



THE VOICE  
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# The Voice

World's oldest and leading organization dedicated to voice research, medicine, science, and education

## THE VOICE FOUNDATION

In the current issue, the authors discuss the benefits and challenges of collaborative clinical management of neurological voice disorders.

**ROSEMARY A. LESTER-SMITH, PH.D., CCC-SLP**

Please welcome Rosemary as our new editor along side Kim Steinhauer, PhD.



## EDITOR

*"My fascination with voice started when I was a teenager beginning classical voice training and continued to grow as I completed my clinical training in speech pathology and research training in voice science."*

## Finding Solid Footing on Shaky Ground: Using Multidisciplinary Collaboration and Comprehensive Management to Care for Complex Neurological Voice Cases

### Staff Updates

Maria Russo will no longer be serving as Executive Director of The Voice Foundation. She deserves much credit and gratitude for her work during her twelve years with our organization and community. We wish Maria much success in her future endeavors.

We are pleased to welcome **Ian DeNolfo** as our new Executive Director. Ian is not a stranger to us. He has been filling the role of Executive Coordinator of TVF and Managing Editor to the Journal of Voice for the past several months and helped run this year's Symposium in Philadelphia. He holds a Bachelor of Music degree from the Juilliard School and a Master of Music Degree from the Curtis Institute. Ian had a successful career as a leading tenor and is passionate about advancing knowledge surrounding voice health issues, therapy and training.

We are also pleased to welcome **Melanie Culhane** to The Voice Foundation as our new Executive Coordinator and Managing Editor for Journal of Voice. Melanie is an American lyric soprano who currently resides in Philadelphia, PA where Melanie earned her Master of Music degree in Voice Performance from Temple University. She graduated from the University of Mississippi with her Bachelor of Music degree in Vocal Performance in 2017.



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# Introduction

Rosemary A. Lester-Smith, Ph.D., CCC-SLP

Assistant Professor of Speech, Language, and Hearing Sciences at The University of Texas at Austin and the Director of the UT Voice Lab.

Happy fall to the Voice Foundation community! I am excited to be serving as the new co-editor for the newsletter, and I am looking forward to sharing community members' unique perspectives on voice with you. My fascination with voice started when I was a teenager beginning classical voice training and continued to grow as I completed my clinical training in speech pathology and research training in voice science. My first experience with the Voice Foundation was a memorable and formative one, attending the Annual Symposium 10 years ago as a doctoral student and having the privilege of learning about voice from many different perspectives. Being introduced to the diverse Voice Foundation community by Robert Sataloff, M.D., learning about the complex and awe-inspiring neurophysiology of voice from the presentations of Charles Larson, Ph.D., and Christy Ludlow, Ph.D., CCC-SLP, discussing the principles of semi-occluded vocal tract therapy with Ingo Titze, Ph.D., being mesmerized by the blend of art and science used to enhance voice in the Master Class of Frederica von Stade, hearing the multidisciplinary approaches for voice assessment and treatment from Peak Woo, M.D., and Katherine Verdolini Abbott, Ph.D., CCC-SLP – all of these experiences and many others shaped my early perspectives on voice and motivated me to engage in collaborative clinical management of voice disorders and collaborative clinical research on voice. During each collaborative experience I have had with physicians, speech-language pathologists, voice scientists, singing teachers, and other voice enthusiasts, I learn something new that shapes my future clinical interactions and research interests. With each issue of the newsletter, I hope to further promote collaboration within the dynamic Voice Foundation community and share members' unique perspectives on a range of voice-related topics.

