ColumbiaDoctors | *Pediatric Orthopedics*

A guide for patients
and families

What to Expect:
Non-Operative Care

AMAZING THINGS ARE HAPPENING HERE FOR KIDS

Division of Pediatric Orthopedics

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columbiaortho.org

Columbia University
Department of Orthopedic Surgery
College of Physicians and Surgeons

NewYork-Presbyterian
Morgan Stanley Children's Hospital

Welcome to Columbia Orthopedics

Dear Parents & Patients,

Welcome to the Non-operative Spine & Scoliosis Care at Columbia Orthopedics. We understand that scoliosis can be a frightening diagnosis and that you will have many questions. We have designed this book to provide you with general information about scoliosis and the non-operative treatment options available to you at Columbia.

Here at Columbia Orthopedics we have assembled a group of scoliosis experts who work together with families to create an individualized care plan for every patient. We do this by offering the most up-to-date, safest, and effective treatment options, as well as the support and guidance of our specialists.

Columbia Orthopedics is dedicated to providing sensitive, age-appropriate care to children and their families throughout their scoliosis journey. We understand that the emotional impact of scoliosis can be as intense as the physical demands and we are here to support you.

Sincerely,

ColumbiaDoctors | *Pediatric Orthopedics*

The Non-operative Spine & Scoliosis Care at Columbia Orthopedics

Table of Contents

Your Care Team

Michael G. Vitale, MD, MPH
Specializes in the non-operative and operative treatment of complex pediatric scoliosis and other spinal disorders. Has a special interest in quality and safety.
Pediatricscoliosissurgery.com
App: *Scoliosis Tracker* App for Iphone/Ipad
Book: *Scoliosis-A Guide for Children and Their Families*

Benjamin D. Roye, MD, MPH
Specializes in the non-operative and operative treatment of complex pediatric scoliosis and other spinal disorders.
Columbiaortho.org/profile/Benjamin-d-roye-md

Amber Sentell Mizerik, PA -C
Physician Associate
Works with Dr. Vitale, helps run a clubfoot clinic, and sees patients independently.

Nikki Bainton, CPNP
Pediatric Nurse Practitioner
Works with Dr. Roye and sees patients independently.

Julie Morales, RN
Pediatric Nurse
Works with Dr. Roye

Brianna Campbell, CPNP
Pediatric Nurse Practitioner
Sees patients independently and works with Dr. Vitale.

Prachi Bakarania, DPT
Physical Therapist
Physiotherapeutic Scoliosis-Specific Exercise (PSSE) Focus

Abigail Smul, DPT, CSCS
Physical Therapist
Physiotherapeutic Scoliosis-Specific Exercise (PSSE) Focus

John Tunney, BOCPO
Orthotist and Prosthetist
Specialist in the NYRC brace

Walter A. Nance, BOCO, OTC
Orthotist and Scoliosis Casting Technician

Contact Information

Online Messaging and Patient Records - Patient Portal (MyChart)

Columbia Doctors offers a patient portal (MyChart) that allows you to send messages to the clinical staff and office, as well as access your medical records (including x-rays, notes, etc.).

You must complete an invitation to access the portal at the front desk. If your child is over the age of 12 the account will need to be created under their name and email. They will then need to grant you "proxy" access. We recommend that you complete this in the office. Once you are granted access from our staff you can access the portal at myconnectnyc.org/MyChart/Authentication/Login

School Notes, Physical Therapy Prescriptions, and X-ray Requisition Requests:

1. You may send a request to your provider through the MyChart portal. This is the fastest way to receive any of the above requests.
2. You may call 212-305-5475 to submit a request. Please have a fax number or address to send the requested item to, including the fax number for physical therapy prescriptions.

Medical Records

1. You may access medical records through the MyChart portal.
2. You may also contact our medical records office with your request. You can find instructions on how to complete a request at columbiaortho.org/patient-care/resources/medical-records.

Patient to Patient Program

We have a program that connects you with other patients who have gone through scoliosis bracing. Please let us know if you would like to connect with another family. The process can take a few days but we will get back to you with their name and phone number.

The organization SCOLIOS-US also has a mentoring program for patients who have had spine surgery. You can find their information under "Scoliosis Resources" on page 22.

Insurance & Financial Information

Insurance Authorization or Coverage of Braces

Columbia Orthopedics partners with East Coast Orthotics to provide patients with braces. Please contact Angela Berberich at (631) 392 – 2237 for questions related to insurance authorization or coverage of a brace.

