closing the front and there is no room to place the feet behind the knee and often the edge is so high that it hurt the back side of the upper leg and there is no support point in front of the patient. An firm table on the head side can take care for an good upper trunk forward and give support in the standing performance.

Also the movement in bed to hold the independency on the highest level.

In phase 3 this isn't the border of the performance and often is this possible without asking too much and asked above the capacity level. But only an aid is not enough, there must be an component exercise within the treatment. The cooperation between individual with dementia /caregivers and therapist must be therefore good. It is so important that there is an weekly discussion at the home of the individual with dementia to speak about, what is going less. And the aids are important but the therapy must be therapy that means that the intensity must at the right level !!

## Phase 2.

This phase can be reached suddenly often through a fracture after a fall. Often that fracture will be restored very quickly, but the narcosis [34] will almost always have a bad influence and in this phase the pain experience [36] is so different from people without dementia and that asks much from all to detect pain. Because we think they have no pain but a part of their behaviour says different and that behaviour is to be influenced by good pain treatment.

The walking capacity is often almost zero and when it is possible, it is an exercise on the highest level and on the border of the capacity.

That means that walking isn't anymore a part of the ADL, because this can also lead to changing in the behaviour and the cause are we!! We ask too much!!

Imagine that you must do every day on several times something, that you are afraid of because it is so difficult and/or it hurts. How do you react?

Therefore we introduced the wheelchair! But in many nursing homes that is a "prison" [38] in which moving is very difficult and from which it is impossible to come out. Many of the wheelchairs make the remaining possibilities of the movement capacity impossible.

And the time that older people with and without dementia are sitting in a nursing home are incredible. Every day there are new world records in sitting times scored in nursing homes!! Transfers in and out of the wheelchair and moving in and out of bed and transfers [39] from the toilet – chair are often not possible. Not because the individual cannot perform it with facilitation anymore, but because the wheelchair makes it impossible to make the transfers with an assistance or facilitation. The environment is too created for the wheelchair and active till devices.

There is a difference between assistance and facilitation [40] and that is the following difference;

*Assistance* is often taking over the movement. And brace the possibilities that the person still can perform.

*Facilitation* means that the possibilities of the individual will be asked almost fully and in that movement the caregivers etc. take care of rest. Often means that the movement is more than 100% R.M. and this facilitation will ask for the good movement at a lower level and therefore will the correct movement be present.

All transfers-aid will be said, that they do this also but till now no investigation has proven this [41]. On the contradiction they are capable of destroying these remaining possibilities very fast.

Not only the movement but also the sitting possibilities and therefore the quality of life. But there are even indications that it will also affect the swallowing possibilities

Again be aware what only sitting does with the brains of an individual with dementia and be aware that long sitting is very bad for the brain.

Every movement that the individual can make, he must make in his chair and sitting on a table doing a nice game as "active cues" is so good but then must the wheelchair allow you to participate and now he braces that!! .

An "wheelchair- environment" that prevents movement, isn't what we never must want !!

Phase 2 is so difficult because now the intensity and the heaviness of the ADL-movements and treatment are often on the same level. Movement asks now almost a movement on the edge of the capacity border with all reactions that this can give. But there are also long sitting hours, that create behaviour differences from agitation till apathy. And often the individual with dementia will seek for another stimulus [6] to distract and that is important, but please be aware what sitting in a wheelchair for more than 2 hours, isn't human anymore [44].

Therefore when we can change the wheelchair and make more movement and transfers possible, they will try to move and that braces the progress of the disease.

The transfers must be done with facilitation and not with transfers-aid because that will change the senso - motoric track. That is often happen by the use of active elevator, see next photo 2. And not only this one is bad, but all are bad and will have an negative influence on the mind and brain of people with dementia and of course also on others without dementia. Because it change the body scheme in the brain and the “think” that the stand well but they stand all behind their feet in balance and that is wrong !! (Photo 1).

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**Photo 1**

**Photo 1.**

This approach to get someone out or in bed , chair etc. is common in an lot of nursing homes in Europe. This means that this person is total dependent of aid and that will have an change in the brain perception of standing and the perception - standing in balance.

Investigation are rare but we now that cognition impairment through the dementia disease gives also an different perception of the body in the brain [46]. That means that this people believe that they are lying straight in bed but we see that the lie oblique in bed and correction is than almost impossible.

What we do here is the same, this individual will feel that he is in balance after several months and will that perception see as the truth and will sit and move differently.

And when the power in the legs are not strong enough than will this movement start in the trunk.

This will be an upper trunk backward with after that an lower trunk backward and that means that the back-diagonals are full in action and that created extension in trunk and legs.

Nobody can stand up in that way!

See photo 2 and 3.

*Photo 1 published with the responsibility and permission of the author by j.v.d.Rakt.*





Photo 2

Photo 3

**Photo 2 and 3.**

Both individuals with vascular dementia who were transfer with an active elevator and after three months this was the position, when they are placed on an bench. They “choose” for an posture with too much lower trunk backward and they feel that they are almost out of balance but through the change in body perception they dare not to come to the front. Therefore she must hold the edge of the bench. On table no effort will be made to get an sandwich !!

*Photo 2 and 3 published with the responsibility and permission of the*

This isn't the way individual should performed, therefore it is so important, that the wheelchair gives the opportunities to move and participated and that transfer-aid don't change the body perception but help to get this body-perception so long as possible correct.

That ask for an active approach. Regrettable in lot of nursing homes there isn't the culture, on the contrary, there is an culture that “inhibit” movement from the beginning out of fear of falling or other accidents (Photo 2 -3) .

This is changing but very slow also through the lack on staff on the ward !!

**Phase 1.** The individual lying often in bed or in an wheelchair that is almost equal on a bed, but still create an high tone. That high tone is often all the can and they live always on the edge of the capacity. That means that contact isn't possible .

Noami Feil describe this as the vegetative stadium and no contact was possible [45].

But decreasing this tone will often give also more cognition and an form of awareness that can occur every day for an amount of time.

This foetal attitude we see also by patient after an coma and going in an vegetative state [48] and there we know that there are possibilities to get them out of that state. But the difference between this individual with individuals with dementia is that there can be no recovery but only an decrease of capacity needed for the foetal attitude with an high tone.

Creating an nice attitude isn't enough there must be an decrease of tone because that will give an decrease of the capacity and make room for more cognition .

In this last phase we must always measure the tone and see, what the reaction is of the tone on your interventions. It isn't right to only look or someone lying “nice” in orthosis and symmetrical. That isn't so important, because how we know what his/her body perception [46] is and maybe we have put them in “nice” attitude and is their reaction more tone.

This was also often the case with children with an brain damage and because this children are growing all kind of orthosis where applied to hold the body in an symmetrical way but what is the tone.

When the tone increased that will have more influence than we expected than an asymmetrical attitude because the tone will change the position of the joints and therefore also have an great impact when that bone/joint is growing.

Treatment of patient with neurological damage and especially with dementia must always consider the border of the capacity. What we can asked on the ward in the ADL but also what we as therapist can ask in an treatment session. And phase two and especially phase one gives an picture of an individual at the end of his capacity !

Therefore the last part of the assessment form is to recognized where this individual is and prevent that he lives always on the border of his capacity ! (table 1 ).

Last part of the assessment form discussed in part 1A and 1B [11,12].

Phase determination according the Rakt –Scheme.

Table 1 ( Last part of assessment scheme )

**Phase 1**

|                              |  |
|------------------------------|--|
| Support greatness            |  |
| Capacity volume              |  |
| Trunk-extension – dominancy. |  |
| Static reactions.            |  |

Foetal attitude ?

The elements that are present :

|       |  |
|-------|--|
| Head  |  |
| Trunk |  |
| Arm   |  |
| Hand  |  |
| Legs  |  |
| Feet  |  |

**Phase 2**

|                   |  |
|-------------------|--|
| Support greatness |  |
| Capacity volume   |  |
| Trunk dominancy.  |  |
| Static reactions. |  |

Are there elements present :

|       |  |
|-------|--|
| Head  |  |
| Trunk |  |
| Arm   |  |
| Hand  |  |
| Legs  |  |
| Feet  |  |

**Phase 3**

|                               |  |
|-------------------------------|--|
| Support greatness (How big ?) |  |
| Capacity ( behaviour)         |  |
| Trunk dominancy.              |  |
| Static reactions.             |  |
| Know or recognize             |  |
| Perception disturbances       |  |
| Problems with planning.       |  |
| Double task                   |  |

**Phase 4**

|                         |  |
|-------------------------|--|
| Capacity ( behaviour)   |  |
| Perception disturbances |  |
| Problems with planning. |  |
| Double task             |  |

**Mister A.** : the casus , that we have assessed in part 1A and 1B, when we see in which phase he is and want to prevent that he must act on the edge of his capacity!!

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## Phase 3

|                               |   |
|-------------------------------|---|
| Support greatness (How big ?) | Walking without an aid was difficult, but when the aid (rollator frame) was adapted, he had more capacity left. Walking without he would do with his arms on his back to hold more tension in the back diagonal initiated in the upper trunk. |
| Capacity ( behaviour)         | Walking , standing up , moving in bed were all activities that ask very much of him. And walking gave him discomfort and that has an negative outcome on his capacity and his behaviour.  |
| Trunk dominancy.              | He wasn't able to erect his trunk starting from the lower trunk. This through the lumbar and cervical stenosis but also his power in the extensor of the hip were to weak.  |
| Static reactions.             | There were signs that the synergy in his leg (especially in his feet) were dominant and that could be an sign that he used local static reaction to extend his legs.  |
| Know or recognize             | His cognition was clear decreased   |
| Perception disturbances       | Especially in his legs was the perception decrease but there were also signs of an whole body perception change.  |
| Problems with planning.       | Obvious   |
| Double task                   | In all task , moving in bed, coming to standing position , balance and walking double tasking wasn't possible. To do that he had need of an greater support area.   |

Conclusion; Phase 3 is the phase for the ward and the ADL movements. Than the change that he can perform on the border of his competent, isn't great. But there are possibilities that good treatment will create an greater possibilities and that he can also perform on the level of phase 4.