In the current issue, the authors discuss the benefits and challenges of collaborative clinical management of neurological voice disorders. Patients with neurological voice disorders often require the care of a multidisciplinary team, as discussed by David Lott, M.D., a unified medical and behavioral treatment approach, as discussed by Emily Wilson, M.S., CCC-SLP, and therapy that extends beyond the clinical treatment room, as discussed by Amanda Stark, M.S., CCC-SLP, and Julia Ellerston, M.A., CCC-SLP. Although neurological voice disorders are often challenging to assess due to their physiological and functional complexity and challenging to treat due to the limited research on medical and behavioral management for some neurological voice disorders (Khouri & Randall, 2022; Lester-Smith, Miller, & Cherney, 2021), a team approach brings together the unique expertise of each member and may facilitate patient-specific problem solving and optimize treatment outcomes. Furthermore, providing patients with the opportunity to engage with a team of clinicians and interact with other patients who have voice disorders may motivate patients' participation in their treatment and enhance functional communication gains. We thank the authors for offering their unique perspectives on navigating the challenges of working with patients who have complex neurological voice disorders and the rewards of helping patients improve their voice and quality of life. We hope that these articles enhance collaborative assessment and treatment of neurological voice disorders within and outside the Voice Foundation community and motivate future research on these disorders.

Rosemary A. Lester-Smith, Ph.D., CCC-SLP, is an Assistant Professor of Speech, Language, and Hearing Sciences at The University of Texas at Austin and the Director of the UT Voice Lab. She received a B.A. from the University of New Mexico, M.A. from Indiana University, M.S. from Northwestern University, and Ph.D. from the University of Arizona. She completed postdoctoral training at Mayo Clinic, Boston University, Northwestern University, and Shirley Ryan AbilityLab (formerly Rehabilitation Institute of Chicago). Dr. Lester-Smith is a certified speech-language pathologist and has worked in a variety of clinical settings, primarily evaluating and treating adults with voice and swallowing disorders. Her research aims to improve the diagnosis and treatment of neurogenic voice disorders.

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# Multidisciplinary Team Approach to Neurologic Voice Disorders

David G. Lott, M.D.

Neurologic voice disorders are a complex group of disorders to diagnose and manage. For the purposes of this communication, this article focuses on two neurologic voice disorders: laryngeal dystonias (including spasmodic dysphonia) and vocal tremor. These can be a frustrating group of diseases for both patients and clinicians. However, they don't have to be. Having a knowledgeable and dedicated team can profoundly improve patient outcomes and satisfaction. Why is a team approach better? What does it take to put a good team together? Well, I'm glad you asked.

*Having a knowledgeable and dedicated team can profoundly improve patient outcomes and satisfaction.*

There has been quite a bit of good research on neurologic voice disorders recently. Perhaps the most important finding is that clinicians are not very good at diagnosing these disorders. Ludlow et al.<sup>1</sup> set out to determine clinician diagnostic accuracy. They found that the inter-rater agreement on diagnosis was never any better than 36%! That might be good for baseball, but it is not so good for medicine. Difficulties arriving at the correct diagnosis can arise because there is no widely adopted consensus of attributes to suggest a diagnosis (Ludlow et al. did suggest one), some of the signs and symptoms overlap, some patients have more than one of those disorders concurrently, some patients have other contributing medical factors, and some patients have contributing external life stressors. Since no two individuals have the same factors, it is important to develop an individualized management plan.

Why is that information important to establishing a multidisciplinary team? It fundamentally changes the way we have to diagnose these disorders. Instead of a single clinician giving a diagnosis (with which only 36% of others might agree), it allows us to work toward getting the correct diagnosis as a team. The breadth and variability of contributing factors prevents a single clinician from being able to accurately work toward a diagnosis. When speaking with these patients, I frequently have to put my pride aside and tell them that there's no way to be certain exactly what the disorder is, but our team will work hard to determine the mechanism. The diagnostic goal of the team is to cast a wide net and start "peeling back the layers of the onion" until we narrow the diagnosis and find the proper individualized management strategy.

The management goal for neurologic voice disorders is not necessarily to cure the disease, but to maximize vocal function and quality of life. Our multidisciplinary team includes an ENT (laryngologist), speech-language pathologist (SLP), neurologist, gastroenterologist, psychiatrist, counselor, social worker, and most importantly, the patient. The initial patient visit occurs in our voice clinic where both a laryngologist and SLP see the patient simultaneously.

During that visit, a full physical, laryngeal and voice exam are performed to determine areas of involvement as precisely as possible. We identify the pertinent patient factors and stressors. Together, with the patient, we then determine an individualized treatment plan. Not every team member is utilized for every patient. However, it is important for patients to understand the role and potential benefit of visiting with each team member.

