The standardization of terminology of pelvic floor muscle function and dysfunction.
Report from the pelvic floor clinical assessment group of the International Continence Society.

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This report presents a standardization of terminology of pelvic floor muscle function and dysfunction. No earlier documents contained definitions on this terminology. These definitions are descriptive and do not imply underlying assumptions that may later prove to be incorrect or incomplete. By following this principle the International Continence Society aims to facilitate comparison of results and enable effective communication by investigators performing pelvic floor muscle studies.
It is suggested that acknowledgement of these definitions in written publications be indicated by a footnote to the section “Methods and materials” or its equivalent, to read as follows: “Terminology used is conform the definitions recommended by the International Continence Society, except where specifically noted”.

The pelvic floor is related to more than one organ system. Dysfunction of the pelvic floor therefore influences different functions at the same time. This report is on pelvic floor muscle function and dysfunction and not on pelvic floor disorders. It contains no terminology on pelvic organ prolapse, urinary or faecal incontinence. Other reports refer to these subjects [Abrams et al, 2002, Weber et al, 2001, Bump et al 1996]. This report on terminology of the pelvic floor muscles is written for use, in daily clinical practice, by every health care provider working with patients who have pelvic floor muscle problems. It facilitates the communication between different carers in the field of pelvic floor muscle pathology. Because it has been developed by a multidisciplinary group it can be used by different specialties. This document is based on our current knowledge of physiology and pathophysiology of the pelvic floor muscles.

The pelvic floor

The term *pelvic floor* relates to the compound structure, which closes the bony pelvic outlet. The term *pelvic floor muscles* refers to the muscular layer of the pelvic floor. The pelvic floor consists of different layers, the most cranial being the peritoneum of the pelvic viscera and the most caudal being the skin of vulva, scrotum and perineum [DeLancey 1992]. The middle layers of the pelvic floor are made up of predominantly muscular tissue. Apart from the pure pelvic floor muscles, fibro-muscular and fibrous elements, like the endo-pelvic fascia, are found in this layer. Different well recognisable muscles together form the muscular layer of the pelvic floor: levator ani, striated urogenital sphincter, external anal sphincter,

ischiocavernosus , and bulbospongiosus. All these muscles are working together to seal off the lower aspect of the pelvic cavity. Urethra, vagina and rectum pass through the pelvic floor and are surrounded by the pelvic floor muscles. The pelvic bones are the structures to which the muscular layer is attached. The function of the pelvic floor is to support the pelvic organs. The function of the pelvic floor muscles is performed by contraction and relaxation. In its resting state the pelvic floor gives **support** to the pelvic organs. Whether the support function is normal depends on the anatomical position of the muscles, on the activity of the pelvic floor muscles at rest (active support) and on the integrity of the fascia (passive support). During intra-abdominal pressure rise the pelvic floor muscles must contract to maintain the support function of the pelvic floor. A **contraction** of the pelvic floor muscles results in a ventral and cranial movement of the perineum and an upward movement of the pelvic organs together with an anterior movement caused primarily by the vaginal and rectal parts of the levator ani. When the pelvic floor muscles contract the urethra closes, as do the anus and the vagina. This contraction is important in preventing involuntary loss of urine or rectal contents. For women it can also function as a defence mechanism against sexual intercourse. For maintaining continence it is also important to realise that detrusor activity is inhibited by pelvic floor muscle contraction.
Pelvic floor muscle **relaxation** following contraction results in a reduction in the support given to the urethra, vagina and anus. The perineum and the pelvic organs return to their anatomical resting position. The pelvic floor muscles must relax in order to remove the passive continence mechanisms, thereby favouring normal micturition. The same is true for relaxation before and during defecation, allowing the anorectal angle to become obtuse, favouring rectal emptying[1].

Terminology

At this moment there is no existing international agreement on terminology of pelvic floor muscle (dys)function. In the literature most studies are clinical studies for example on the effect of pelvic floor muscle therapy for urinary incontinence. Basic studies on the different aspects of the pelvic floor muscles are not available. When considering standardisation of terminology, many problems have to be faced. The different aspects of the pelvic floor muscles and their function are hard to define. Furthermore even when they can be defined, they cannot be easily measured. And even when they can be measured, there is no agreement as to what is considered to be normal values.