Appointments with Columbia Providers

Billing questions regarding an appointment with one of our providers should be directed to the Columbia Orthopedics Billing Department at (646) 317-7111.

Team Approach to Non-operative Scoliosis Care

What is non-operative care?

Non-operative care, also known as conservative care, is an approach to the treatment of scoliosis focused on avoiding surgery. Currently, the non-operative methods that we use to treat scoliosis are bracing and physiotheraptuic scoliosis specific exercises (PSSE). Both of these options require an intense and prolonged commitment from the child and family, as well as a skilled team of orthopedic providers, orthotists, and physical therapists.

What is the supportive evidence for non-operative care?

The study "Effects of Bracing in Adolescents with Idiopathic Scoliosis," published by The New England Journal of Medicine in 2013, found that among patients with curves ranging from 20 to 40 degrees, **bracing was more effective than observation** at preventing progression to surgery. It also found that the number of hours that the child wears the brace matters – **patients who wore the brace more had a greater likelihood of avoiding surgery**.

What is the team approach?

We know that handing a teenager a brace and telling them to wear it is not effective without the support of family and a team of trained professionals. We understand that the diagnosis of scoliosis affects the entire family and we are committed to supporting and empowering you throughout this process. Our team includes doctors, nurse practitioners, physician assistants, orthotists, and physical therapists. An integral part of the team is our mental health coordinator who works closely with patients and families to support their mental well being through brace treatment. Each team member brings a unique set of strengths and skills to the treatment process, and by working cooperatively we holistically address all aspects of your care.

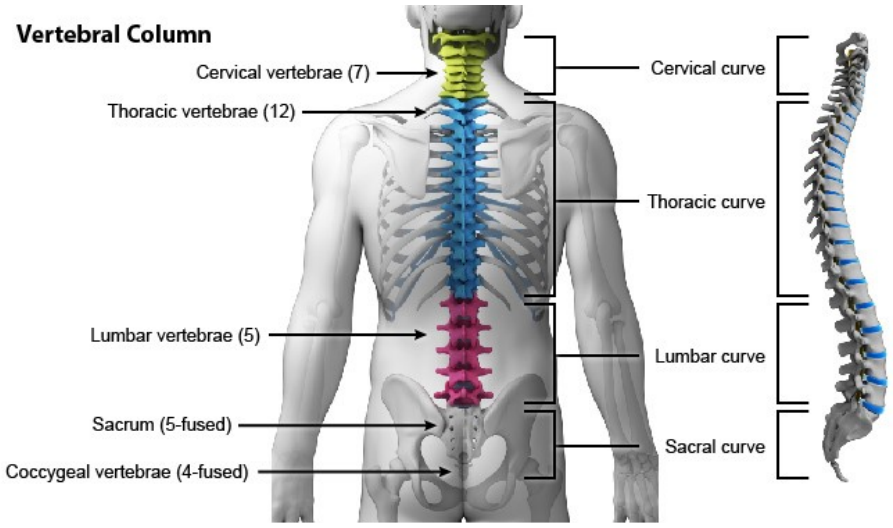
What Is Scoliosis?

Scoliosis is a 3-dimensional curvature of the spine. The most common form of Scoliosis is called Adolescent Idiopathic Scoliosis (AIS) – it is first diagnosed between ages 10 and 18. The term 'Idiopathic' means that the cause is unknown, and denotes that this type of scoliosis is not caused by any other medical problem. Scoliosis can also occur in children younger than age 10, and this is referred to as Early Onset Scoliosis (EOS).

AIS affects as many as 4 in 100 children and is more common in girls. There does appear to be a genetic link to AIS as the incidence is greater in children with a family history of scoliosis in a close relative. This book discusses AIS but many of the same principles and treatments apply to younger patients as well.

Anatomy of the spine

The spine is made up of 24 mobile vertebrae: 7 cervical, 12 thoracic, and 5 lumbar. The cervical vertebrae compose the neck, the thoracic vertebrae are attached to the ribs, and the lumbar vertebrae are in the lower back. The 5th lumbar vertebra connects to the sacrum, which is in turn attached to the pelvis. The spine houses and protects the spinal cord. When viewed from behind the spine should be straight and when viewed from the side it should have a normal thoracic *kyphosis,* or forward curvature, and a lumbar *lordosis,* or backwards curvature.