The ENT is responsible for helping to lead the team, overseeing the process of patient care management, and providing treatments as needed. SLPs play a central role in the management of these patients. Therapy exercises can improve vocal outcomes whether or not botulinum toxin (Botox) injections are used. SLPs can also discuss strategies to enhance communication with these patients. In addition to the numerous other ways SLPs help these patients, perhaps the most important is establishing a long-term relationship so patients know they don't have to battle this disorder on their own. Neurology is also an important member of the team. Laryngeal neurologic disorders can frequently present with other types of neurologic disorders that may have not yet been diagnosed. Additionally, the neurologist is part of our Botox team. Gastroenterology is important to help diagnose and manage any concurrent esophageal disorders. Gastroesophageal disorders, such as reflux, can perpetuate laryngeal irritation and further worsen the voice disorder. Mental health providers are also very important members of the team, as underlying psychiatric issues may contribute to the disorder. Additionally, patients and clinicians often underestimate the mental toll voice disorders can have on patients.



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# 52<sup>nd</sup>

## ANNUAL SYMPOSIUM

# CALL FOR PAPERS

## CARE OF THE PROFESSIONAL VOICE

Abstract Submission: September 15th, 2022  
 Abstract Deadline: October 31, 2022  
 Notification of Decision: January 31, 2023

### May 31 - June 4, 2023

*“It is important that patients know they are part of the team.”*

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Difficulty communicating can often lead to depression and isolation. It is important for patients to meet with someone to help manage those concerns. Since neurologic voice disorders are not curable at this time, mental health is something patients need to be able to manage their entire lives. Last but not least are the patients themselves. It is important that patients know they are part of the team, understand that this disorder does not define them, and give back to other patients. Many cities have voice disorder support groups led by patients.



In order for your team to function well for patients, it is imperative that all team members agree on a common approach to diagnosis and management. Getting mixed signals from multiple providers can destroy patient confidence in the team. For our team, once life-threatening conditions are ruled out, we agree that the number one goal is to improve patient quality of life through our various means of support. Even if we can't improve vocal function significantly, we can help improve quality of life. Another important goal is the willingness to take time and “peel back the layers of the onion”. Since we accept the fact that we may not always agree on the specific underlying disorder, it is imperative that we manage as many factors as we can and narrow down management plans as efficiently as we can. We further agree that management plans should be individualized to each patient. We can't dictate factors that improve quality of life for each patient, therefore the patient must be central to that decision making.

Caring for patients with neurologic voice disorders doesn't have to be frustrating. To the contrary, with the right team in place, significant improvements in vocal function and quality of life can be achieved.

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## Considerations for Interdisciplinary Management of Unilateral Vocal Fold Paralysis

Emily Wilson, M.S., CCC-SLP



*“Using a collaborative approach not only allows us to understand the patient from a medical perspective, but also from a functional and physiologic standpoint.”*

Unilateral vocal fold paralysis is a diagnosis often seen in laryngology clinics as a result of injury to the recurrent laryngeal nerve<sup>4</sup>. There are many potential causes for unilateral vocal fold paralysis including surgical injury, traumatic injury, malignancy, viral infection, inflammatory disease, and unidentified processes<sup>2</sup>. Depending on the position of the impaired vocal fold, unilateral vocal fold paralysis can lead to glottic insufficiency. Subsequently, patients may experience functional limitations related to their voice, breathing, swallowing, or cough. This can be contingent on numerous factors, including the severity of the glottic gap or the presence of maladaptive compensations. As such, recommendations for intervention may not always be straightforward. In my experience, interdisciplinary collaboration between speech-language pathologists and laryngologists is of the upmost importance when caring for these patients. Using a collaborative approach not only allows us to understand the patient from a medical perspective, but also from a functional and physiologic standpoint.