#### Exercises for phase 4.

**At home**, be aware that this will never succeed from the first day[7]. The confidence between the people that there live and the therapist must be build up. That means that people must feel that the therapist is there for both people, not only the individual with dementia and that the therapist will continued giving therapy on home ( Presentation approach from Baart ) [49]. There must be an confidence between all people and then it will be possible to change things and train element to get an better environment and an better body performance.

This can also be done on the ward, where the individual live in an nursing home of elsewhere and the start will be the same.

That will no excluded activity elsewhere, that is always good, but in the own environment we treat and created solution in and for that environment ( context - bounded)[2]), where the individual live. (Picture 5,7,8)

Program ;

1. **The whole living area is an exercise area.** That gives us therapist the possibilities to see each room and use it for exercise and that created rehearsal with an lot of variation. That is the best way to learn motoric and created task specific resistance therapy with the necessary rehearsal[2].
2. **There are in the house so many different chairs that this is an opportunity to varied in standing up and sitting down.** Low chair ask much from the power of the legs and often the arms will help to decrease that weight. An low chair gives us the possibility to

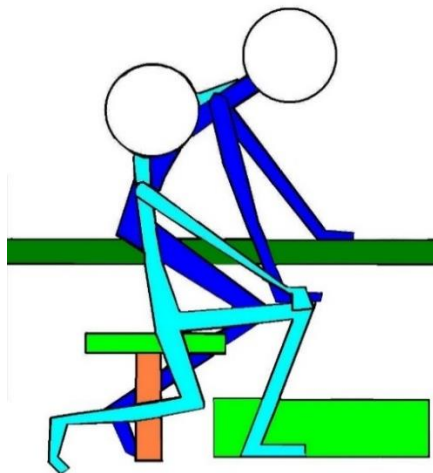
see what his R.M. ( Repetition or Repeated Maximum) is for standing up. We know than what 100% is and by 75% we calculated how many rehearsal are needed, that 3 times met 2 -3 times a week. Than first will there be an increase of coordination and after that an increase of power of the muscle chain necessary for that task. Both are very important because the increase of coordination will give an better cooperation between muscles groups and the power will makes things easier.

3. **Search for possibilities to kneel with the individual and coming to stand from this position.** That can we extent in kneeling and lying down on the floor and getting up and that can be going further with more speed to an form of “fall” exercise or exercises on an mat. One of the most common reasons that older people are afraid to fall is, that don’t know how to come back in standing position. Treatment along the bed, in front of an chair or bench make it easy and when we are so far that sitting on an mat is possible, we have going to the floor moving or exercise on the floor and standing up activities and that we can make difficult by using load.

How to start to get on your knees?

Take an firm pillow and placed that in front of the knee than is the amount of “open space” less and give support for both arms and always an upper trunk forward to hold flexion in the upper trunk. When other members of the family want to participated always allow this, this is social and gives joy especially partners of the same age and grant children.

But let the individual with dementia not fail, but let him win and show that you are proud of his performance. And keep laughing [52,53] !!



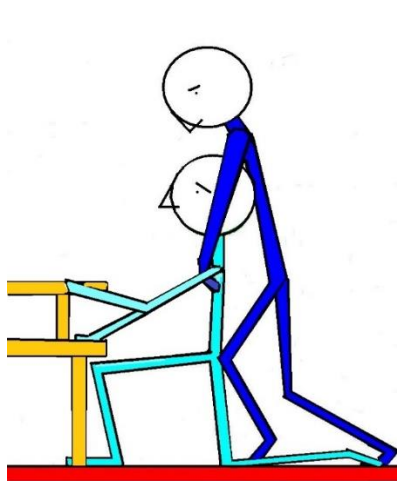
Picture 5

**Picture 5.**

Learn to dare to “fall” on the knee. This is so important because much older people are afraid to do so. And also afraid, how they get up. This part to floor and back is an essential element in the treatment in this phase. Exercises to learn to fall without an injury, is much difficult because the circumstances in which this is learn and done, are never the real situation and the question remain or this will be done when there is an real fall.

Go to the floor can be done on several ways , in this example we choose for an pillow or more to make the distance so little as possible.

*Picture 5 published with the responsibility and permission of the author by j.v.d.Rakt.*



Picture 6

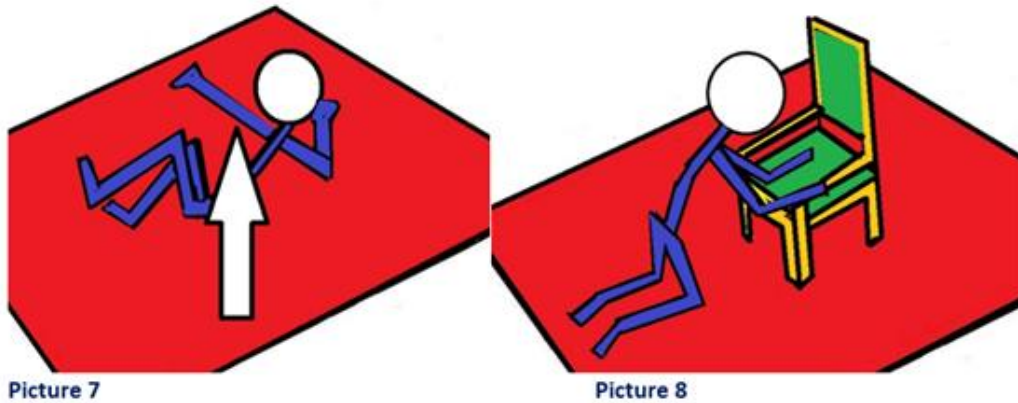
**Picture 6.**

Or, picture 5 there is an support on the chair and the knee of the therapist. Than an upper trunk forward and the individual kneels down. Picture 6 is an technique out the NDT- program and can be done with and without the support of an chair and goes to an attitude of an kneeling rifleman. Now the support of the therapist is on the upper trunk and with his knee in the lower trunk to learn and facilitated the movement on one knee with the other still in front. This can therefore also be used as an training to get down and up of the floor with or without the support of an chair in front. This movement is slow , the movement of picture 5 can be done faster.

*Picture 6 published with the responsibility and permission of the*

Back to the standing position can be done by picture 5 by facilitation of the trunk and knee. By pushing one hand in the stomach upwards and the knee into extension with the support of the hands will this stimulated the individual to an standing position as started in picture 5. This is an exercise to dare to kneel and to do it when this movement is known, so fast as possible. When an person will learn to stand up from an lying position, it is wise to ask for help of the caregivers and family, because often there is an extra hand needed but also to explain what the best method is in which the individual has control over the movement. From lying on the back first turn to the side and flex the knees far .

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Picture 7

Picture 8

**Picture 7 and 8.**

Lying on the side with the knee flexed, he push with his arm his upper trunk from the floor and often pull with the other to get an rotation to an position that he is sitting on his knee and arms. The most difficult point is to turn the lower trunk and placed the weight on the knees.

There is often an facilitation necessary ( and the need of facilitation means that this is an R.M. situation of more than 100% and when it is possible with facilitation means that we have an task specific resistance exercise that need the right amount of rehearsal).

Place an chair sitting in front of him and see that he seeks support but always with an upper trunk forward. The best way to get an good support and an upper trunk forward is to use an low and stabile support on the elbow.

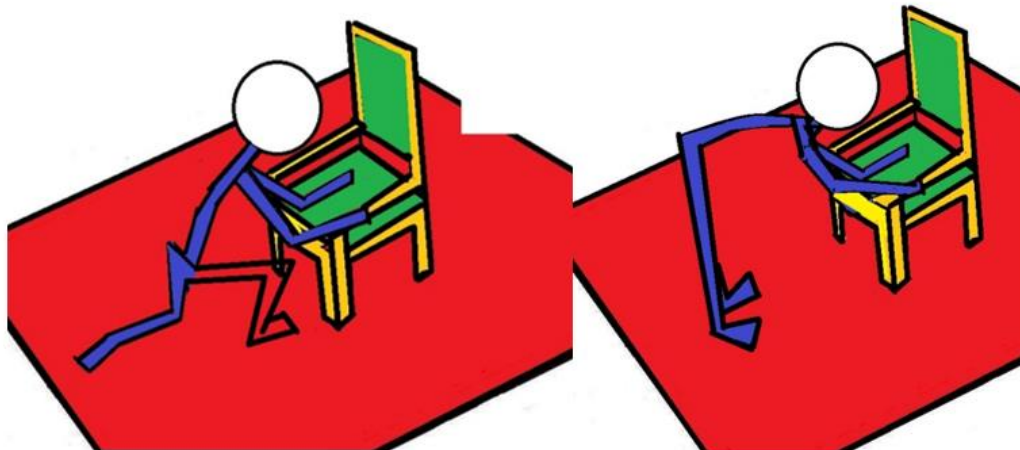
Not reach for an high support because that will asked faster for an upper trunk backward.

Older people that have done this an long time ago, be sure that mobility is there to do this.

And when this mobility is there than this will be in the beginning difficult for the joint and let the amount of rehearsal in the beginning away.

First perform and then use it as an task- specific resistance exercise to increase the coordination and the power of the muscle pattern.

*Picture 7 and 8 published with the responsibility and permission of the author by j.v.d.Rakt.*



Picture 9

Picture 10

**Picture 9 and 10.**

With great support on the chair in front one leg is placed to the front and then asked for an weight shift to the other leg to created stability and room to flexed that leg . Placed the leg on the right spot behind the knee. Now this leg must push the body up and the facilitation is again in the stomach and on the knee . And again this will be an R.M. than from more than 100% but with facilitation will this be an possibility to make it an task specific resistance exercise.