[1] In the literature, there is discussion on the action of the pubococcygeal muscle as to whether this muscle plays a role in giving rectal support against an increased abdominal pressure. [Fucini et al, 2001]

This report adheres to the ICS principle that symptoms, signs and conditions are separate categories and adds a category of additional tests.

1. Symptoms associated with pelvic floor muscle dysfunction

Symptoms are the subjective indicator of a disease or change in condition as perceived by the patient, carer or partner and may lead him/her to seek help from health care professionals. Symptoms are the complaints mentioned by the patient during the patient interview, or stated on questionnaires filled in by the patient. Symptoms alone cannot be used to make a definitive diagnosis, nor can they denote the pathophysiological mechanism. Because the pelvic floor muscles act as an entity it is often the case that dysfunction of the pelvic floor muscles will lead to dysfunction of more than one organ system. Therefore, in the patient interview it is mandatory to ask about symptoms of the different tracts influenced by the pelvic floor muscles [Abrams et al, 2002]. During the interview the following categories of questions should be asked: those relating to micturition, defecation, vaginal and sexual function and pain.

Symptoms associated with pelvic floor muscle dysfunction are divided into five groups: lower urinary tract symptoms, bowel symptoms, sexual function, prolapse and pain[2].

1.1. lower urinary tract symptoms.
- urinary incontinence
- urgency and frequency
- slow or intermittent stream and straining
- feeling of incomplete emptying

1.2. bowel symptoms
- obstructed defecation[3]
- functional constipation[4]
- fecal incontinence[5]
- rectal/anal prolapse

1.3. vaginal symptoms
- pelvic organ prolapse[6]

[2] The definitions of lower urinary tract symptoms, vaginal symptoms and pain can be found in: The Standardization Report of Terminology of Lower Urinary Tract Function [Abrams et al, 2002]
[3] Obstructed defecation can be described as having the urge to defecate but being unable to completely empty the rectum with or without straining.
[4] Following the diagnostic criteria for functional gastrointestinal disorders (Rome II), functional constipation presents as persistent difficult, infrequent or seemingly incomplete defecation. [Thompson et al 1999] (www.romecriteria.org)
[5] Fecal incontinence in the Rome II criteria is defined as: recurrent uncontrolled passage of fecal material. [Whitehead et al, 1999]

1.4. sexual function

- in women: dyspareunia[7]
- in men: erectile and ejaculatory dysfunction
- in both : orgasmic dysfunction

1.5. pain

- chronic pelvic pain[8]
- pelvic pain syndrome[9]

2. Signs suggestive of pelvic floor muscle dysfunction

Signs are observed by the examiner, including simple means, in order to verify symptoms and quantify them. It should be remembered that not all signs have associated symptoms (e.g. pelvic organ prolapse). Some functions of the pelvic floor muscles can be tested during physical examination. For instance a voluntary contraction of the pelvic floor muscles can be assessed by inspection and palpation[10]. Quantification of the function of the pelvic floor muscles is not easy, due to the lack of simple to use and reliable measurement techniques and the lack of cut-off values for pathological conditions. Furthermore the reproducibility of testing is questionable.

2.1. visual inspection [11]

- Investigators reporting pelvic floor muscle studies should state the position of the patient (supine, lithotomy, lateral, standing) and the time of the day. When appropriate the verbal instructions given to the patient should be literally written down. Also additional instruments used should be described.
- Inspection of the vulva[12], perineum and anus in women and of perineum and anus in men is performed to look for skin pathology and anatomical

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[6] Pelvic organ prolapse is frequently associated with a feeling of rectal fullness, of pelvic heaviness or a bearing down sensation especially when standing [Bump et al,1996]

[7] Dyspareunia is the symptom of painful sexual intercourse

[8] Chronic pelvic pain is non-malignant pain perceived in structures related to the pelvis of either men or women. [Fall et al, 2003]

[9] Pelvic pain syndrome is the occurrence of persistent or recurrent episodic pelvic pain associated with symptoms suggestive of lower urinary tract, sexual, bowel or gynecological dysfunction. There is no proven infection or other obvious pathology. [Abrams et al, 2002]

[10] Apart from contraction and relaxation other terms are also thought to be appropriate to the pelvic floor muscles: tone, volume and force. *Tone* of the pelvic floor muscles is difficult to define and cannot be measured. The *volume* of the pelvic floor muscles can probably be measured with an MRI but the definition of what is to be considered as pelvic floor muscles is not well defined. The *force* of the pelvic floor muscle contraction and related terms like strength, power, endurance and exhaustion are yet not applicable in clinical practice.