During interdisciplinary assessment, speech-language pathologists

and laryngologists often use a variety of tools to best guide clinical decision making. Patient-reported outcome measures, case histories, auditory-perceptual evaluation, acoustic and aerodynamic assessment, laryngeal videostroboscopy, and stimulability testing are integral components of evaluation<sup>8</sup>. During the assessment, it is essential to identify the patient’s chief complaints and their goals for intervention. We must also recognize factors that can impact the patient’s response to treat-

ment, such as their overall health status, co-existing medical conditions, the cause of their unilateral vocal fold paralysis, and the timing of their injury. Depending on these variables, our recommendations may vastly change.

Additionally, we must interpret assessment findings from our auditory-perceptual evaluation, laryngeal videostroboscopy exam, and stimulability testing collectively. Dysphonia associated with unilateral vocal fold paralysis can present in a myriad of ways. The position of the paralyzed vocal fold (i.e., median, paramedian, lateral), the tone (i.e., supple, bowed, flaccid), glottic closure configuration, and the degree of compensatory laryngeal muscle tension can all impact the patient’s overall presentation<sup>8</sup>. For example, a patient with a lateral



*We’ve come a long way in the treatment of voice.*

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vocal fold paralysis may present with a characteristic breathy, asthenic voice quality and potentially a weak cough due to glottic insufficiency. If a patient uses excess laryngeal muscle tension to achieve glottic closure, their voice will likely sound strained or effortful. Other patients may experience diplophonia, lowered pitch, or falsetto depending on their compensatory strategies<sup>8</sup>.

Auditory-perceptual evaluation can often give important clues regarding a patient's laryngeal function, but also can help guide therapeutic recommendations. If a patient is stimulable for an improvement in their vocal quality or function with a trial of voice therapy probes, the interdisciplinary team may recommend voice therapy as the preferred treatment modality. Alternatively, if a patient cannot improve their vocal quality or if they are unable to achieve complete glottic closure, the interdisciplinary team may be more likely to consider other treatment options to compliment behavioral intervention such as surgery.

Once a patient has been thoroughly evaluated, the interdisciplinary team will then discuss recommendations for the plan of care. This may include surveillance of the unilateral vocal fold paralysis to assess for spontaneous nerve regeneration within the first year of injury<sup>1</sup>. Radiographic imaging may also be recommended to rule out tumor or mass effect on the vagus nerve and its branches (i.e. CT scan, chest x-rays)<sup>2</sup>, especially for patients without an obvious antecedent event for their vocal fold paralysis. Additionally, laryngeal electromyography (LEMG) can sometimes be used as a diagnostic tool to better understand the neuromuscular function of the larynx<sup>3</sup>. In patients without a clear etiology of their vocal fold paralysis, LEMG may help determine whether the cause is more likely neurologic or structural, such as cricoarytenoid joint fixation<sup>7</sup>. Some studies also support the use of LEMG to predict the prognosis of poor nerve recovery. In these cases, LEMG findings may lead some patients to explore intervention instead of waiting for spontaneous nerve regeneration<sup>4</sup>. However, LEMG should be used cautiously as a predictor of positive recovery, particularly when completed in the early stages of nerve injury<sup>5</sup>. Lastly, the timing and benefit of voice therapy and surgical interventions are typically discussed. Depending on the complexity of the patient, a combination of evaluation and intervention approaches may be recommended. It is critical that we determine our plan of care based on each patient's unique clinical presentation and individual needs.



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## Voice Therapy

The primary goal of voice therapy with this patient population is to optimize vocal quality and function despite vocal fold motion impairment<sup>8</sup>. Additionally, speech-language pathologists often teach strategies to decrease maladaptive compensations that the patient has developed secondary to their underlying vocal fold paralysis. Treatment may utilize breathing exercises to improve coordination of respiration with phonation, circumlaryngeal massage, vocal function exercises, semi-occluded vocal tract exercises, and techniques to balance airflow, maximize resonance, and produce a voice that is perceived as easy and efficient (i.e., resonant voice therapy, flow phonation)<sup>8</sup>. Breath phrasing and decreasing the length of utterances can also be helpful<sup>8</sup>.