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1 image: cybersurgeons.net

Connection to growth

Most children with scoliosis are not aware that they have it. Usually, a difference in the child's back is first noticed by parents or by a medical professional during a routine physical exam. The child may have passed routine scoliosis screenings in the past, but then an asymmetry appears in the child's shoulders, scapula, ribs or hips over a short period of time. This is because *scoliosis tends to progress as a child goes through a growth spurt*. Likewise, scoliosis tends to stabilize once a child is finished growing.

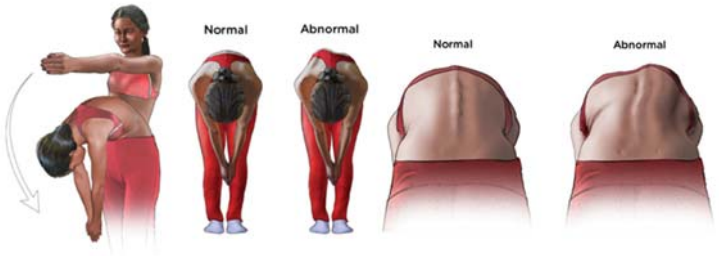
2

Risk of Progression Models with Risser Model and Sanders Model: Pediatricscoliosissurgery.com/risk-severity-scores

How is scoliosis diagnosed?

The pediatrician uses the forward bend test to evaluate differences in the trunk. If there is a concern about scoliosis, your provider will send you to an Orthopedist for a spine x-ray and further clinical evaluation.

The forward bend test:



3

The Orthopedist orders an x-ray of the spine and determines the degree of the scoliosis by measuring the curvature. This is referred to as the **Cobb angle**. Curves less than 10 degrees are considered within normal range, 10 to 25 degrees is a mild scoliosis, 25 to 45 degrees is a moderate curve size, and greater than 45 degrees is severe scoliosis.

Is that an 'S' or a 'C' curve?

There are a variety of curve patterns found among people with scoliosis. Some people have one curve; others may have two, three, or even four curves. Having more curves does not mean that your scoliosis is worse. The body wants to maintain balance by keeping your head centered over your pelvis. It does this by creating additional *compensatory curves*. These curves are a normal and expected finding.

2 Image: nlm.nih.gov

3 Image:choa.org

Why do we treat scoliosis?

In and of itself, a scoliosis measuring less than 45 degrees in a fully-grown person *does not have any impact on overall health or functional abilities*. The size of these curves tends to stay stable throughout life. However, once a curve is 45 degrees or larger it may continue to get bigger even after a person is completely grown. Very large curves can begin to impact internal organs such as the lungs, and they may cause back pain and functional difficulties.

The goal of treating adolescent idiopathic scoliosis is to prevent progression once treatment is initiated and help the child arrive at skeletal maturity with a curve less than 40 degrees.

When curves become greater than 50 degrees there is a very high likelihood that they will continue to get larger over time. At this point, spinal fusion surgery is recommended to correct the scoliosis and halt progression of the curve.

How will scoliosis affect my life?

Being told that you have scoliosis can be scary. In all of the most important ways scoliosis will not change who you are. Your personality will be the same, you will not feel sick or unhealthy, and you can still do all of the sports and activities that you enjoy.

However, while you are still growing your scoliosis needs to be checked by your Orthopedist several times per year. You will most likely need to get x-rays taken at your appointments to make sure that the curve hasn't progressed. Depending on the size of your curve, we may recommend a special type of physical therapy or you may be prescribed a back brace to wear. Living with a brace can be challenging, but this is temporary – *once you are finished growing you will be finished with the brace*.

As an adult, scoliosis will not stop you from doing any of the things you love. You will be able to have an active life, participate in sports without restriction, and have children.

Appointments and Imaging

- Your Orthopedist will want to see you several times per year to monitor your scoliosis. The number of visits will vary based upon how quickly you are growing and your treatment regimen.
- In general, you can expect to see us *2 or 3 times per year*.
- At each visit you will be asked to change into a gown so that we can perform a physical exam, which includes looking at your back during the forward bend test.

Spine X-rays

- At most visits your Orthopedist will ask you to get a spine and hand x-ray prior to your appointment to compare Cobb angle measurements and track your curve over time.
- X-rays may also be used to check the fit and effectiveness of a brace.
- Many children and parents have concerns about the repeated exposure to radiation at such a young age. We take this concern very seriously and do our best to limit the number of x-rays per year.

