

## Genees & Kunst 8

### Eighth Biannual Symposium on Medical Problems of Dancers & Musicians, Revalidatie Friesland, Beetsterzwaag, April 4, 2009

G.J.F. (Gert-Jan) de Haas, MSc, BA(mus), and C.I.C.A. (Camilla) Winterkorn-Pierrot, MD,  
for the Dutch Performing Arts Medicine Association (NVDMG)

The Dutch Performing Arts Medicine Association—in Dutch, *Nederlandse Vereniging voor Dans- en Muziek Geneeskunde (NVDMG)*—was founded April 1, 2005, in The Hague by a group of enthusiastic medical doctors, including specialists and general practitioners. It is an academic, scientific association for physicians, psychologists, scientists, and allied healthcare practitioners who are interested in dance and music, but it is also open to all other interested parties and students. Institutional membership is intended for dance companies, orchestras, dance academies, conservatories, and hospitals.

The association's Mission Statement is three-part:

1. to increase awareness, interest, and expertise in performing arts medicine and science, hence improving the health and well-being of dancers and musicians,
2. to promote contact, friendship, and communication among interested physicians, psychologists, scientists, and allied healthcare practitioners, and
3. to provide a scientific framework for performing arts medicine and to monitor its quality.

The vision of the NVDMG is to form an academic, scientific forum for performing arts medicine, where its members and other interested people can meet, communicate, and cooperate. By enhancing the visibility of performing arts medicine, by stimulating scientific research, and by offering education, training, and awareness, the association facilitates purposeful prevention and treatment (care and cure) for dancers and musicians. The NVDMG has adopted *Medical Problems of Performing Artists (MPPA)* as its official publication.

The NVDMG has grown to over 225 members, representing 22 different medical specialties and of whom 25% are general practitioners. Institutional members include the Dutch National Ballet, the Dutch National Touring Opera, Arnhem-based dance company *Introdans*, several dance academies, the *Codarts Rotterdam Conservatory for Music*, and several hospitals. There are 28 student members, as proof of a promising future.

NVDMG is sponsored and supported by several pharmaceutical companies, a law firm, and a Dutch bank. Its meetings are accredited for general practitioners and occupational physicians, among others. Information about the NVDMG can be found on its website [www.nvdmg.nl](http://www.nvdmg.nl).

On Saturday, April 4th, 2009, the Dutch Performing Arts Medicine Association (NVDMG) organized a scientific and artistic symposium “Genees & Kunst 8” for its 8th member assembly, at Revalidatie Friesland (“Rehabilitation Friesland”) Rehabilitation Centre, in Beetsterzwaag, The Netherlands. The assembly was co-hosted by Mr. G.J.F. (Gert-Jan) de Haas, Vice-chairman of NVDMG and head of the Psychology & Psychiatry Department of the Medical Centre for Dancers & Musicians (MCDM), K.H. (Kees-Hein) Woldendorp, MD, rehabilitation specialist and musician in Revalidatie Friesland, and Prof. S.K. (Sjoerd) Bulstra, MD, PhD, orthopaedic surgeon and head of the Orthopaedic Department of the University Medical Centre Groningen (UMCG). In addition, Revalidatie Friesland celebrated the 10th anniversary of the musicians’ outpatient clinic led by K.H. Woldendorp, MD.

A brief introduction of the NVDMG, presented by the president, A.B.M. (Boni) Rietveld, MD, was followed by other introductions by Mrs. F. (Francisca) Ravestein, Mayor of Opsterland (of which Beetsterzwaag is a part) and G. (Gerard) Hoogvliet, MD, head of the Rehabilitation Department of Revalidatie Friesland. Prof. Bulstra served as moderator of the symposium.

Scientific presentations, interspersed with dance and music performances, were given by NVDMG members and by three invited speakers:



Prof. S.K. (Sjoerd) Bulstra, MD, PhD, symposium moderator.



A.B.M. (Boni) Rietveld, MD, with F. (Francisca) Ravestein, Mayor of Opsterland.