Some patients with unilateral vocal fold paralysis can adequately meet their functional demands with voice therapy alone<sup>8</sup>. In my experience, patients with a median or near median position of the paralyzed vocal fold tend to be optimal candidates for behavioral intervention because they can often maintain adequate glottic closure once their compensatory muscle tension has been unloaded. For these individuals, voice therapy can be the primary treatment modality. Alternatively, patients with a lateral position of the paralyzed vocal fold often have a larger glottic gap, and subsequently may find it challenging to meet their needs with voice therapy alone<sup>8</sup>. These patients often elect to proceed with surgical intervention but also benefit from voice therapy as part of their pre-operative, intra-operative and



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post-operative care. Treatment typically involves patient education, techniques to optimize voice use throughout the peri-operative period, and strategies to reduce maladaptive voice and breathing patterns that may interfere with surgical intervention<sup>8</sup>. In some cases, the speech-language pathologist will additionally be present during awake procedures (i.e., medialization thyroplasty) to facilitate optimal voice use as the surgeon assesses the correct size and placement of the implant.

*It is critical that we determine our plan of care based on each patient's unique clinical presentation and individual needs.*

## Surgical Intervention

Injection laryngoplasty and medialization thyroplasty are surgical procedures used to improve glottic closure in patients with unilateral vocal fold paralysis. Injection laryngoplasty involves injection of material (i.e., hyaluronic acid gels, calcium hydroxylapatite, autologous fascia) into the paralyzed vocal fold to temporarily bring the medial edge closer to midline<sup>2</sup>. During medialization thyroplasty, an implant (i.e. Silastic, Gore-tex, or Montgomery) is carefully placed through a window cut in the thyroid cartilage to displace the affected vocal fold medially<sup>2</sup>. This procedure is completed in the operating room and can be performed in conjunction with arytenoid adduction for patients with a posterior glottic gap or arytenoid rotation<sup>10</sup>.

When deciding surgical recommendations, there are many variables to consider such as the patient's goals and their recovery timeline. It can be common for patients to begin with injection laryngoplasty, especially if they are waiting for spontaneous nerve regeneration or if they are hesitant to commit to permanent intervention without trialing an injection first. If the patient finds this procedure to be beneficial, they may elect to repeat the injection laryngoplasty or proceed with permanent medialization thyroplasty once the injectable has dissipated. If the patient does not report a significant benefit from their injection, the material is temporary and usually does not result in persistent effects. During these instances, it is important to recognize that some patients may still elect to pursue medialization thyroplasty with hope for an improved outcome because the surgeon can personalize the size and location of the implant during the medialization thyroplasty. Lastly, some patients may choose to forgo injection laryngoplasty altogether and move forward with medialization thyroplasty to achieve long lasting improvement. Patients who are unlikely to experience spontaneous nerve regeneration may particularly be interested in this option.

Although injection laryngoplasty, medialization thyroplasty, and arytenoid adduction can result in significant improvements, some laryngologists may instead recommend laryngeal reinnervation to prevent denervation atrophy of the laryngeal muscles<sup>6</sup>. This procedure can improve the bulk, tension, and tone of the paralyzed vocal fold to allow for improved glottic closure<sup>9</sup>. However, it is important to educate patients that laryngeal reinnervation does not restore the functional motion of the paralyzed vocal fold<sup>9</sup>. Additionally, some patients may also benefit from injection laryngoplasty to address their functional limitations while waiting for the benefit of laryngeal reinnervation to gradually take effect.

Like many voice disorders, unilateral vocal fold paralysis is a complex diagnosis that can present in a variety of ways. When caring for these patients, we must evaluate the patient thoroughly and collaborate across disciplines. The key to successful management of unilateral vocal fold paralysis is to understand each patient's unique clinical presentation and tailor our recommendations accordingly.