After this we can do two things;

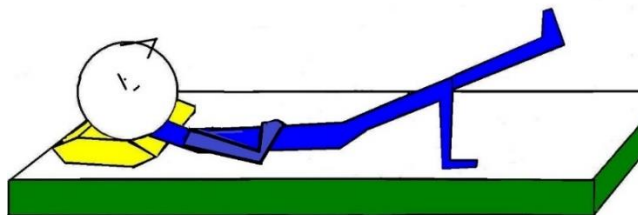
1. We turn the individual and let him sit down in the chair
2. Or we go to standing situation and then we turn the chair and give him support on the back of the chair. Picture 9 and 10 published with the responsibility and permission of the author by j.v.d.Rakt.

When mat exercise are going well, than this is an perfect oppportunity to exercise on the mat. The great advance is that there is no height and all exercise can be done.

Par example; all exercise that also be given in bed or on the bench, can also be given on the mat and it is an task specific resistance exercise that ask for power and coordination for the lower trunk and is needed when we move in bed. (Picture 9,10,11)

Picture 11 shows an tentacle that is also perfect possible on the mat with the great advantage that when there is an failure, this never is an problem for fear to fall from an height. In this picture the legs are bend very much and that isn't the case when we move in bed, but much older people must bend their legs more because they are lacking the power in the hip extensor to lift the hip from the surface and move in bed.

Starting with flexed knee the difficulty will increased when the legs are stretch and with an good rehearsal program, we created more coordination and power in the extensors of the lower trunk and the weakest point of the back diagonals.

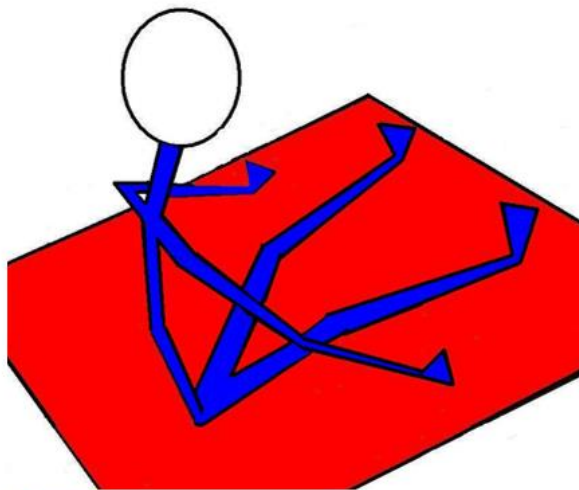


Picture 11

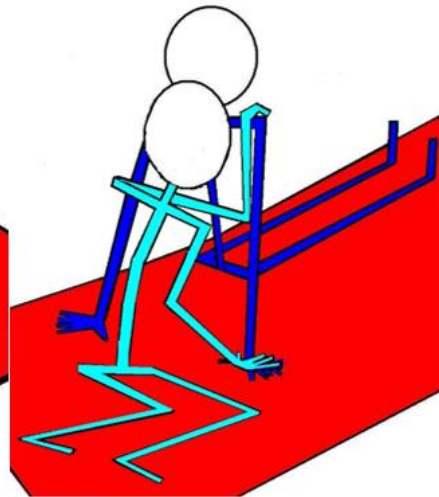
**Picture 11.**

Tentacle , the hips are in the air and then one leg. The hip must give power and coordination to hold this posture. To create "load" is stretching of the leg an possibility.

Picture 11 published with the responsibility and permission of the author by j.v.d.Rakt.



Picture 12



Picture 13

#### Picture 12 and 13.

Sitting on the mat exercise to an backward support even with lift of the buttock and with on leg in the air. An variation on the tentacle and again is this with load an task specific resistance exercise that will increase the power and the coordination but also the selectivity from the trunk and the back / front and homolateral structures.

Sitting in long sit ( picture 13) is an difficult attitude because the mobility of the trunk but also the nerve system is often not so good.

But it is strange that this isn't done anymore and an lot of individuals with an without dementia can do this and gives us the opportunity to treat the nerve system[54,55] but also exercise movements sideway in falling on the elbow all away to fall to the side and go further with exercise in side lying position with the leg under in extension.

The mat makes it possible because the height isn't dare and the fear of falling isn't present. The great problem is often that individuals are not costume anymore to sit on the floor and that makes the fear for the floor only greater.

Thus when there is an chance to go further on the floor do it and make this an exercise that stimulated movement but also coordination and power of muscle chain.

*Picture 12 and 13 published with the responsibility and permission of the author by j.v.d.Rakt.*

Exercising on the mat and going down and coming back to stand will chance the heart rate and there we have also an aerobe piece of the treatment that we need by individuals with dementia because that will stimulated the brain and "inhibit" the disease (Picture 12,13) .

#### 4. Specific balance exercises.

We can choose out different approaches from statiek [18] exercises with resistance till one leg standing also with resistance.

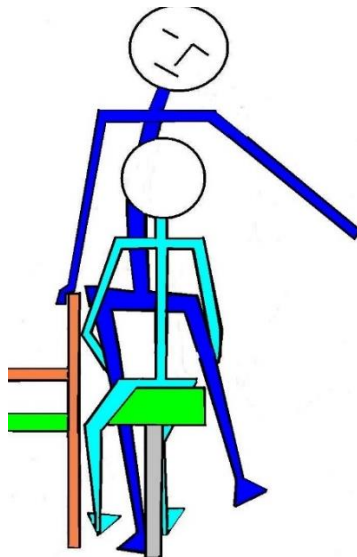
First one leg standing [56] : Remember that this isn't alone lack on power, but also perception and that has an bracing effect on coordination. We must build both again up because without an good perception [46] that will never succeed. An the question is can the brain alter this perception. We see this alteration in the people that are be transfers with active elevator and therefore we think that it is possible to change the perception, but by people with dementia this is also changing through the disease. Thus what is possible and how much stimuli there much be there, no literature is present about this subject.

But one important aspect, we think, is that the individual feel his feet because than the stimulus enter the brain and can he build on that perception.

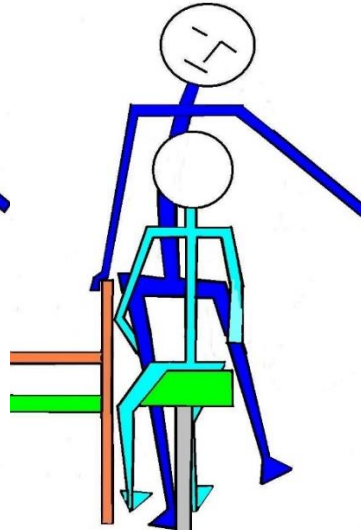
One leg standing is only possible when the weight of the body is standing on one foot. And that means that the lower trunk of that leg must go further than the border of the foot . And we see that this fast change as people walk with and rollator frame but we see also that this is change by an approach with load and accent on borders, best practice !! (Picture 14,15,16) .

**One leg standing “relearning” ;**

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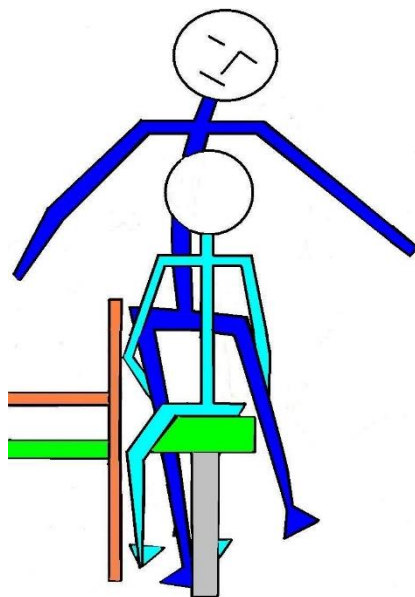


Picture 14



Picture 15

**Picture 14 and 15.**  
Most important part is the possibility to move the hip in abduction over the foot. Therefore use an chair to hold but also this chair is point that the individual must hold to get an good idea about the movement over the hip with an elongated spine. The situation is so safe as possible and help when you work on an start of one leg standing !!  
*Picture 14 and 15 published with the responsibility and permission of the author by j.v.d.Rakt.*



Picture 16

**Picture 16.**  
Now the situation is still the same, only the hand that was on the chair is in the air. But the therapist can help /facilitated this one leg standing on all kinds. Picture 14 and 15, the therapist controlled the leg that makes the one leg standing but also lift the other leg in the air and gives an great contribution on the one leg standing performance. The purpose is to get the movement of the hip over the foot. Lifting gives another perception than the technique used in picture 15. There give the therapist an resistance against the leg that is free of the floor and resistance in the leg that is free will asked for more muscle reaction and more ground reaction on the leg where he is standing one. And that is important to get more information in the foot sole that enter the brain.  
*Picture 16 published with the responsibility and permission of the author by j.v.d.Rakt.*

How people do the one leg standing isn't important certainly in the beginning, because the dare to move to far lateral can be so little that this is almost impossible to create an new perception that can work.

Perception alone isn't enough, there must be also enough power in the homolateral structures to hold the pelvis in the correct attitude and with the spine in the correct attitude to get the right step strategy.



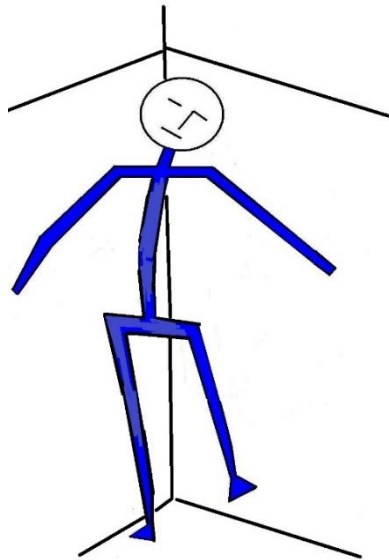
Often will that not be possible certainly when there is an period of walking with an rollator frame, are passed but an part of this exercises to secure the homolateral decline is always important.