- J.N.A.L. (Joris) Leijnse, PhD, who is an expert on biomechanics and focal hand dystonia in musicians, lectured on the influence of the connected tendons in the hand and forearm on focal hand dystonia;
- R. (Rineke) Smilde, PhD, of the Prins Claus Conservatorium Groningen and Koninklijk Conservatorium in Den Haag, lectured about her biographical research on the subject of stage fright; and
- Prof. E. (Berit) Otten, PhD, professor of neuromechanics and prosthetics, at UMCG, spoke on the subject of neuromechanical analyses of dancers and musicians using high-speed cameras.

The varied program continued with presenters including:

- A.B.M. (Boni) Rietveld, MD, orthopaedic surgeon, who spoke about research on the Mann cheilectomy, done by him and W.L. (Lukas) van der Haak, a medical student and dancer.
- K.H. (Kees Hein) Woldendorp, MD, rehabilitation specialist and member of the assembly council of NVDMG.
- W.J.B. (Walter) Mastboom, MD, PhD, oncology surgeon at the Medisch Spectrum Twente.

Abstracts of these presentations are published here as the symposium proceedings.

For the artistic intermezzis, the gymnasium of Revalidatie Friesland was transformed into a professional theatre by NVDMG technician Mr. Ruud Moojen. It included:

- Performances by students of the show-musical Dansacademie Noord-Nederland, part of the Dance Academy Lucia Marthas.
- Duo Albarus, with Martin Grudaj, cello, and Elena Malinova, piano.
- Uilleann pipe music performed by Roelof Rosendaal.
- “Western style” drumming demonstrated by Sicco Kloosterman.
- Doggy Few with their traditional Irish music, which accompanied a festive dinner.

The day concluded with the world premiere of *Bal Electric*, the first production of Stephen Showshire for Noord Nederlandse Dans, at the Groningen City Theatre.

G.J.F. (GERT-JAN) DE HAAS, MSc, BA(MUS)

*Vice-chairman, NVDMG, and Head, Psychology & Psychiatry Department, Medical Centre for Dancers & Musicians (MCDM), Medical Centre of The Hague*

C.I.C.A. (CAMILLA) WINTERKORN-PIERROT, MD

*General Practitioner and Treasurer, NVDMG Den Haag*

### Anatomical Variations Predisposing to Focal Dystonia in the Musician's Hand

J.N.A.L. (Joris) Leijnse, PhD

*Hand Biomechanics Researcher, Aalst, Belgium*

Focal hand dystonia in musicians (FHDM) is a painless, playing-specific, hand/finger control problem that usually ends a performing career. FHDM develops many years after commencing playing, at a mean age of 33 yrs, but starting as early as ages 24 to 25. Hand function is generally normal in non-playing tasks. FHDM comprises up to 10% of musician's hand complaints and affects about 1% of professional musicians, with a greater incidence in males than females (up to 80% male, see Table). FHDM is considered both a neurological and an overuse disorder, occurring after years of practice. The causes are still unknown, and no systematic effective treatment exists. About 10% of FHDM musicians report a family history.

Most research in FHDM has been neurological. Decreased inhibition and increased sensorimotor cortex plasticity were



Gert van der Vijver, sand artist.



J.N.A.L. (Joris) Leijnse, PhD.

found in FHD and other focal dystonias, but increased plasticity was also found to a lesser extent in nonsymptomatic musicians. Much less attention has been paid to peripheral factors—i.e., factors outside the central nervous system, in the hand itself. Yet, through movement control feedback loops, peripheral disturbances may affect control. Suggestive of the influence of peripheral factors, among others, is the strong correlation between instrument type and affected hand: right hand in keyboard players and classical guitarists, left hand in bowed string and flute players (see Table).

Analysis of anatomical/biomechanical hand factors and many case observations led us to formulate a model of how such factors, including peripheral nerve pathology such as nerve compressions, may be cofactors or “triggers” in FHD development.<sup>1,2</sup> Examples are any factor that can negatively influence hand and finger movement control in playing: damaged ligaments, nerve lesions, lack of anatomic finger independence, minor trauma, etc. By hypothesis, such factors may cause instrument-technical playing problems that require compensatory muscle actions, which under certain conditions may result in overcompensation. FHD symptoms would emerge when, in the execution of the problematic playing movements, overcompensation reaches such proportions that antagonists to the intended movements are co-recruited, at which point control problems become manifest. A case analysis of a hand factor has been published.<sup>3</sup>