EOS Machine

We have installed an extremely low-dose x-ray machine, called **EOS**, at our Morgan Stanley Children's Hospital and Och Spine Building (Hudson Yards) locations. This machine simultaneously captures a full body image from the front and side and then uses a computer to combine the images. This unique process delivers considerably lower radiation than conventional radiology. As an added benefit, this type of x-ray is much faster and takes less than a minute to complete. *In order to use EOS the patient must be able to follow directions and stand completely still for about 20 seconds.*

Why a hand x-ray?

- A large part of treating scoliosis appropriately is determining the child's current rate of growth. To do this we consider several factors: any recent increase in height, pubertal development, and a special x-ray of your hand called a *bone age x-ray*.
- A bone age x-ray helps us to determine where you are in your growth: whether you are growing steadily as a pre-adolescent, in the midst of your adolescent growth spurt, or in the slower final stages of growth. This information will help guide our treatment decisions.
- Unfortunately, it does not tell us how tall you will be! There are many bones in the hand and each one of these bones has a growth plate that we can see on x-ray. As a child matures, these growth plates begin to close in a sequential manner beginning at the tips of the fingers and proceeding down the hand until, finally, the growth plates of the wrist close. At that point the child is finished with growth.

- We use a grading system called the *Sanders scale* to classify the x-ray into one of 8 stages. *The adolescent rapid growth spurt occurs during stages 3 and 4*, followed by a period of slower growth. Understanding where you are in your growth tells us when to initiate and end treatment and helps guide us on how frequently you need to follow up.

MRI

- Not all scoliosis is "idiopathic" and sometimes there are other reasons that scoliosis develops. If your Orthopedist notices that the curve has an atypical pattern, if the curve is progressing rapidly or if there are differences in your neurological exam we may ask you to get an MRI of the spine.
- An MRI allows us to look closely at the spinal cord to make sure that it is not being affected by the scoliosis and that there are no other causes of the scoliosis such as a syrinx, tethered cord, or chiari malformation.
- There is no radiation exposure through an MRI. An MRI uses powerful magnets to create detailed images of the body.
- What does an MRI entail?
    - This test is non-invasive and takes about one hour; it only requires that you lie still on a table inside the MRI machine. It does not touch you and you will not feel the pictures being taken.
    - We understand that lying still can sometimes be difficult for children, so at Morgan Stanley Children's Hospital we have Child Life Specialists on staff to explain the test in a developmentally appropriate way. There is a special "mock" MRI machine, which the Child Life Specialists may use to allow children to simulate the experience through play. This helps them to prepare for the test and understand what is going to happen. We also have special glasses and headphones that can be worn in the MRI machine to watch movies or listen to music. If you are interested in any of these options, please let your provider know and we will connect you with Child Life. *When scheduling your MRI please let them know if you are interested in using the special glasses and headphones so that they may have them available for you.*
- To schedule your MRI appointment please call (212) 342-8491.
- You can watch the video "What to Expect When You Have an MRI" at youtube.com/watch?v=BBTslj1mkP8

Research and technology

As a major academic institution, Columbia University is dedicated to enhancing the existing body of knowledge about scoliosis through research and the development of new technologies. At a visit with your Orthopedist you may be asked to participate in a research study. Your involvement may include filling out a questionnaire, allowing us to take your measurements, or trialing a new app or device. While the choice to participate is always optional, we hope that you will seriously consider any research request because the information we collect improves the care of all patients with scoliosis. All research at the University is under the strict oversight of the Institutional Review Board and whether or not you choose to participate in a study, your care will always adhere to standard practices.

Bracing

Bracing treatment is typically recommended after the curve has reached 25 degrees, but this may vary depending on the child's age, skeletal maturity, family history and additional factors. Several types of braces exist, such as the

a) Rigo-Chêneau brace
b) Boston style TLSO (thoracic-lumbar-sacral orthosis) brace/3D Boston
c) Charleston bending brace
d) Providence brace

All braces are designed to prevent progression of the spinal curve. However, it is expected that when you take off the brace your spine will return to its previous shape. Bracing does not cure or improve scoliosis.

It is important to remember that our goal is to keep your curve from changing, even though you are growing.

Advances in brace design have allowed for more comfortably fitting braces. If your brace is uncomfortable, it is important to speak with your Orthopedist as well as your orthotist. They may want to take updated x-rays to see if the curve has progressed; evaluate whether you have outgrown the brace; or make changes to the brace. If the brace is comfortable then you are more likely to wear it for the recommended number of hours.

Types of braces

In our practice, we typically use the New York Rigo-Chêneau (NYRC) Brace with smart and brace technology and the Boston style TLSO brace.