The group that created an perception with some power than there must be exercises with great variation in all kinds of one leg standing activities .

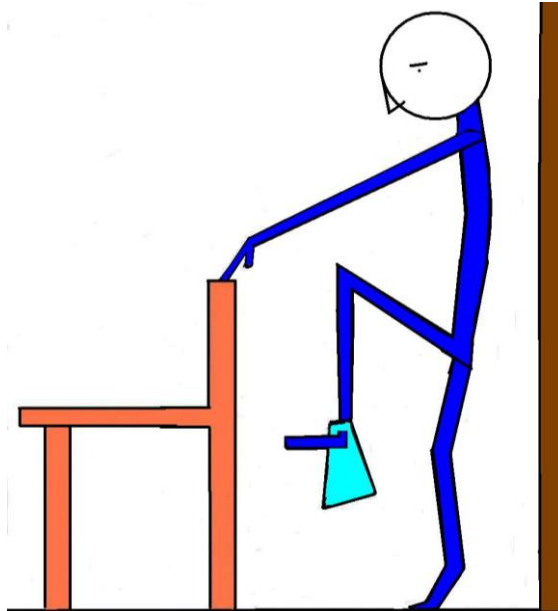
And that activities can with load and without or in all kinds of combinations.

Rehearsal through variation [57] !! .

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Picture 17



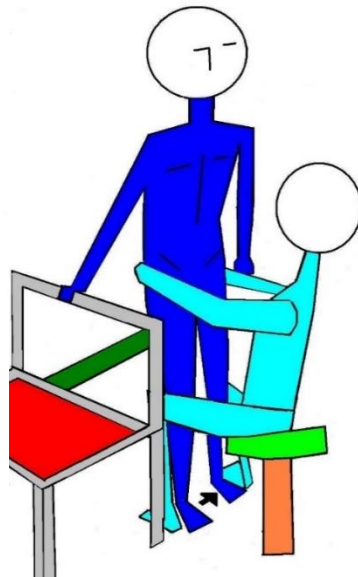
Picture 18

**Picture 17 and 18.**

Exercising in the corner of the room and build up the perception in the leg without the fear of falling. Or in this case lifting an load on one leg high in the air with an support on the front but this is also possible with an support on the side . *Picture 17 and 18 published with the responsibility and permission of the author by j.v.d.Rakt.*



Picture 19



Picture 20

**Picture 19 and 20.**

Examples of task specific resistance therapy and the diagonals are used to created more power in the homolateral keypoint.

Resistance against the right foot Picture 19 (Diagonal support)

Resistance against left foot (total homolateral structure) picture 20.

*Picture 19 and 20 published with the responsibility and permission of the author by j.v.d.Rakt.*

That means that the diagonal in picture 19 will go on the front and back through the keypoint of the left hip with the support of the right arm/hand but that the therapist must be sure that the

angle of the diagonals is correct otherwise the adductors are the muscle that will responded[19,20].

The load against the free foot-right- one must be enough to give 50-75% R. M. and after 10 rehearsal with an light direction change (also an variation ), we must feel that the power is decreasing ( muscle fatigue ) and that this is gone after an short brake. Than another 10 times is possible with the same end. This again for third time and this 2 or three times an week will give an better coordination and muscle power (Picture 17,18,19,20).

Picture 20, the resistance against the left foot asked that the right shoulder and right hip to create an stable front to make the movement of the left foot in abduction possible.

The sign that we must see that the contraction is an co-contraction that stimulated the homolateral keypoint is co-contraction and then will lift the pelvis on the standing leg side.

One leg exercises are perfect exercises to do it together with the individual with dementia and to let him feel how strong he is and don't forget this is an situation in which he standing and you - the therapist- are sitting !!! .

### Statiek –exercises

According to the investigation of Prof. S. Robinovitch [21] and his team the greatest cause that older people fall is an disturbed weight distribution. [18,22,23,28]. That means that there is not enough time to get the weight properly on one foot or that the weight distribution is wrong because the brain think that there is still time left. That asked for exercises, that works on that combination: - that the reaction is on time and - that the system create the time necessary for an step-strategy. That is by older only possible with an combination of ankle and hip /trunk strategy, because both are less [58]. When the brain has an wrong perception, what we see par example by photo 14 out the Robinovitch investigation, we must search why this is happen and what we can alter that this mismatch can prevent (Design photo 3).



#### Design photo 3.[22]

See the yellow line and see how great the part is that is on the back side of this line.

This lady is falling backward because there is more body behind the line than in front of that line.

But remarkable there isn't the balance – stop reaction totally in here body.

We see that there is an slight arm movement to the front and there is some flexion in the hip and knee. But little in the trunk and totally no reaction in the ankles. Ankle dorsal flexion and trunk/hip flexion to the front is the normal braking strategy . See we in this photo an reaction in feet ?

No, not yet, latter on it occurs but that isn't the step-strategy never be enough. And an fall will occur.

*Design photo 3 published with the responsibility and permission of the author by j.v.d.Rakt.*

### Design photo 3

Here we have an perception problem, the brain react to late and why is that ? We know that this is happen by individuals that perform transfers with active elevators, but this lady is independent in here standing up, where can the perception change. We think that the answer must lies in the standing up strategy and maybe the assistance that is use there often.

Investigation what is cause of the fall [22] Lancet 2012 :

1. Incorrect weight shift 41% ,
2. Stumble 21,1%,
3. Push 11.0%,
4. Support lost 11,0%,
5. Collapse 10.6% ,
6. Slip 2.6% ,
7. Unclear 2.6% ,

Collapse is difficult to prevent, slip is to prevent but when somethings is slippery than is prevention almost for everyone impossible and is exactly what we said that fall prevention isn't possible everywhere. We must accept that people of older age and with dementia will fall but we must also create the possibility that this people can live according their wishes!!

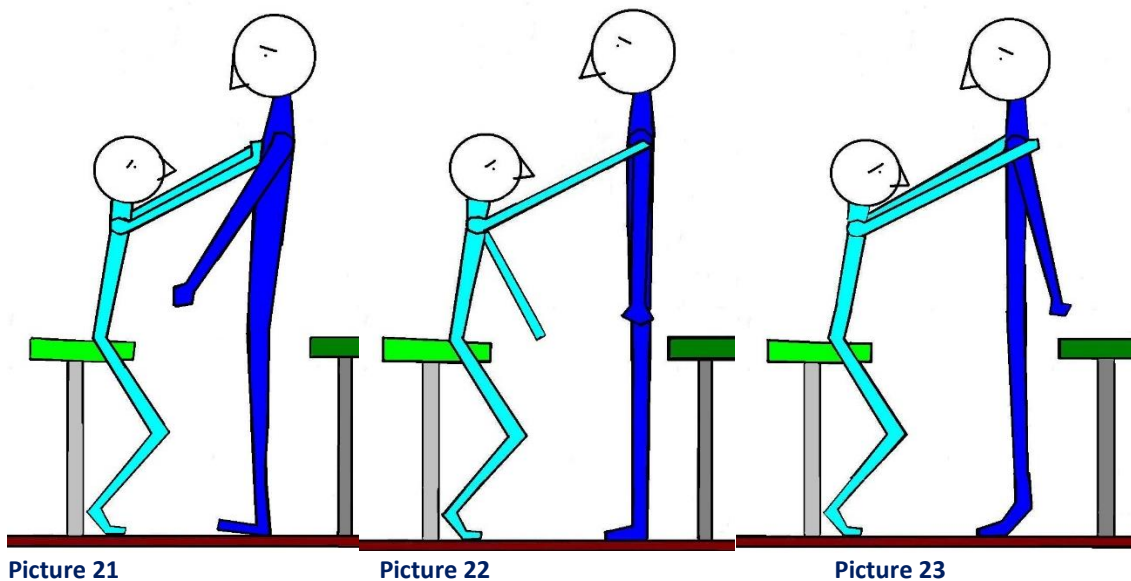
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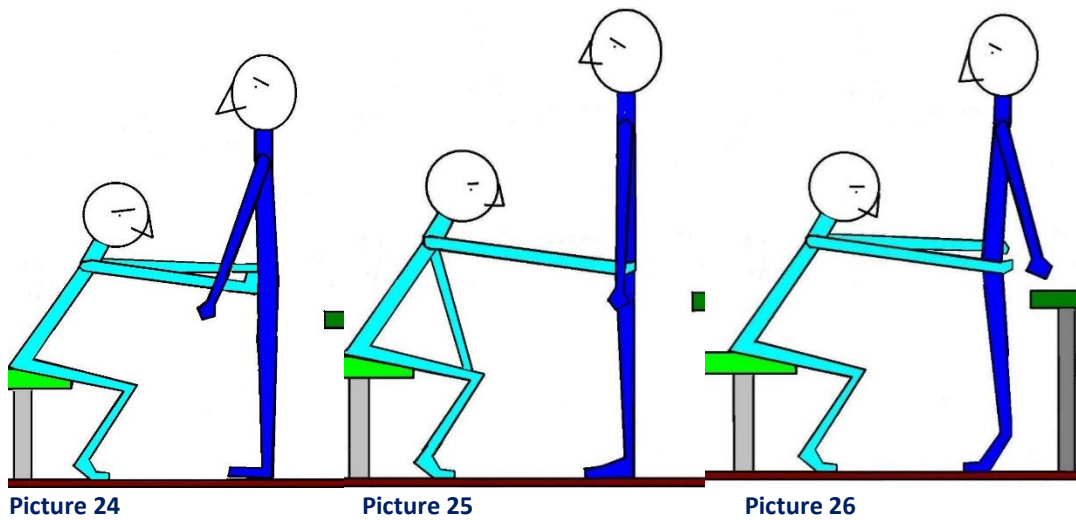
But when we look to the other reason, stumble, push and support loss than always is the ankle and trunk/hip brace-power to little. That means: No good weight shift and therefore No good step strategy.