[11] It is mandatory to give the patient a full explanation as to what to expect during the physical examination, before starting it. An assessment must be discontinued if the patient exhibits any symptoms of distress during the examination. Patient dignity must be considered and maintained at all times. (www.gmc-uk.org/standards/intimate.htm)

abnormalities. Testing for pelvic organ prolapse[13] is an integral part of the physical examination of every patient with pelvic floor muscle complaints. A vaginal and rectal exam is part of this investigation.

- During inspection the patient is asked to perform a pelvic floor muscle contraction. Good instruction is mandatory: ask the patient to prevent the escape of gas or urine. In the normal situation a pelvic floor muscle contraction will lead to ventral and cranial movement of the perineum.
- When the patient is asked to cough the perineum should show no downward movement; ventral movement may occur because of the guarding action of the pelvic floor muscles.
- Anal/rectal prolapse can be evaluated by asking the patient to strain, as if defecating, while seated on a commode chair.
- **Perineal elevation** is the inward (cephalad) movement of the vulva, perineum and anus.
- **Perineal descent** is the outward (caudal) movement of the vulva, perineum and anus. The position of the anus and the perineum should be noted at rest and during straining. If perineal descent is seen, when the patient has been asked to contract the pelvic floor muscles, this indicates that the patient is straining instead of contracting the pelvic floor muscles.
- **Extra-pelvic muscle activity** is the contraction of muscles other than those that comprise the pelvic floor, for example the abdominal, gluteal and adductor muscles. Extra-pelvic muscle activity is needed for maximal pelvic floor muscle effort[14].

2.2. digital palpation[15]

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[12] The condition of the vulva and vagina (atrophy, inflammation) should be noted. A touch test is advised. In this test the introitus is touched lightly with a cotton swab, at different points. Normally this does not hurt but in patients with a vulval pain syndrome it will be classified as painful.

[13] In female patients the ICS POPQ system is advised. [Bump et al,1996]. In female and male patients attention should also be focused on the anus, looking for rectal or anal prolapse.

[14] The two muscle groups, pelvic floor and transversus abdominis, are now understood to be part of the local muscle system of lumbo-pelvic stability. The other components are the diaphragm and the deep fibres of musculus multifidus. Increase in abdominal muscle activity is synergistic with increase in pelvic floor muscle activity. [Neumann et al, 2002 Sapsford et al, 2001]

[15] The gloved and lubricated index finger of the examiner is introduced into the vagina (women) or the anus (women/men). Digital palpation should be performed with the patient in the supine and standing position. In the supine position the hips and the knees should be flexed. If the knees are bent, the patient should not hold the legs herself, legs should be relaxed. Palpation is performed with one finger because two fingers may stretch the pelvic floor muscles and thereby influence the ability to contract. It is important to be very clear as to what is expected from the patient. Asking for a pelvic floor contraction will not be enough in most cases. The instruction “lift” and “squeeze” are useful. Palpation with two fingers in the supine position is used to measure the genital hiatus and to get information on the pelvic organs. For anal palpation the patient is put in left lateral position.