1. Leijnse JN: Anatomical factors predisposing to focal dystonia in the musician's hand—principles, theoretical examples, clinical significance. *J Biomechan* 1997; 30(7):659–669.
2. Leijnse JN, Hallett M, Sonneveld GJ: Musculoskeletal factors in musicians' focal hand dystonia—etiological model, therapeutic implications. *J Neurophysiol* 2009 (submitted).
3. Leijnse JNAL, Hallett M: Etiological musculoskeletal factor in focal dystonia in a musician's hand: a case study of the right hand of a guitarist. *Move Disord* 2007; 22(12):1803–1808.

### Musicians' Stage Fright: Biographical Research

R. (Rineke) Smilde, PhD

Lecturer, Prins Claus Conservatorium, Groningen, and Koninklijk Conservatorium, Den Haag

My research into musicians as lifelong learners<sup>1</sup> was based on the questions of what musicians need today to be able to function effectively, how they learn as “lifelong learners,” and what this means for their training as professionals. Within the concept of lifelong learning, which can be described as a concept of learning which enables us to deal with change by being adaptive and responsive, we see that biographical learning plays an important part. Biographical learning refers to the way people learn from their experiences, their knowledge and self-reflection, what they learn from transitions and crises in their lives, and how they give this a place in their biographies. Biographical learning can lead to new insights in learning processes, in emotional as well as cognitive areas.

As research, I interviewed professional musicians from various professional practices and at various stages of their lives in order to gain insight into the role of lifelong learning in their personal and professional development. What emerged strongly during the analytical process was the leadership of musicians in an artistic as well as a generic and educational sense. Generic leadership can be described as the ability to lead by exemplary behavior, developing and applying life skills, dealing with questions of identity and self-image, and showing meta-cognition. This generic leadership is useful to musicians in solving health problems related to their profession and stage fright.

Profession-related health problems can have an enormous psychological impact and are often experienced as an attack on the personal and professional identity, which for a musician cannot be separated. Stage fright frequently was related

TABLE. Musicians' Focal Hand Dystonias: Hand, Instrument, and Gender Incidence, 1991–2000

Instrument Class	Instrument	Total	Hand Affected			Male
			L	R	% L/R	
Keyboard	Piano, organ, clavichord, MIDI keyboard, accordion	19	2	17	88% R	12
Strings	Guitar	20	2	18	90% R	20
	Violin	2	2	0	100% L	1
	Cello	2	2	0	100% L	0
Winds	Flute	5	4	1	83% L	3
	Sax	1	1	0		1
Total		49	13	36	73.3% R	75.5% M

Data from Leijnse, Hallett, and Sonneveld. *J Neurophysiol*, 2009.<sup>2</sup>



R. (Rineke) Smilde, PhD.

to a high degree of perfectionism and low self-esteem. Musicians told me that they worked extremely hard and that it was never good enough. Also, there is a taboo on acknowledging profession-related physical problems and stage fright.

One case was the long-lasting stage fright of Johan, a solo trumpet player in a famous orchestra. He had a blackout during a concert and broke down. Johan's coping strategy was remarkable: he knew that, next to him, a number of colleagues also suffered from stage fright, although it was never openly discussed. Johan showed leadership by taking a risk, which consisted of being completely open toward the management of the orchestra and also by discussing his problems openly with fellow sufferers, so they could help each other and fight the taboo together. Johan is now able to deal with his stage fright, reflect on it, and transform his experiences into something of great value for his students at the conservatoire. We can see this as transformative learning, because it concerns insight which leads to effective social action.<sup>2</sup> Important, moreover, is that Johan let go of the automatic linking of his identity and self-image to "failing" and "not failing."

One of the reasons for Johan's empowerment was the implicit trust he felt from the orchestra, the feeling of belonging. Being part of a community of practice<sup>3</sup> was something Johan had known since childhood, through the fanfare orchestras in which he had played with family and neighbors. A plea for formal music education institutions to give attention to informal music-making, with a focus on pure intrinsic motivation, therefore seems appropriate.