The exercises and training must include this combination of the ankle and trunk/hip strategy and thus the creation of more time for the weight shift .

Especially task specific resistance treatment with balance exercises seems the best solution[21]. This seems a little bit strange because task specific means that it is an part of the task that belongs by the balance, but the speed will always be the problem!

**Statiek** exercises are both: Task specific and directed on bracing of the balance disturbance. (Picture 21,22,23) And this is to change in an resistance treatment that create an better coordination and power and some speed is possible !!





**Picture 21 till 26.**

Statiek exercises. [18.58.59]

We have use this also by the assessment to determined, where the weak places are. Of course must we place the accent on the weak spot in an situation that isn't so complex as this attitude but still we can in this attitude train on the possibility to get an better brace of the fall movement and create time for the weight shift.

The assessment was an searching or the individual was capable to give an resistance on an light push/pull. Now we created an pull or push against the border of the performance that the individual can performed. That is 1 R.M. and we do this 10 times and feel or there is an decline in performance after 8 times, that is positive because that is muscle fatigue. This 3 times 10 times twice a week and we are building up an better coordination and muscle power.

Of course the weakest point will are still there. Par example pull on the shoulder to the front ( picture 23) will still give an flexion in the trunk and hip but we are with 75% of 1 R.M. now exercising to stop the movement there and create an brace from that point on. Of course it is possible to activated this part of the diagonal by giving task specific resistance treatment in another position that isn't so instable.

The same is for the homolateral structure. In this exercise he will answer the pressure with the other leg and we want that he can do it with the homolateral structure of the leg he is standing up because otherwise he will never create an stable pelvis, an co-contraction – and therefore never an elongation of the trunk and will his free leg go into the wrong direction. To create there more concentric power, exercise this in side lying. Is perfect to stimulated the coordination and power in an less complicated attitude and we can feel or this increase of power is translated in the balance reaction. Still this training in an more stable position must be “transfer” in the position that is instable – this statiek position – and of course in the movement at home and on the ward.

The statiek exercises (Picture 24,25,26,) give more possibilities that are equal with balance reactions.

- Through giving heavy resistance and then suddenly release, will ask for an contra-balance reaction. That means pulling to the front and release ask for an balance reaction of the front side.
- An heavy resistance till 100% will evoke all the reactions in the ankle and trunk/hip and try to hold this for more than 10 sec.
- This can also homolateral or on one leg and hold 10 sec. and then placed the free leg.
- Pushing away and fixated the feet that make dorsal flexion is also an possibility to stimulated the whole chain.

- Be aware that this are situations that are prepared and not the situation in which the individual fall. That is very difficult and ask for speed without danger an there is only one environment that can give this and that is water or an robotic system[60].

All exercises forms where individual are coping with balance are right but often that is only an exercise to walk par example over an difficult way with an aid and that will never ask for the balance reaction but for holding the balance within the support area.

The exercises are perfect, certainly with load, but that are exercise that go never out the support area and are not training the border of the balance. That means that brain haven't the problem to solve an problem because this isn't yet an problem.

That means on the other hand not, that this isn't right. People with dementia must move and that they are doing.

But the effect what we want of this movements is ;

Aerobe , an increase of the heart rate of 50-60% can give an decrease on the cognition loss.

Anaerobe and especially strengthening programs task specific will alter the muscle that are involve by the balance reactions and then especially the muscle that brace the movement and give time to do an weight shift and make an good step strategy. All activity that are doing are perfect but the limit is that they not give the aerobe or anaerobe stimulus that is requested, but give joy to move !.

##### **5. Task specific resistance treatment** for part of the muscle chain that are weak !

This is an part that ask for an good assessment and an search for the muscles that are the weakest in the chain [19,20]. And then an treatment, that has an relation with the task and will stimulated the power and the coordination of the chain and this muscle in particular. Looking to the balance exercises and the differences there, in which has to be done to get an better balance and what the practice is. The same we see by activity related with task specific resistance therapy. And it isn't the way the strengthening goes, not- "task specific"- isolated muscle strengthening will also have an reaction when the therapist works according the correct schedule.

We must know what the 1 Repetition ( Repeated/Repetition) Maximum is R.M. That will be the base to give an exercise with an load /resistance between 75% - 40 % , by 75% is 10 rehearsal often enough by 40% must that be more almost 20 rehearsal. And important that on the end the movement is slower and that there are sign of muscle fatigue. That we do 3 times and minimal 2-3 times an weak.

Why task specific instead of isolated ?

Task specific will be have an relation with the task and that task must be: move in bed , coming out of the bed, sitting on the edge and standing up, out the bed, chair toilet etc.

Isolated has no relation with the task and we –therapist- see therefore not how the movement go and we aren't busy to learn how to move and no stimulation of the brain to search for an solution [55].

Task specific resistance therapy has an relation with the task in which the individual has problems. There is also an senso- motore component that is equal with the task and that has an connection with the projection and networks in the brain.

But sometimes this task is to heavy especially in an start of revalidation or when someone was very ill. Than is the only approach often isolated strengthening but remember the investigation of Büchner [60].

He say that leg strength increasing give not an higher walking speed. He make 3 groups of people that get leg strength exercising to increase the walking speed. The first group (C) weren't able to walk on their own but increasing of the leg strength gave an possibility to get walking with must assistance. The second group (B)were bad walkers and here he say that increasing leg strength lead to an increasing of the walking speed. But say he that the improvement was an climbing line at the end of the second group , this improvement was almost zero. And the last group (A) leg strength improvement gave no reaction on the walking speed. That means that

only leg strength training will not lead to an improvement of the walking speed by people that walk. Also that people that cannot walk or very difficult ,leg strength training can improve the walking speed.

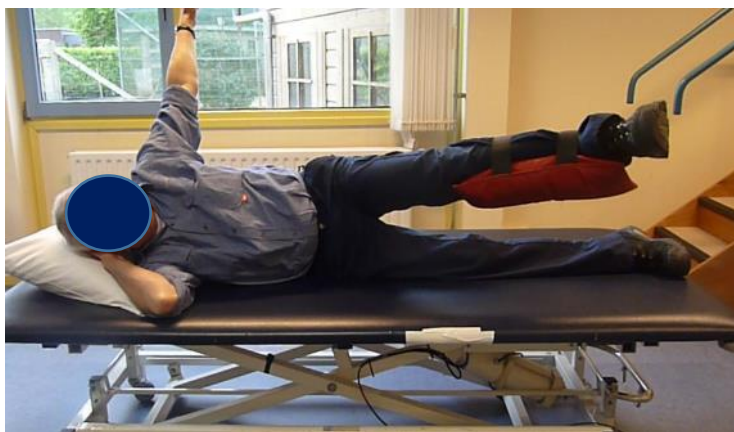
Other questions must be asked how to get the best and fast increase of power and coordination by concentric, eccentric or isometric strengthening. Is eccentric the form older people often use, dangerous [63] or is there an danger for muscle change but with an higher brain function [64]. But what is well important, that the independency of the individual will remain and that means that must be exercises with load in the task. Because aids are beautiful but when another must do than the independency is gone !!

Be aware that the vulnerable of individual with dementia is great in this phase. Still we can change something what is latter phases often isn't possible, because the capacity will be decreased and therefore is exercising often very difficult for this group !!

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In this phase we can train task specific in lying position / sitting and standing position and make always an relation with the task.

**Examples ;** Side lying on the bed and move the upper leg with an load to the front and back, what is happening in his body. (Photo 4)



**Photo 4**

**Photo 4.**

Demonstration of the load on the leg that moves free to the front and back but there must be stabilisation[19,20] in the diagonals to take care that this person is not falling off the bench.

The main point are the right arm/elbow and the right leg/hip and especially the foot.

*Photo 4 published with the responsibility and permission of the author by j.v.d.Rakt..*

The whole right side must work hard to hold the body on the bench and let the movement of the left leg take place with load.

This stabilisation task is one of the most important task that we make when we are turning in bed or are searching for the strategy to get sit on the edge.

First the diagonals, look which way the left arm moves comparing with the left leg [19,20]. There is an rotation in the trunk trough the cooperation of diagonals to counteract each other movement. But this movement must have an anchor and that are the keypoints of the diagonal on the right side – the shoulder and the hip.

The foot on the bench push in the bench to hold the anchor but that movement and power explosion is not only in the foot but very much in the hip. There the rotators must work to give the foot the correct amount of power.

The upper trunk keypoint shoulder will give an abduction in 90 °position to the back with retraction in the scapula in the bench with the elbow and that is the best way because the keypoint is so great and fixated under the head. In the foot it is an combination of eversion with exorotation of the small and great exorotation muscle in the hip.

Tentacle ( picture 11). Another example of an Task specific resistance exercise. Load on the leg that is in the air and this ask for more leg extension power but also coordination. And important is that we normal move in bed with not so much extension, therefore make more stability with

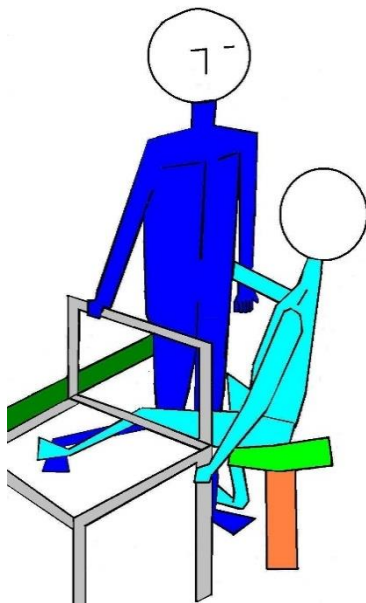
the arms and created an better task specific exercise by stretching the working leg more in the hip and knee. It ask also for more selectivity !