- Investigators reporting pelvic floor muscle studies should state the position of the patient (supine, lithotomy, lateral, standing) and the time of the day. When appropriate the verbal instructions given to the patient should be literally written down. Also additional instruments used should be described. In the case of digital palpation, the number of fingers used should be noted.
- Digital palpation of the pelvic floor muscles is an easy to perform physical examination. Digital palpation is used to assess the pelvic floor muscles and surrounding areas at rest and during contraction and relaxation. The pelvic floor muscles are palpated circumferentially.
- Digital palpation is also used to test for pain. Digital pressure on the pelvic floor muscles may reproduce or intensify the patient's pain. This pain-sign can be unilateral.
- **Voluntary contraction** of the pelvic floor muscles means that the patient is able to contract the pelvic floor muscles on demand. A contraction is felt as a tightening, lifting and squeezing action under the examining finger. A voluntary contraction can be absent, weak, normal or strong[16].
- **Voluntary relaxation** of the pelvic floor muscles means that the patient is able to relax the pelvic floor muscles on demand, after a contraction has been performed[17]. Relaxation is felt as a termination of the contraction. The pelvic floor muscles should return at least to their resting state. A voluntary relaxation can be absent, partial or complete[18].
- The quantification of a contraction is problematic[19]. There is no validated scale to quantify contractions of the pelvic floor muscles. Therefore quantification, more than absent, weak, normal or strong, is not recommended.
- **Involuntary contraction** of the pelvic floor muscles is the contraction that takes place preceding an abdominal pressure rise, such as due to a cough, to prevent incontinence. An involuntary contraction can be absent or present[20].

[16] A voluntary contraction can be absent: if no contraction is palpated or present: if a contraction is palpated which can be either weak, normal or strong. If there is no voluntary contraction noted this does not exclude involuntary or unconscious contractions. Contraction should be tested in both the supine and the standing position to see if contraction against gravity is possible.
[17] Relaxation of the pelvic floor muscles should be tested after a contraction. Therefore the investigator should always start with a contraction and then ask for relaxation.
[18] A voluntary relaxation after a contraction means that this pelvic floor contraction is terminated. The pelvic floor will come back to its resting state (partial relaxation) or below (complete relaxation). When there is no relaxation palpable it is called absent; this does not exclude involuntary or unconscious relaxations.
[19] The Oxford scale is used most frequently, but interobserver variability has been reported to be high. Modified scales have been used but the simplest classification is absent, weak, normal and strong. With every scale one has to realize that there is no gold standard to refer to. [Bo et al, 2001]

- **Involuntary relaxation** of the pelvic floor muscles is the relaxation that takes place when the patient is asked to strain as if defecating. An involuntary relaxation can be absent or present.
- **Non-contracting pelvic floor** means that during palpation, there is no palpable voluntary or involuntary contraction of the pelvic floor muscles.
- **Non-relaxing pelvic floor** means that during palpation, there is no palpable voluntary or involuntary relaxation of the pelvic floor muscles.
- **Non-contracting, non-relaxing pelvic floor** means that during palpation, there is neither a palpable contraction nor a palpable relaxation of the pelvic floor muscles.
- If vaginal palpation shows a marked asymmetry in pelvic floor muscle function this should be stated. There can be a difference between the posterior and anterior muscles of the pelvic floor or between left and right.

3. Additional tests for pelvic floor muscle dysfunction

Additional test can be used to get more, partly indirect information, on the function of the pelvic floor muscles. Electromyography, pressure measurements and imaging are the most important additional tests to be used.

3.1. EMG

- Investigators reporting pelvic floor muscle studies should state the position of the patient, the type of electrode and the recording equipment used. When appropriate the verbal instructions given to the patients should be literally written down.
- EMG of the pelvic floor muscles may be performed using surface- or needle electrodes. The techniques are quite different as is the inconvenience for the patient. The results are also quite different in nature. Surface electrodes are non-selective because of their large surface area; they yield information on normal function and dysfunction (either neurological or non-neurological). Needle electrodes are more selective and can also be used to assess neurological conditions that may involve the pelvic floor muscles.
- Intra-vaginal or intra-anal EMG probes will give the same (functional) information as surface electrodes[21].

[20] In an effort to raise abdominal pressure the thoracic, diaphragmatic and abdominal muscles act together with the pelvic floor muscles. Anticipatory or feed forward contractions help to increase urethral closing pressure before the increase in abdominal pressure.

[21] EMG of the pelvic floor muscles using surface electrodes gives insight into the function of the pelvic floor muscles both to the examiner and to the patient. It should be kept in mind that with the use of surface electrodes other muscles will contribute to the EMG signal.