1. Smilde R: Musicians as Lifelong Learners: Discovery through Biography. Delft, Eburon Academic Publishers, 2009.
2. Mezirow J: An overview on transformative learning. In Illeris K (ed): Contemporary Theories of Learning. London, Routledge, 2009.
3. Wenger E: Communities of Practice, Learning, Meaning and Identity. Cambridge, MA, Cambridge University Press, 1998.

## The Neuromechanics of Dancers and Musicians

**Prof. B. (Bert) Otten, PhD**

*Professor of Neuromechanics and Prosthetics, Centre for Human Movement Sciences, University Medical Centre Groningen*

Dancers and musicians both make movements that often approach the very limits of human possibilities. The accuracy and velocity of these movements are certainly impressive. There are two questions that come to mind in explaining

how humans can achieve this: First, how do they do it?, and second, how did they learn it? Although entertaining, the answers to these questions given by performing artists are not very instructive. The fact that the performers have no scientific explanation indicates that there is no need to understand how you dance and how you learn to do it, as long as you get there.

This is central to the thesis of "embodied cognition," which means that the knowledge (cognition) on how to perform a movement is not explicit, but embodied. It is part of the human body, including the nervous system, in direct interaction with the environment. It is important to realize that this is in contrast with the view that the brain is the all-controlling center of the body.

As an example of embodied cognition in a musician, consider when a drummer plays fast two-handed complex rhythms, the frequency at which this can be done is over 10 Hz for each hand. Based on muscle physiology, this is quite impossible: skeletal muscles need time to increase their force, even when the neural activation has a sudden onset. When the technique of such a drummer is studied with high-speed recordings, it appears that he uses complex elastic bouncing techniques of the drumsticks in the hands, modulated by hand posture. In other words, the rhythm of the muscle activation is far below 10 Hz, but because of the way the stick is driven by the hand with variable elastic and damping properties, the beating frequency is higher.

Another example is a dancer. When a dancer jumps very high on bare feet, the landing is very important: it needs to be done with minimal risk of injury. When studied with high-speed recordings, it appears that the foot is prepared for the landing by spreading the impact as far as possible over time. This is done by using co-contraction of the muscles that attach to the metatarsal area and toes. This technique is found simply by adjusting muscle activation as needed in a process called "discovery learning." Instruction is of limited use, because it cannot directly reach the sensory motor system; most of what this system can do in relation to the environment has been learned by doing it.

These two examples illustrate the rich field of embodied cognition. Any failure of the motor system of dancers and musicians in terms of injury may be explained in an incomplete embodied cognition in relation to the environmental conditions, the tools that are used, or the loads to be handled.



Prof. E. (Bert) Otten, PhD.

## Mann Cheilectomy for Painful, Limited *Relevé* due to Hallux Rigidus

A.B.M. (Boni) Rietveld, MD, BA(mus), and W.L. (Lukas) van den Haak, BA(dance)

Orthopaedic surgeon and musician (ABMR), and Medical student and former professional dancer (LvdH), Medical Centre for Dancers & Musicians, MCH Westeinde, The Hague

*Relevé* is essential for dance and requires 90° dorsiflexion of the hallux. Hallux rigidus is limited painful dorsiflexion of the big toe and can be idiopathic (juvenile) or caused by degenerative osteoarthritis of the first metatarsophalangeal (MTP) joint (usually in older dancers). Hallux rigidus limits or terminates a dancer's career. If conservative treatment fails in the juvenile form, an extending ("closing wedge") osteotomy is performed. In the degenerative form, arthrodesis or debasing is not a solution, because it will not allow any dancing. Our hypothesis was that a Mann cheilectomy,<sup>1</sup> which involves removal of the dorsal one third, including the dorsal osteophyte, of the first metatarsal head, would be a suitable alternative for the "demanding" dancer's foot. Post-treatment includes the postoperative use of a toe-CPM (continuous passive movement) machine.

**Methods:** We studied 25 Mann cheilectomies performed in 20 patients with a painful and disabling hallux rigidus operated on between 1994 and 2008. Using a visual analogue scale (VAS, 1–10), we compared pain, stiffness, and satisfaction both pre- and postoperatively. The best score for pain and stiffness was VAS 1; for satisfaction, VAS 10 was best.