After the exercise on the bench in side lying position or the tentacle do with this individual, transfers in bed to the side , up and down and turning in bed and transfer in side lying position to the front and the back. Be certain that they can move independent in their own bed without aid and is there an aid be sure that this aid isn't because the legs are not train well.

Stand phase exercises are very important. The extension power of the hip is important for the balance but also for the propulsion. We see older individual getting uncertain and that means an walking speed that is decreased and no heel strike action any more. This is an pity because the heel strike get the great buttock muscle ready for his work, this muscle is than on his large and all the energy that is in him will be free at that moment and will give the body an movement over the hip and that is the speed that we want in normal walking[63].

Not the push-off is the propulsion of normal walking but the heel strike and the action of the muscle gluteus maximus is the prime muscle that give us walking speed. When we accelerated to an running level than there are more system necessary to get that speed on the right level (Picture 27).

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Picture 27

**Picture 27**

Standing on the leg that must be trained, we give an resistance against the other leg.

This because, now the standing leg must work much harder to hold the support that is necessary to get the other leg from back to the front.

When there is no movement possible with the swing leg than is the resistance 1.R.M. We now know enough to get an exercise that will increase the power and the coordination of the standing leg.

We take 75 % and that we rehearsed 10 times and by 8 we feel that the resistance isn't so big as in the beginning ( muscle fatigue) en after an short brace we do this another 10 times . When this is possible we know certainly that it is muscle fatigue. In total 3 times 10 and that 2- 3 times an week.

*Picture 27 published with the responsibility and permission of the author by j.v.d.Rakt.*

But we can change always an little bit the direction because the therapist give the resistance on the foot or leg of the individual and that stimulated the brain to search for an solution and that is Motoric - Differential Learning [55]. We can also make this swing smaller but when there is progression also bigger and even so big that it is necessary to get on the toes of the standing leg to get the swing leg so far to the front.

Variation is endless because we can also give an direction to the crunch of the therapist or we can give the resistance more against the side of the foot and make more abduction.

There is one important rule !!

The pelvis of the standing leg may never drop [2]. On the contrary, that side of the pelvis must go up that is an sign that there is an co-contraction and that is necessary for an stable stand phase but also important to get the power of the keypoint on his highest level (Photo 5).

**Photo 5.**

In this photo the principle of co-contraction is visible.

Watch the lines and when the resistance is so high that there is need for an co-contraction in the standing leg to get the swing leg with the resistance to the front.

He is holding on the chair support because this isn't an balance act but it is always important that the diagonals ( front and back ) have the right angle of 45°.

Then the keypoint must act and that part is very important for the stability of the hip by side way balance.

When this muscle isn't very strong than will this co-contraction not occur or the individual must lean much on the support of the chair and make another angle in the diagonal. Than it is important also the abduction muscle sec to train.

**Photo 5**

Abduction can be exercises as in photo 5 but in standing position see picture 19 and 20.

Personally I prefer the resistance through the therapist above apparatus because now I am capable to communicated with the individual and make it an game in which he always win !!

The discussion is still there; "Why the focus lay on concentric performance and not on eccentric strengthening. There is also an discussion to use even High explosive exercises to strengthening older people, thus also individuals with dementia in this phase. There are an lot of reasons to choose another strengthening program but lay the focus on the muscle/coordination change that occur by all older people[56].

The fast muscle will go first and therefore is necessary to hold that process so long as possible back. And one of the ways to accomplish this is by concentric and high explosive exercising and this will give more reaction than with eccentric strengthening .

And there is still evidence that eccentric strengthening had an effect on the fast muscle even that this this muscle damaged[61].

On the other side there is also evidence that eccentric is an difficult and higher brain function and that this is very important for the motoric learning part[62].

State of the art on this moment :

Give exercises and increase the power and the coordination and make an comparison with the Rikli and Jones Senior Fitness Test [64] because when someone sit high in this list, there can always be an improvement but there are borders .

Certainly by individuals with dementia and this is important because be careful with the capacity of the brain and thus also with the capacity of the muscle system[67].

## **6. Walking behind an chair and pushing that chair with load through an corridor.**

Two effects and both are very important ;

1. Aerobe
2. Anaerobe

Aerobe; measure the heart frequency and try to stimulated that this frequency get on higher level 50% - 75% [3]

Anaerobe ; when you are pushing an chair the "support" function is total difference.



The rollator frame needs a little push with an equal amount of support and will decrease the weight on the legs and a decrease of the coordination of these legs.

Pushing a chair needs a decrease of load of the arm on the support of the chair and a great amount of power of the whole body to push the chair away.

That means that the load on the legs is much greater but also that the coordination between the arms and legs is totally different than with the support on the rollator frame.

By a rollator frame the arms must also play a great part in the coordination of the body behind that frame and that is the reason that so many individuals have problems with their shoulder joint.

Pushing a chair now the arms have a roll in pushing often with arm in extension and endorotation but the greatest coordination must come out the legs together with the power.

We see that the knee- and hip joint are more in flexion in the stand phase and the swing leg makes more flexion and that the whole body stays in a different angle than by normal walking or walking with a rollator frame.

Walking with a rollator frame gives often more flexion in the hip because the individual often will use an eccentric contraction in the hip muscle or even a stretch reaction of the muscle (myotatic reflex).

When we use a chair and of course dependent of the height and the load on the chair, there will be more extension – concentric – in the hip extensors and that is again an task specific resistance therapy, from which the individual can benefit and will be longer independently walking with a rollator frame (Photo 6).



**Photo 6**

**Photo 6.**

This patient with Parkinson /dementia has more difficult walking with the rollator frame.

He is often in the afternoon not capable to walk with his frame through his department.

The assessment gives a decreasing of his condition but also a decreasing of the perception, coordination and the power of the legs.

Strange aspect, on this photo the way he grasps the back support of the chair (exorotation), problems with the shoulders? An dominance tone in the back diagonal in the upper trunk?

*Photo 6 published with the responsibility*

We try this test. Walking behind a chair and push him through the room, which strategy he used and how much load he can push away.

Furthermore which height of the chair gives the best position of his body and the greatest amount of training of the extensor of his hips.

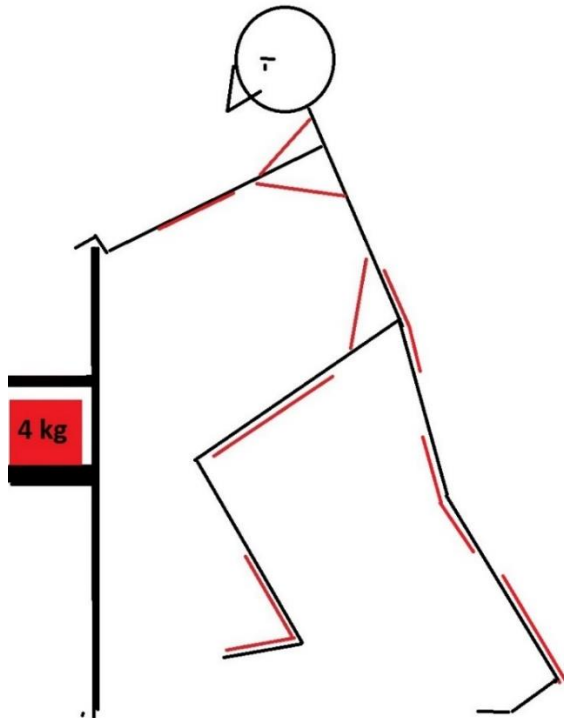
A higher chair was not an option. The height on photo 16 was good and that means that he cannot use the elongation the muscle of the hip extensor to get a concentric contraction, but create a concentric contraction to get the chair over the floor through the ward.

On the sitting was a load of 2 kg., more wasn't possible. R.M. 80% !!

And the way, he takes the support of the chair to push this away was strange? On this way he placed his gleno-humeral joint in an end position in exorotation and makes a connection with

the back diagonal and retraction of the scapula. Now the gleno-humeral joint is almost complete closed and vulnerable. When we must push, we must make an connection with the front structures of our body. The front diagonal the will give an stable protraction and stable shoulder girdle (Picture 28) .

2079



Picture 28

**Picture 28.**

Pushing asked for an protraction and that is front diagonal . Walking behind an heavy chair ask for an attitude that the whole body can help to move this chair and that will be an attitude with an angle in the whole body so that the pushing leg can do his job at his best.

That is extension in the leg joint and that means that in the hip the extensor must work concentric ( back diagonal).

But to create an continue push the other leg must be stand in right position so that he can hold the push to the front without an moment of decrease power and speed.

When the combination chair height and load is correct the legs will never be full in extension. And see we a cooperation of the front and back diagonal with an great core stability effect !

*Picture 28 published with the responsibility and permission of the author by j.v.d.Rakt.*

This exercise can also in the latter phases of this disease. The core stability will decrease so far that the rollator frame is holding far away and that is the moment that walking with an rollator frame isn't possible anymore without assistance. The individual walk than with the rollator frame almost only with eccentric or "myotatic- reflex" muscle reaction and has almost no coordination over his body. Walking behind an chair without load will not replace this and will need also an assistance but will help- this process to decrease.

**Why he hold the chair on this way?**

He use the standing up method with the both hands on the side support of the wheel chair. That means that he makes an upper trunk backward and that this ask an retraction in the scapula and an retroflexion with exorotation in his gleno –humeral joints.

But this also means that he makes not the right movement to get the best position of his feet under his knee [24]. The part of the standing up movement with no weight on the feet is too fast finished. That means that the activity of the arms decrease the "vorlage" but also ask for more activity and power from that shoulder girdle.

His right shoulder is painful especially when he must move from exorotation to endorotation and reverse and that he expressed by grasping the chair in exorotation also because he has than an great support place ( balance problem ) .