- During a voluntary contraction of the pelvic floor muscles, the intensity of the EMG signal should increase. When the patient is asked to hold the contraction, a sustained high intensity on the EMG can be observed. At the subsequent relaxation the intensity will fall to, or even below baseline.

3.2. Pressure measurements

- Investigators reporting pelvic floor muscle studies should state the position of the patient and the type of transducers, balloons and EMG that was used .
- Urodynamics can be done to obtain insight into the function of the lower urinary tract. Special attention should be paid to the function of the pelvic floor muscles in relation to the bladder. Simultaneous measurement of the pelvic floor EMG, during the micturition phase, can demonstrate the mechanism of dysfunctional voiding.
- Anorectal manometry assesses continence mechanisms by determining: (a) rectal volume required for sensation of distension and urgency to defecate, (b) rectal compliance, (c) voluntary contractions of the external anal sphincter and (d) the resting pressure in the anal canal. Water perfused and solid state pressure transducers are used in combination with a balloon positioned in the anal canal. EMG of the anal canal can be added but should not be used alone[22].

3.3. Imaging

- Investigators reporting pelvic floor muscle studies should state the position of the patient, the type of equipment used. For measurements it should be stated which referral points and lines are used and how e.g. the decent is computed. For ultrasound and MRI the type of transducer or coil should be stated. When appropriate the verbal instructions given to the patient should be literally written down.
- Several imaging techniques are used to assess the pelvic floor and the organs of the pelvis. Most techniques are radiological and many still have to be classified as experimental[23].
- Ultrasound can be performed with an endovaginal or endoanal probe, or with an external probe on the introitus or perineum. The position of the bladder neck in relation to the symphisis pubis is an important landmark. During the investigation the patient can be asked to contract the pelvic floor muscles and this can be

[22] For a complete description see the Rome II report: Functional disorders of the anus and the rectum [Whitehead et al, 1999]

seen to result in an elevation of the bladder neck. Anal ultrasound is used to define structural defects in the anal sphincter.

- Fluoroscopy is the oldest technique used to indirectly image the pelvic floor and the pelvic organs. Filling of the intestine, colon, rectum and vagina with contrast medium, is know as evacuation proctography or defecography. A lateral projection is important to get the best information. At rest the anatomical position of the pelvic organs and the pelvic floor can be visualised. Subsequently the patient can be asked to strain and can be asked to contract the pelvic floor muscles. The changes in the anatomical positions can then be observed.
- Video-urodynamics combines the techniques of urodynamics and fluoroscopy. This will give extra insight into the relationships between pelvic floor anatomy and function of the bladder and urethra.
- MRI is the newest technique for imaging of the pelvic floor. The use of endoluminal coils is advised in order to obtain adequate images of the pelvic floor and the related structures. Dynamic MRI can be used to observe the movement of the pelvic floor during Valsalva manoeuvre, a defaecatory effort and during pelvic floor muscles contraction. It can also be used for the detection of pelvic organ prolapse.
- Different imaging techniques are used for different indications[24]

3.4. Other techniques

Several diagnostic tests can be used to get more indirect proof of the function of the pelvic floor muscles.

- A bladder diary is an important investigation in lower urinary tract symptoms.
- A defecation diary will help in investigating anorectal symptoms.
- Neurophysiological investigations like pudendal nerve latency time are used when there is suspicion of a neurological problem causing pelvic floor muscle dysfunction.

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[23] In a state of the art article in Radiology an overview of the imaging techniques that are available, their indications and limitations was presented. [Stoker et al, 2001]

[24] *Cystourethrography*, the oldest technique used to indirectly image the pelvic floor, is especially useful in detecting cystoceles. *Evacuation proctography* is used for detecting rectoceles, enteroceles, intussusception, anal prolapse and obstructive defecation. *Ultrasound* of bladder and urethra has still not to be seen as a routine investigational technique for pelvic floor muscle imaging but certainly has advantages: no ionizing radiation and little discomfort for the patient. Ultrasound of the anal sphincter is a cornerstone of the diagnostic work-up of anal incontinence. *Magnetic resonance imaging* is the latest developed technique and seems to have great ability to image all the different structures in the pelvis including the pelvic floor itself. For *urinary incontinence* none of the imaging techniques plays a cardinal role in the diagnostic workup. The value of imaging lies in the detection of concomitant anatomical and functional defects. The use of imaging techniques has to be considered when surgical

4. Conditions

Conditions are defined by the presence of characteristic symptoms associated with specific signs. Based on symptoms and signs the following conditions can be determined[25].