Rigo-Chêneau Brace (left)

Boston TLSO (right)

Essential differences in brace design give Rigo-Chêneau braces better derotational control over scoliosis curves.

What is the New York Rigo- Chêneau (NYRC) Brace?

- The New York RC Brace (NYRC brace) is based on the tried and true principles of Dr. Manuel Rigo and Dr. Jacques Cheneau. The brace maximizes in-brace frontal curve correction (Cobb angle), derotation of the spine, and sagittal balance, specific to your patient's native pelvic incidence.
- The 3D biomechanical design of the NYRC brace complements the Schroth Physical Therapy Method. To slow the scoliosis curve progression Schroth therapists teach patients to improve their

postural alignment with specific exercises and positions. By helping achieve the greatest 3D in-brace correction as possible, the NYRC brace contributes to the efficacy of the Schroth physical therapy.

- Sagittal balance (the neutral alignment of the spine, pelvis, and head) has proved important in the treatment of adult spinal deformity. The maintenance of balance during scoliosis treatment has lasting effects. Both the therapists and the bracing system work together to achieve this goal.
- There are cutouts in the brace that align with the concavities of your curves and allow for thoracic expansion and reshaping of the ribcage.

How is the New York Rigo-Chêneau (NYRC) Brace made?

The NYRC Brace is a highly customized orthosis manufactured with the most advanced computer-aided design and computer-aided manufacturing (CAD/CAM) technologies. The size and shape of a NYRC brace varies depending on your curve pattern because the brace is made specifically for you. Measurement for a NYRC brace involves photographs, measurements in static and dynamic postures, and a 3D scan of the patient's body. Your brace measurements are then uploaded into a state-of-the-art computer system. We select the appropriate brace mold and then your brace is manufactured by East Coast Orthotics according to these specifications. It has been developed to provide, for each case, the most reliable and effective results during the non-operative treatment of idiopathic scoliosis. Each NYRC brace is carefully designed and fabricated in New York (U.S.A.). Our expert orthotist, John Tunney BOCPO, has years of experience with the NYRC Brace and is available in our office so that you are able to see him at the time of the visit with your Orthopedist.

For more information on the NYRC Brace, please visit East Coast Orthotic & Prosthetic Corp. on the web at ec-op.com/nyrc-brace/.

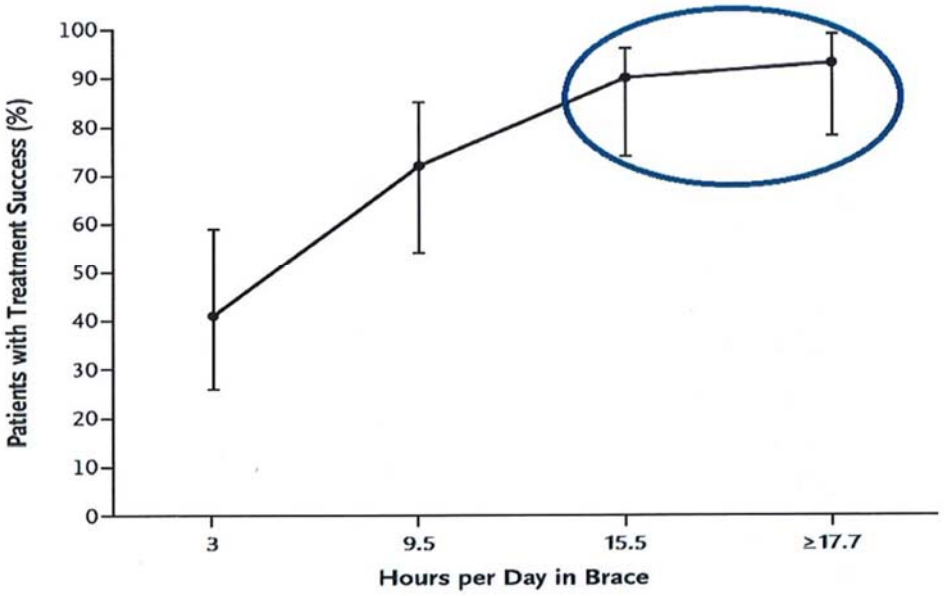
What is the Boston TLSO Brace?

The Boston TLSO utilizes a custom, made-to-measure design. It works by applying three-point pressure to the curvature via foam pads placed within a molded plastic shell. The brace is constructed using a radiograph-based blueprint designed by the orthotist. It closes in the back, as opposed to the NYRC brace which closes in the front.