This way of standing up is one of the reason that so many older people with and without neurological disease have so many problems with their balance and their independency. Balance, because they create an different and wrong senso - motoric track[22], standing up and dependency, because they will end with much support on the side rest and aren't able to get the weight of the hand without falling back and maybe here is also the reason why so many have great difficulty with walking backwards[22].

In this phase this isn't an great problem but when the disease goes further this will be the greatest problem and here is the moment to change this behaviour.

Photo 7 show the attitude that he have with his arms still in the first position and the flexion in the hip. Picture 8 let see an different position and also with more space between the leg. The steps are bigger because he is pushing. On photo 7 he push but very little and not with his whole body.



Photo 7

**Photo 7.**

Good position of the arms and the step is increased . There is an pushing off from the foot on the back with flexion in the knee and this movement goes on over the other hip and that means that he is able to get the push to the front done with his other leg.

The angle in the hip isn't in full extension but that isn't possible. Therefore is the power to little and must he start with an elongation to created that power. But the load on the chair was immediately twice so big !!

*Photo 7 published with the responsibility and permission of the author by j.v.d.Rakt.*

Exercising walking with an chair with load is only possible in the forward direction, other direction is of course possible but ask often too much of the shoulder joints and muscles and tendons. This is therefore an Task specific resistance therapy in with the progression of the walking pattern and the cooperation between the front and back diagonal is the important factor to create an core stability in especially the lower trunk .

**7. Bed training: turning, sideway transfer and up and down in bed and coming to sit on the edge and going to lie down.**

Remember that cognition loss has an effect on the perception of the body also when they are lying on bed. Our observation is that this person lies oblique, but the individual with dementia has the feeling he lies perfect in the middle[46].

In this phase of the disease the movements in the bed are often good, but it is always good to do thinks that the individual find easy to do and make from this an 'competition' by make it heavier and with an lot of fun.

Furthermore it give the therapist the opportunity to look how he accomplish this tasks. Remember ([11,12] that normally we turn and move side ward with an little bending of the legs. Turning will be start with an push off (back diagonal) and then complete with an lift of the head (front diagonal and with the leg on the bed as controller (Keypoint). Now we have the opportunity to watch how this individual perform and what is situation is in the sleeping room. Aids are in this phase not necessary, but when they are there, know that in the beginning of the treatment it is unwise to give criticism. Think on the EDOMMAC –approach [7] ! . When there is more "friendship "and trust than this will be go much better and with an greater confidence. Regrettable often the people that visit one of two times will advise an aid and think that the solution is finish. But they forget that most aids for movements in and out bed are aid that will give more work for the arms and that means that the leg will be less involved and will further decrease in function and power/coordination.

And the environment in which the person must be performed must be adapted to his possibilities. A bed that stands in the middle of the room makes unnecessary difficulties, against the wall gives a better structure. Good lighting is essential to trust the floor and that floor must be light in colour and have a clear end. Where it starts the wall and where it ends the floor. The edge of the bed must be stable but also not negatively interfere with the feet placement and the bedrest must be no obstacle or hurt.

And there must be a stable point in front/side from him to make it possible to get up with support in front and create a stable standing position.

#### **8. Training on bed gives us also the opportunity to assess joint, muscles and nerves and treat them.**

Starting with the toe is always very simple, but almost always there was a problem. Often there was a little form of arthritis (gout) that decreased the performance.

This moment of rest can be helpful to ask if there are complaints and when the relation is good often there will be a direct moment that the individual will complain about his problems – of all kinds. Used it [51] !!

But we are aware of the importance, that you as a therapist know, what the individual can and that makes it easy to get on the right time when things are going worse and that moment will come, also the moment that living at home is difficult.

#### **9. Stair climbing**

This is an exercise that must be done as long as possible. The structure, the railing makes it on a cognitive level upstairs easy but aerobic and anaerobic (task-specific resistance treatment) very heavy and rehearsal is always there.

In this phase the stair must be a part of the movement through the day and also than a part of the exercising moments.

Regrettably often the stair is replaced through an elevator that makes stair climbing impossible and that means that this daily activity and the stair exercise are gone.

Often is the reason that the stair isn't safe but there are so many options to make this stair safer. Two railings and a better lighting, but also strips on the edge with a different colour and with a rough structure make it often possible to get upstairs.

But downstairs is often a problem because seeing the hole makes people afraid and then they make the wrong movement in the trunk.

Therefore is the task of the therapist to analyse the movement of climbing a stair up and down before the stair can be a part of the treatment program.

Older people have always problems with a stair but in their home this is part of their normal movement arsenal. The problems are aerobic and anaerobic. On both problems is a border and we must be sure that this isn't the case before we start with stair climbing and not make room for an elevator.

Are the problems with exercising to overcome than this is the perfect situation to train aerobic (and his effect on cognition) and anaerobic especially stair up, because the muscles that must be used are also very important by standing up, walking and balance.

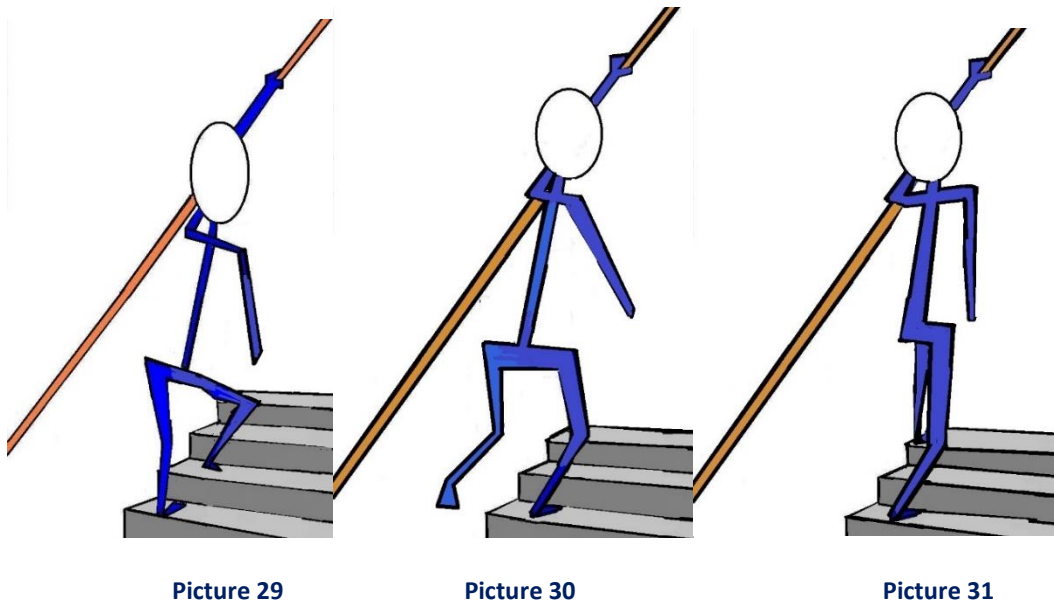
But the difference of climbing a stair between old and younger people is ;

1. The speed.
2. The use of the railing of the stair. Young people will use this railing only as a "touch" point, older people use the railing by pulling (stair up) and pushing – a kind of brace and extra support to create more time for placing the foot down – and that asked for a railing that strong enough.
3. And the "placing" of the feet. This placing is altered because the power that is being asked in the calf muscles is changed. We all placed stair up and down first the forefoot on the step but young people stay (stair up) on this forefoot, older people go to a full foot support and that asked for a larger breadth, because the weight comes on the heel.

(Picture 29,30,31) Stair down , young people stay often on the forefoot and that makes it possible to hold speed and the body in total extension, older people will land on the heel and that makes it difficult to hold the body in total extension. Than they make an upper trunk forward and that makes it difficult and dangerous to go downstairs, because to many weight is in front of the feet and that asked for an heavy support on the railing. When older people can created more flexion in the knee than the correct trunk attitude can be preserved and is downstairs easier. (But that asked for enough controlled extension power in both legs (Picture 32,33,34).

### Analysis.

2082

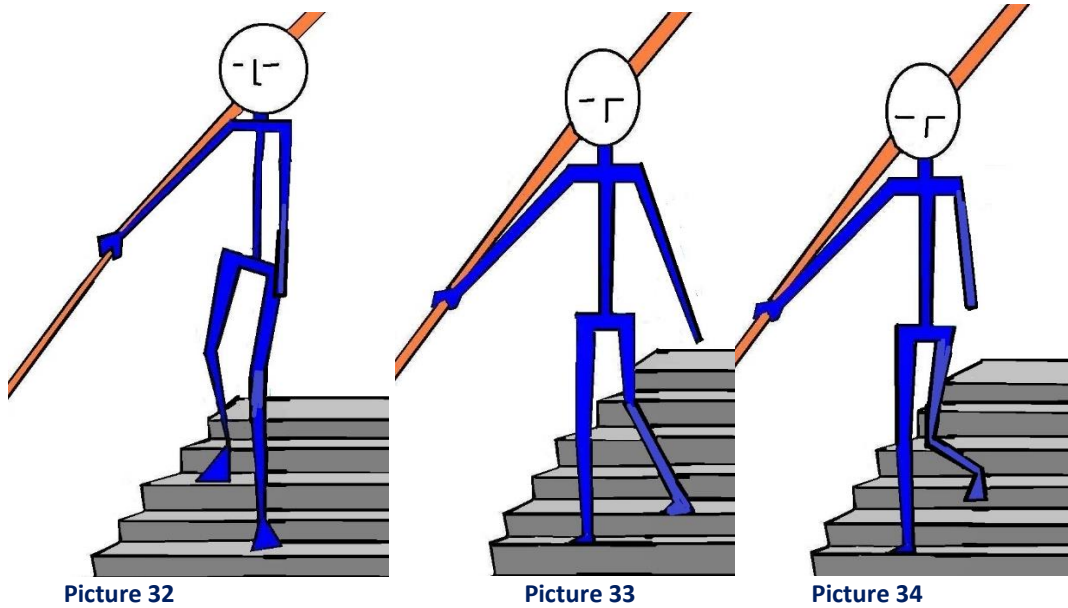


#### Picture 29,30 and 31.

In this three pictures the left arm is every time high, that is the case when the other leg must give the extension force to elevated the body up (picture 30 and 31) The pull of the left arm help the right leg to get enough extension ( diagonal back) but placing the right foot (29) and extension in the left leg has need for an pull with the right arm or people make an adjustment by creating an fixation left through an placing of the elbow on the railing. When there are two railing than will every time the other arm pull. The pulling is an sign that the power in the other leg is on the border . *Picture 29,30 and 31 published with the responsibility and permission of the author by j.v.d.Rakt.*