**Results:** Mean weight-bearing dorsiflexion of MTP-1 was 53° (32–70°) preoperatively. At 3 months postoperatively, this was 69° (60–85°). Mean postoperative VAS for pain was 3.6; for stiffness, 2.9. The mean VAS for satisfaction was 7.3. With longer follow up (a average 3.7 yrs, range 1.3–0.4 yrs), these results seem relatively constant.

**Conclusion:** Hallux rigidus is a threat for (the "*relevé*" of) dancers. After Mann cheilectomy, all patients gained dorsiflexion in MTP-1, with an average gain of 22°. Some patients incidentally experienced postoperative pain with a different character. Postoperatively, all patients resumed their dancing or sports activities, and all but one were satisfied with the result. In our hands, Mann cheilectomy is a good alternative in the treatment of hallux rigidus in the "demanding" foot, if arthrodesis is not an option. It restores the ability to dance and gives a less limited, less painful *relevé*.

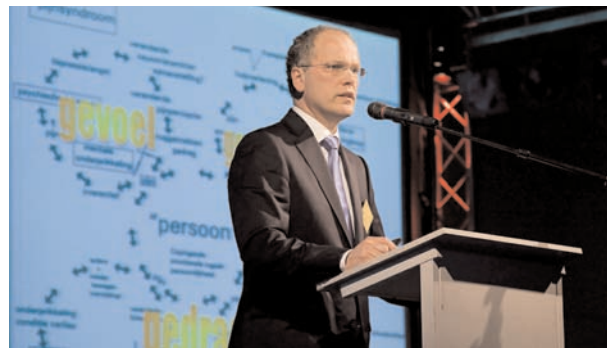
1. Mann RA, Clanton TO: Hallux rigidus: treatment by cheilectomy. J Bone Joint Surg Am 1988; 70:400-406.

## Chronic Pain in Performing Artists: Focus on (Muscle) Tension

K.H. (Kees-Hein) Woldendorp, MD

Rehabilitation specialist and Coordinator, Musicians' Outpatient Clinic, Revalidatie Friesland, Beetsterzwaag

Performing artists are afflicted by a range of complaints, such as sensitivity rashes, dental, laryngeal, and pulmonary problems, neurological disorders, and musculoskeletal com-



K.H. (Kees-Hein) Woldendorp, MD.

plaints. However, the majority (70%) of complaints comprise nonspecific pain, which can have a large impact on their performance. Research has shown that performing artists tend to continue despite their pain. Various factors play a role in this, such as the taboo on talking about their complaints, the physical demands of their profession, their emotional involvement with the artistic side of their work, and the need to strive toward perfection. Hence, there is a multifactorial background for their pain. Diagnosis and treatment should be directed at this multifactorial basis in order to achieve the best possible results.

An important facet of chronic pain is the relationship between chronic muscle tension and the inability to relax adequately. Well into the 1970s (and even now), it was usual to consider pain as a disorder caused by a local process. For example, the location of the pain was related to an underlying reason (e.g., arthritis). However, in practice, this direct relationship often failed: patients with advanced vertebral abnormalities on x-rays had no pain, and vice versa. Clinging onto the disorder model often resulted in unsuccessful medical and (physio-) therapeutic interventions.

In 1977, Engel introduced the biopsychosocial (BPS) model in which various psychological and social factors could influence pain. A logical step was the change in direction of treatment. Thus, the basis was formed for the multidisciplinary treatment of pain that is now standard in pain therapy clinics, rehabilitation, psychiatry, and in recent years, general practice. But the BPS model does not provide an explanation of the interrelationships between biological and psychosocial factors. My "dynamic pain explanation" model, introduced in 1999, provides an insight. If the pain persists (usually 6–12 wks), then the dynamics of the other psychosocial factors increase in such a way that the somatic and psychical changes (as a result of altered pain behavior) lead to feedback mechanisms, and a vicious circle can arise. In this web of factors interfering with each other, four vicious circles (fluctuating in time) can be identified: somatic, psychic, cognitive, and social.