Time in the brace

Each patient will have an optimal brace wear time based on their individual scoliosis treatment plan, which will be discussed and reviewed with your orthopedist regularly. For some patients this is a part-time bracing regimen (typically around 12 hours/day) or nighttime bracing for smaller curves (generally under 25 degrees) and in younger patients who are not in their adolescent growth spurt. Some patients are prescribed a full-time regimen (16-18 hours/day) for curves that are larger than 25 degrees. There are many factors that are taken into consideration when deciding your treatment plan, including the size of your curve, growth, and skeletal maturity.

The BrAIST trial was a study funded by the NIH and published in the New England journal of Medicine that found that the effect of bracing is determined by the number of hours in the brace, as well as by the curve correction of the brace. It demonstrated that longer hours of brace wear were associated with greater benefit. If you wear the brace less than your recommended prescription, it is more likely that your curve is going to progress and possibly require surgical treatment.



The more you wear your brace, the better it works!

Adapted from: Weinstein SL, Dolan LA, Wright JG, Dobbs MB. "Effects of Bracing in Adolescents with Idiopathic Scoliosis." The New England Journal of Medicine. 2013 Oct 17;369(16):1512-21.

Brace follow up

Once you have been measured and fit for the brace, the orthotist will explain how to wean into the brace. The brace is like a new pair of shoes; it takes some time to get used to it and to be able to obtain the prescribed number of hours per day at the desired tightness. It will take about 4 to 6 weeks to reach the prescribed number of hours, and at that point we will have you follow up with our Nurse Practitioner and orthotist to obtain an x-ray in the brace. We take this x-ray to make sure that the brace is correcting the curve. The orthotist will make any changes that need to be made to the brace to achieve the desired correction. That is the only appointment for which you will wear your brace for the x-ray! For all of your other scoliosis follow up appointments, we will obtain x-rays **out** of the brace to see whether the curve has progressed. At those visits you must be out of the brace for 24 hours prior to the x-ray to eliminate any effect the brace might have on the curve. We recommend setting an alarm on your phone to remind you to be out of your brace for 24 hours prior to the x-ray. However, please bring your brace to all of your subsequent appointments.

*The series of appointments can get confusing, so we have created the guide on the **left side of this folder** to assist you.*

Brace Compliance Monitor

Tracking compliance with Bracing helps to get the best outcome. The Smart strap in the NYRC allows the patient and the provider to be able to look at compliance over a period of time. This helps to provide feedback during the visit and talk about ways to improve brace compliance.

When do I stop wearing the brace?

If there is no curve progression, the brace is usually worn until an adolescent reaches skeletal maturity, a point that varies among individuals. We use the bone age x-ray to help us determine the right time to halt bracing treatment.

When your growth has slowed and your Orthopedist determines that you are ready to stop wearing the brace, we will recommend a period of weaning out of the brace. Typically, we will first wean the brace to nighttime only and then at the next visit if there is no further progression, discontinue the brace all together.

During the weaning period and after the brace has been discontinued, some patients experience some back pain. This is because your core and back muscles can become weak from immobilization while in the brace. It is important that you continue with scoliosis specific exercises to maintain your core while you are wearing the brace. If you do experience back pain after you discontinue the brace, please speak with your Orthopedist. We may prescribe some physical therapy to work on your core muscles and decrease the pain.

Brace Tips and Tricks

Clothing

- The undershirt you wear underneath the brace is very important to increase your comfort and prevent irritation. Something relatively tight fitting, seamless, and sweat wicking are all qualities to look for. Here are some websites that sell specialty tank tops for underneath the brace:
  - www.hopescloset.com
  - www.embracedincomfort.com
  - www.bracebuddies.com
- Uniqlo, Costco 32 Degrees Cool Shirts, Amazon Kurve V-Neck Short Sleeve Seamless Top, and shirts from Under Armour and other athletic brands are also good choices.
- You can find some clothing recommendations in the book *"Straight Talk with The Curvy Girls."* There is a whole section of the book devoted to how to make it easier to dress with a brace on.
- Always bring/wear appropriate clothing with you to your visits with the Orthopedist and the Orthotist. An example of clothing would be a snug fitting t-shirt and leggings.

What if I am having issues with the fit of the brace?

- Call your Orthotist if you are having brace fit issues. You do not need to wait to see your orthopedist for these issues to be resolved.
- Always make sure that your brace is on correctly. In most braces the waist is well defined and should be the landmark for correct brace wear. If the waist is positioned properly the rest of the brace should fit as designed. Putting on the Rigo-Chêneau brace while lying down can make a big difference.