4.1. **Normal pelvic floor muscles**: a situation in which the pelvic floor muscles can voluntarily and involuntary contract and relax. Voluntary contraction will be normal or strong and voluntary relaxation complete. Involuntary contraction and relaxation are both present.

4.2. **Overactive pelvic floor muscles:** a situation in which the pelvic floor muscles do not relax, or may even contract when relaxation is functionally needed for example during micturition or defecation. This condition is based on symptoms such as voiding problems, obstructed defecation or dyspareunia and on signs like the absence of voluntary pelvic floor muscle relaxation.

4.3. **Underactive pelvic floor muscles:** a situation in which the pelvic floor muscles cannot voluntarily contract when this is appropriate. This condition is based on symptoms such as urinary incontinence, anal incontinence or pelvic organ prolapse and on signs like no voluntary or involuntary contraction of the pelvic floor muscles.

4.4. **Non-functioning pelvic floor muscles**[26]**:** a situation in which there is no pelvic floor muscle action palpable. This condition can be based on any pelvic floor symptom[27] and on the sign of a non-contracting, non-relaxing pelvic floor.

Directions for future research.

The ICS wants to stress the need for future research in the field of pelvic floor muscle function and dysfunction. The following directions are thought to be important.

- Studies on inter- and intra observer variability for testing of the pelvic floor muscle signs as described in this report.
- Studies on the development of disease specific pelvic floor muscle dysfunction questionnaires.

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reconstruction of the pelvic floor is planned. For *anal incontinence,* endo-anal ultrasound is the most important single test.

[25] There is no strict relation between a symptom and the condition of the pelvic floor muscles. An overactive pelvic floor muscle can lead to voiding problems but in some situation also to incontinence. The examples in this text are the most common relations.

[26] Non-functioning means that there is no activity at palpation. This does not exclude activity of the muscles in other situations, neither does it rule out activity that is below the detection border of palpation.

[27] When there is no contraction or relaxation palpable, it is the resting activity of the pelvic floor muscles that determines the symptoms. When there is a high resting activity the symptoms will likely be: voiding symptoms, obstructive defecation or dyspareunia. When the resting activity is low, symptoms like stress urinary incontinence, faecal incontinence or prolapse may be the complaints presented by the patient.

- Studies on the normal values for pelvic floor muscle function when measured with EMG.
- Studies on the possibility to measure and quantify pelvic floor muscle tone, force and volume.
- Studies on the relation of pelvic floor muscle dysfunction as described in this report and the symptoms mentioned by the patients.

Addendum.

The ICS Pelvic Floor Clinical Assessment group was announced at the ICS meeting in Denver in 1999. The members of the committee were invited to be active in the group right after that meeting. The members invited are all experts on their own field of healthcare in relation to pelvic floor muscle function. Members are from 7 different disciplines: urology, gynaecology, surgery, gastro-enterology, physical therapy, sexology and neurology. Members came from 7 different countries reflecting the worldwide covering of the ICS. The group had a yearly discussion during every ICS meeting. The first draft of the report was put on the Internet at the ICS website (www.icsoffice.org) in 2001 and presented in 2002 in Heidelberg. As a result of the discussion with the members of ICS the report was rewritten and made more compact. This version was then commented on by 25 ICS members and put on the website. During the meeting in Florence in 2003 the new version, based on this comments was discussed and accepted by the ICS general meeting.

Members of the committee were: John Benson, Bary Berghmans, Kari Bø, Jacques Corcos, Clare Fowler, Jo Laycock, Peter Lim Huat Chye, Rik van Lunsen, Guus Lycklama à Nijeholt, Bert Messelink (chairman), John Pemberton, Alex Wang, Alain Watier.

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