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## Comprehensive Treatment of Voice and Speech in Parkinson's Disease

Amanda C. Stark, M.S., CCC-SLP and Julia Ellerston, M.A., CCC-SLP



Over 200 years ago, James Parkinson first defined the medical phenomenon known as Parkinson's disease (PD). Originally described as the "shaking palsy," decades of scientific research have elucidated underlying etiologies, improved our diagnostic precision, and helped us understand a causative model for this life-threatening disease. PD is a progressive neurological disease with a mean onset of symptoms around 55 years old (Ascherio and Schwarzschild 2016) and affects 1-2 per 1,000 of the general pop-

et al., 2015). In 2015, however, the Movement Disorder Society Clinical Diagnostic Criteria for PD was revised to also recognize several non-motor manifestations. Clinical diagnostic features of non-motor manifestations range from constipation and psychiatric disorders to dementia and sleep disorders (Jankovic, 2008). It is important to note that based on the Neurology literature, there is a general lack of inclusion of voice, speech, and swallowing deficits in the diagnostic process of PD.

The underlying cause of the motor and non-motor impairments PD is still largely unknown. However, due to the known impact of PD on dopaminergic neurons in the basal ganglia, dopamine replacement therapy has been a gold standard treatment to manage PD motor symptoms. More recently, deep brain stimulation of the basal ganglia nuclei has been used to control motor deficits. However, neither dopamine replacement nor deep brain stimulation prevents disease



Baumann et al., 2018; Behrman et al., 2021; Behrman et al., 2020).

In addition to formal speech treatment, there is a growing body of evidence supporting singing as an adjunct therapeutic modality to address voice and speech deficits. Singing has been demonstrated to promote louder voice production than habitual speech production (Tamplin et al., 2019). Moreover, singing may help patients learn to develop and train their respiratory function, as increases in max-

*...there is a growing body of evidence supporting singing as an adjunct therapeutic modality to address voice and speech deficits.*

ulation (Tysnes and Storstein, 2017). It has been generally accepted that PD affects 1% of the population above the age of 60 (de Lau and Breteler, 2006). PD results from the death of dopaminergic neurons in a region of the basal ganglia called the substantia nigra pars compacta or the presence of proteinaceous aggregates in neurons called Lewy Bodies. Dopaminergic neuron death causes degeneration of dopamine release in the striatum, impacting the circuitry of the basal ganglia and reducing movement control.

Historically, the diagnosis of PD was based largely on the presentation of motor abnormalities. Hallmark motor features, including bradykinesia, resting tremor, and rigidity, are central to the clinical diagnosis (Postuma

progression.

Current evidence-based individual speech treatment options for voice and speech impairments associated with PD include Lee Silverman Voice Treatment® and Speak OUT!® Both programs are relatively high intensity and based on motor-learning principles. The approaches are thought to help bypass the extrapyramidal tract in the brain and engage the pyramidal tract to promote improvement in voice and speech. These therapy programs utilize individual therapy followed by a maintenance group therapy (LOUD for Life® and The LOUD Crowd®, respectively) to focus on improved loudness, with additional effects also noted in articulation, intonation, and facial expressions (Levy et al., 2020;

imum expiratory pressure and maximum inspiratory pressure have been observed (Di Benedetto et al., 2009; Haneishi, 2001; Ferriero et al., 2013; Stegemöller et al., 2020). Intonation changes, phonation range changes, and improved speech intelligibility have also been demonstrated in the literature (Di Benedetto et al., 2009; Stegemöller et al., 2020). Additional study of larger sample sizes, appropriate dosage, and the use of randomized control trials would strengthen support for singing as a treatment modality.

The University of Utah Voice Disorders Center currently offers Speak OUT!® and The LOUD Crowd®, as well as a weekly half-hour choir online. These programs were initiated

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*the combination of programs...  
provides a great chance for patients  
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therapy skills...*

and are partially supported by grants from Parkinson Voice Project. In addition to providing evidence-based treatment to speakers with PD, the LOUD Crowd® provides a clinical experience to a graduate student in the Communication Sciences and Disorders program at the University of Utah, supervised by clinicians from the Voice Disorders Center. The choir started online and has remained online, despite the challenge that audio signal latency poses to choral timing. Attendance for the choir and The LOUD Crowd® has been excellent due to the comfort of participation from the patient's own home rather than traveling to our clinic. We find that the combination of programs offered by our clinical site provides a great chance for patients to socialize and practice their therapy skills, and allows clinicians to monitor patients for decline and offer additional treatment in a timely manner.



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