Can I connect with other patients with scoliosis?

- The organization SCOLIOS-US has a mentoring program for patients with scoliosis. You can find more information at https://www.bracingforscoliosus.org/bracing-mentor-program/
- Check out SCOLIOS-US' "Empower Hour," a virtual support group (via Zoom) led by pediatric social workers. Each series consists of 4 one hour sessions to build on your strength and resilience to help you tackle your scoliosis brace.
- We have a program that connects you with other patients who have gone through bracing treatment. Please let us know if you would like to connect with another family. The process can take a few days but we will get back to you with their name and phone number once the family grants permission to be contacted.
- Curvy Girls is a Scoliosis Support Group with many regional chapters in the tri-state area. You can find their information, as well as information for other support groups and organizations on page 25.

Physiotherapeutic Scoliosis-Specific Exercise (PSSE)

Our medical center is proud to offer a specialized form of physical therapy called Physiotherapeutic Scoliosis-Specific Exercise (PSSE), for the management of scoliosis, kyphosis, and other spinal conditions. PSSE, like the Schroth Method, can have a role Our physical therapists are trained in a variety of different PSSE approaches, to include the Schroth Method from the Barcelona Scoliosis Physical Therapy School (BSPTS) Concept by Rigo, the Scientific Exercise Approach to Scoliosis (SEAS) from the ISICO group out of Milan Italy, and the Lyon Method based out of Lyon, France (*certification is in process*).

Methods

BSPTS Concept by Rigo - Barcelona, Spain

BSPTS Concept by Rigo is a PSSE approach and one of several branches that have emerged from the Schroth method. The Schroth method was originated by Katharina Schroth and her daughter, Christa Lehnert-Schroth, in the early to mid 1900s. BSPTS- Concepts by Rigo is a rigorous certification pathway rooted in a solid understanding of the biomechanics of the spine in order to best optimize the health of each patient's spine and movement system throughout the lifespan. The approach utilizes exercises that are based in training the individual to find the best three-dimensional alignment that is most stable, centered, and balanced for that individual's unique trunk shape.

Kwan KYH, Cheng ACS, Koh HY, Chiu AYY, Cheung KMC. Effectiveness of Schroth exercises during bracing in adolescent idiopathic scoliosis: results from a preliminary study-SOSORT Award 2017 Winner. Scoliosis Spinal Disord. 2017;12:32.

Schreiber S, Parent EC, Khodayari moez E, et al. Schroth Physiotherapeutic Scoliosis-Specific Exercises Added to the Standard of Care Lead to Better Cobb Angle Outcomes in Adolescents with Idiopathic Scoliosis - an Assessor and Statistician Blinded Randomized Controlled Trial. PLoS ONE. 2016;11(12):e0168746.

SEAS method - ISICO, Milan Italy

This method begins with the patient's understanding and perception of their own posture. Once awareness is in place, the patient learns an "active self-correction", where they are trained to find the best possible alignment of the spine and trunk in all three-dimensions. The SEAS method then focuses on achieving trunk and spine stabilization through individualized exercises and incorporation of the active self-correction into daily activities. The SEAS method is unique in that it uses less props and is easier to implement in day-to-day life.

Monticone M, Ambrosini E, Cazzaniga D, Rocca B, Ferrante S. Active self-correction and task-oriented exercises reduce spinal deformity and improve quality of life in subjects with mild adolescent idiopathic scoliosis. Results of a randomised controlled trial. Eur Spine J. 2014;23(6):1204-1214.

Lyon Method - Lyon, France

The Lyon Method is the oldest PSSE method in existence and combines scoliosis-specific exercise with bracing. The Lyon school of physiotherapy is directed by Dr. Jean Claude de Mauroy. It is the first method to focus on the importance of the sagittal plane (side view) alignment and its role in affecting scoliosis progression.

De Mauroy JC, Fort D. Prospective study of 393 adolescent thoracic hyperkyphosis patients treated by the Lyon method. Scoliosis. 2013;8(S2):050.

What to Expect

Our therapists practice with a philosophy that considers the whole person, and not simply a painful body part. Your experience with us will begin with a thorough and comprehensive assessment. We will take a history, and perform an exam that investigates your posture, function, movement patterns, breathing patterns, and muscle performance, as well as tissue tone. A plan of care will be developed based on goals set by you and your therapist together and individualized to your needs. You can expect to be with us for up to 45 minutes for your initial appointment.