Taking stair climbing in the program gives us the possibility to see what adjustment people must make to get upstairs but also an very good possibility to train. Because when we know how he performed and what the cost are, we can aerobic and anaerobic created an treatment protocol. Sometimes so simple by increasing the frequency and with the next step - load. When there is more power the pulling of the railing will change. And there is no "simple" treatment that people can do between the treatment session than walking the stair each day extra times and increasing the aerobic and anaerobic possibilities. Therefore not change the placing of the arm but increase the frequency and/or load, than must the change of the placing of the arm will come. Often the treatment start when people are not capable to place the feet each time an step higher but placed the left foot on the same step as the right and vice versa. Than the treatment must start with increasing the frequency and/or give some load but don't change the performance. That performance must change when there is more power in the muscle and air in the lungs.

Stair down .



2083

**Picture 32,33 and 34.**  
 Downstairs isn't heavy but most people are afraid to fall. The placing of the arm (Right ) has a diagonal relation when the individual stand on his left leg and the position of that arm must not be too low because than there will be more mass in front of the feet than necessary. Again we landed on the forefoot but older people can set their weight on their heel. When the hold their body position in extension is little knee flexion necessary to get the other foot on the next step, young people will "fall" on the that step. Older people will place him and will also want to look and that is very difficult with the right position of the body.  
 Very important: no upper trunk forward , there might be flexion in the hip and a little bit isn't bad but to much the balance will pull him backward. Or start with the upstairs attitude.  
 This isn't heavy therefore when stair up goes well than there is no reason –power- why down stair don't go. *Picture 32,33 and 34 published with the responsibility and permission of the author by j.v.d.Rakt.*

**10 . Walking.**

In this phase there is often no need for facilitation of the walking but when necessary, do it. We want the walking on an higher level. Facilitation technique will be show and discuss in the next part and in the article about phase 3 [1] . Walking must therefore be an part that ask for aerobic activity but we can this also give it an anaerobe function . Through an higher speed and load we can make this an task specific resistance therapy that will increase the power and the coordination.. When this individual walks outdoor with an rollator frame, than is facilitation of walking outdoor perfect to do.

Walking must also be an preparation for the problems that will occur such as difficulty in walking sideward, with or without crossing legs, but also backward walking and learning the step to the back too increase by making more upper trunk forward[19,20]. We can exercise walking on the toe and heel, we can turn and step over things, make it an great variation show but be sure that the goals are achieved. The heart rate must increase and the R.M. must change. Start also with walking so fast as possible around the table and make this an game. Because that table will be very important to be independent when the disease go further. Dare also to make it difficult by doing double tasking but be aware that the capacity of people with dementia is an border that we must be very careful with it.

This people are so vulnerable when they fail and that must never happen, keep smiling and give compliments and let their win.

## 10. Sleep. Food and neurotransmitters

The brain will try to recover when we are sleeping. Is this also by people with dementia? We assume it and therefore when there is a session that is heavy, give these people the occasion to take a nap in a fine chair or on a bed. Food, protein supplements and even neurotransmitters are important to get a good system to create more effect of the treatment but it is always wise to let this be done through a professional. What we know is, that rewards make more dopamine free and that is for older people very important and make them laughing !!

### Group activity .

2084

All group activities are nice but most of these group activities are no treatment or training. Often these exercises were done in a sitting position and that is too easy for them in this phase of the disease. And there is evidence that group activity isn't capable to give the same result as an individual program [67]. There is a lot of discussion but it is obvious that a group activity in which the danger is present of falling, ask for every individual with dementia of the group - one therapist and that wasn't the purpose of the group activity.

Group activity isn't therapy and trying to get a group on a therapy level is only possible when we use water. That means that we change the environment and go into the water with water free people with dementia and train these people in a group.

That will not say that group activity isn't good for older people with dementia but it is no physical therapy !!!

Other group activity will never change the aerobic situation as should be and will never give an stimulus for the power and coordination and therefore isn't equal with therapy, but water will provide an environment that is so rich that every person must move and react. And it had an pre and post-treatment that asked focus on ADL.[69]

### Alternative therapy? Whole Body vibration.

This therapy is investigated by older people and the results are very hopeful. Not only on muscle strengthening but also could it have a positive effect on the cognition. By people in this phase of dementia there is little investigation on this moment, there are some cases investigated and there was the outcome that it has a positive effect on the cognition but that this effect was gone when the treatment stopped[70,71,72].

But on the other hand there is also an effect on the strengthening and that makes that there are possibilities that the two major effects of therapy can be stimulated by using this apparatus.

Strengthening of leg muscle is investigated by Ir. Li of the university of Eindhoven[70] and in lots of other places and there was this effect of strengthening with whole vibration significant.

There is a lot of difference what the best way is :

An combination of resistance with vibration and the height of the resistance ( How much % R.M. )but it is clear that there is an effect on the increase of power and coordination when these exercises are done in combination with the Whole Body Vibration and there is always the effect on the cognition.

It is in my opinion the effort worthy to try to get a better result and many people are impressed that they use an apparatus to achieve that goal but we must first get the trust of the people that live at home !

### New Research :

New investigations give more effect on the plasticity of the brain by elderly, when we use a combination of physical activity and cognitive activation. But this cognitive action must be so that it will not brace the physical activity.

That means that when this is double task where the physical activity is stopped than this isn't the right combination.

Exergames,[72,73], dance or Tai Chi ( Ai Chi in water [ 74,75])are examples that the cognitive action is part of the performance and stimulated an further expansion of the physical activity and still asks for memory of passes and attitudes or strategy as by exergames.

Still there is no certainly what the dose must be and the frequency of the therapy and most of this research was an systematic review but by elderly with no neurological diseases therefore copy this isn't right , we must adapt it.

Do this in water , you adapt the environment and make it safer and now is that piece of cognitive action possible by par exemple Ai Chi but other activity in which the focus lay on more that only the movement activity.

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### Summary :

1. Take the whole living area as your treatment place at home but also in residency or nursing home. Every room has an problem and now you can see what is difficult and which strategy there are and what is maybe possible. Don't forget the toilet, bad room and bedroom but also the store house and the garden. And in the garden there are lot of exercise that give an great rehearsal with an lot of variation.
2. Exercise on all chair that are present in the house / home because than you can see which chair are maybe too difficult and you can others show what is wrong and why.
3. It is important that people go to the floor and stand up from it . So many elderly are afraid to fall because they know not how to get on their feet again. Make this every time an exercise and that can for an bench or for the bed. And when someone goes easy to the floor, do with him exercises on the floor.
4. Balance exercise on one leg in the corner of the room and try to develop that exercise till it is an house work exercise.
5. Task-specific resistance exercises with an R.M of 75% with an good 10 times rehearsal with muscle fatigue and that 3 times in one treatment and 2 -3 times an week. An be sure that the load is appropriate.
6. Walking with an chair but that chair is heavy through load on it and will stimulated muscle and coordination but will have also an aerobe effect. And aerobe is important for the cardio vascular system but also for the cognition.
7. Exercise on their own bed. That gives us the possibility to see how smooth this movement are and what must have extra attention.
8. And lying on the bed we can assess joint , nerves and other problem that we have heard of see in the treatment. Use from the start an pain list such as the PAINAD etc.
9. Stair exercise. Through his structure stair climbing is simple but has an great aerobe and anaerobe effect . Downstairs is difficult not on aerobe or anaerobe issues but because the body must be erect and people see the depth of the stair. When this is too difficult make it an exercise to hold this capacity so long as possible. But also try to get down on the same way as getting up, because now the depth is gone !
10. End with an aerobe exercise as walking with great variation and an cardiovascular stimulus. This is important because after this we give the advice to rest even to get an nap because sleep is very good for the brain.
11. An short nap and give also advices for the eating. Be aware that compliments stimulated the dopamine system.

### Conclusion

Recent publications give the picture that an combination of physical activity and cognitive activity gives the greatest plastic effect in the brain. Exergames [72,73]in combination with physical activity lead to an better cognitive performance and an better health.



Even dancing [74]with increasing of the choreography was superior compared with “normal “physical activity with an good amount of intensity.

Y. Netz [75] wrote an Narrative Review in which he concluded that the combination of high cognitive performance with high physical activity lead to the best brain plasticity by elderly. The amount of stimuli on all area with have an effect but we must consider that the brain of an person with dementia isn't capable often to do both things together and that can lead to an fear of failing.

The capacity that is present will be leading in this approach, but still many of our patients will can do it and therefore every treatment must be individual, to give the greatest benefit!

The combination of aerobe ( with an good intensity) and anaerobe training can help to slow down the process of the disease but also in this phase give an answer on the losing muscle power that old people have and people with dementia special. Still be alert on tone changes because it is still an neurological disease and the loss of selectivity makes that an lot of exercises are not possible or less possible and the effects will be lesser.

The capacity of the brain makes it difficult to go to the edge and the progress of the disease will ruined the body and make movement an lot heavier in the coming future as we shall see in phase 3.

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