If we apply this dynamic four-circle model to the average professional musician or dancer, it is hardly surprising that there is so much pain in these groups. In the somatic circle, chronically increased muscle tension and inability to relax adequately play, in my opinion, a crucial role. Many factors can influence muscle tension. The tendency to chronic ten-



W.J.B. (Walter) Mastboom, MD, PhD.

sion varies widely among individuals and site, and upbringing may inadvertently aggravate it. Joint hypermobility (common in performers) leads to extra muscle activity for the maintenance of stability. It has been shown that this group has a higher risk of chronic pain, which is often therapy resistant.

The knowledge and skills required for the diagnosis and treatment of chronic pain are available in the rehabilitation department. A multidisciplinary approach is usually necessary, just as it might be for nonperformers.

#### Voice Care in Thyroid and Parathyroid Surgery

**W.J.B. (Walter) Mastboom, MD, PhD, and W. (Willem) Kersing, MD, PhD**

*Oncology surgeon, Dept of Surgery (WJBM), and Dept of ENT (WK), Medisch Spectrum Twente, Enschede*

There are several indications for thyroid surgery, such as a proven or suspected malignant tumor, mechanical obstruction of the esophagus or trachea, and cosmetic reasons. The thyroid gland is located near the larynx. The parathyroid glands are located behind the thyroid gland. Most people have four parathyroid glands, two glands on each side of the thyroid gland with a diameter of about 4 mm. These glands regulate the calcium level in the blood. Overactivity of the glands results in elevation of the blood calcium level, mainly by bone destruction. The most important symptoms are renal

stones, stomach ulcers, tiredness, muscular and osseous weakness, and psychosis. These symptoms are an indication for surgical removal of these glands.

Pathological changes in both the thyroid and parathyroid glands also may result into acute or gradual changes in the voice. These changes are predominantly caused by compression of or invasion into the recurrent laryngeal nerve by the underlying disorder, causing hemiparalysis of the larynx and hoarseness.

During thyroid and parathyroid surgery, besides removal of the lesion, prevention of damage to vital structures in the neck is a surgical challenge. In general, operations on an enlarged thyroid have an increased risk of complications. It is also important to prevent a second intervention in the operated area, since there is a major risk of laryngeal nerve damage caused by the presence of scar tissue. Several fine muscles and their related nerves control the function of the vocal cords. Subtle changes in the voice will not be acknowledged in daily life, but in patients who use their voice professionally, such as singers, actors, and news reporters, small changes will be noticed.

There are two types of operations on parathyroid glands. In the classic way, the thyroid gland is prepared on both sides until all parathyroid glands are found. The most abnormal gland(s) is removed. At present, in most cases, the abnormal gland is located preoperatively and is removed by a small 2-cm incision. This causes minimal damage to surrounding tissues.

Even when surgery in the thyroid region is performed very carefully, subtle changes in the voice may occur. Especially for people who use their voice professionally, the indication for surgery in this region must be carefully discussed with a multidisciplinary team. When an operation is necessary, it is important to choose an experienced surgeon in this field, who is able to use minimally invasive techniques when feasible and to adapt the original operative plan if unexpected circumstances are found during the procedure.

*Additional photographs of the performances at Genees & Kunst 8 can be found online at [www.sciandmed.com/mppa](http://www.sciandmed.com/mppa) in the pdf version of this paper or at the NVDMG's Picasa site: <http://picasa.web.google.com/NVDMGfotoalbum/GeneesKunst8#>.*



Board of the NVDMG.



Roelof Rosendaal, Uilleann pipe player.



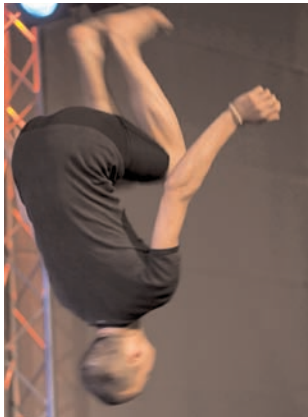
Duo Albarus, with Martin Grudaj on cello and Elena Malinova on piano.

Photographs by Mr. André van de Bos.

For additional photographs of the symposium and performances, see <http://picasaweb.google.com/NVDMG@fotoalbum/GeneesKunst8#>.



Sicco Kloosterman, drummer.



Student dancers from the Dansacademie Noord-Nederland in Groningen, part of the Dance Academy Lucia Marthas.