What to bring to your first appointment

Please bring a prescription from your referring provider if you have one, insurance information, as well as any diagnostic tests such as x rays for your therapist to review. Note: if you are a patient who was seen or referred by a Columbia provider, your MD notes, PT script, and imaging will be in our system, so no need to bring them to your appointment.

What to wear to your first appointment

Bring or wear comfortable clothes that enable you and your therapist to observe your trunk as you perform various postures and movements. For females, this includes a sports bra or bathing suit top and shorts. For males, this includes a T-shirt and shorts.

What are the Exercises Like?

You may find the experience of scoliosis-specific exercises to be different than conventional exercises. The exercises have an emphasis on body awareness and discovering the most centered and sturdy alignment for your unique spine and trunk shape in all three dimensions (front view, side view, and rotation). You and your therapist will work to create stronger postural muscles and you will learn to utilize your new alignment knowledge in activities of daily life, school, sports, and work. If appropriate, your therapist will review modifications to conventional exercises you are doing to ensure you are able to maintain your best alignment. Mirrors, hands-on guidance, as well as external props might be used to facilitate your most optimal posture. The total duration of your program will vary based on your individual needs, but usually averages 10-15 total sessions.

Schroth Therapists Directory

ColumbiaDoctors and New York Presbyterian Hospital have several certified Schroth therapists in different areas of New York.

Och Spine at NewYork-Presbyterian/The Spiral (Hudson Yards) – 5141 Broadway, New York, NY, Appointments: 212-305-4878

Prachi Bakarania, DPT (Currently does Video Visits – please email scoliosisspinept@cumc.columbia.edu or call the number above to request an appointment).

Abigail Smul, PT, DPT

Columbia Tarrytown Practice – 155 White Plains Road, Suite 102, Appointments: 914-333-2403

Rebekah Wallach, PT, DPT

Trella Allen, DPT

NewYork Presbyterian/Lawrence Hospital (Eastchester) – 329 White Plains Road, Appointments: 914-787-3370

Meghan Fontaine, PT, DPT

Mary Miceli, DPT, BSPTS

Brianna Lotrione, DPT

NewYork Presbyterian Brooklyn Methodist Hospital – 263 7th Avenue, Brooklyn, NY 11215, Appointments: 718-369-8000

Kevin Migliore, PT, DPT

To find a PSSE therapist in your area, please contact us for recommendations of therapists that we often work with. You can also view a more expansive list on the websites below:

- Schrothptsintheus.com
- Schroth-barcelonainstitute.com/physical-therapists-directory

Calcium and Vitamin D Supplementation

Recent research suggests that Calcium and Vitamin D supplementation may further reduce the risk of progression of adolescent idiopathic scoliosis.

We recommend that you take **600 mg of Calcium** and **800 IU of Vitamin D3 daily**.

Many pharmacy chains carry this dose of calcium and vitamin D in one pill (see below for product examples). This is a common over the counter supplement and does not require a prescription.

NewYork-Presbyterian
Brooklyn Methodist Hospital

Product Name	Product Image	Ca and Vit D
Vitafusion Calcium Gummy		1000 IU vit D 500 mg calcium (2 gummies)
Nature's Way Alive! Calcium + D3 Gummy		1000 IU vit D 500 mg calcium (2 gummies)
Adora Calcium Chews		500 IU vit D 500 mg calcium (1 disk)
Viactiv Calcium plus D Chews		500 IU vit D 650 mg calcium (1 chew)
21st Century 600 + D3 Plus Minerals, Chewable Tablets		800 IU vit D 600 mg calcium (1 tab)
Caltrate Calcium and Vitamin D Plus Minerals, 600+D, Chewables Orange and Fruit Punch		800 IU vit D 600 mg calcium (1 tab)
Children's Genexa Vitamin D3 Drops		800 IU vit D (2 drops)
Ddrops Booster, Liquid Vitamin D3		600 IU vit D (1 drop)

NewYork-Presbyterian Kids

Research Articles

If you wish to do further reading about this non-operative approach to the treatment of scoliosis, we recommend the following articles:

Weinstein SL, Dolan LA, Wright JG, Dobbs MB. "Effects of Bracing in Adolescents with Idiopathic Scoliosis." *The New England Journal of Medicine*. 2013 Oct 17;369(16):1512-21.

Sanders JO, Khoury JG, Kishan S, Browne RH, Mooney JF, Arnold KD, et al. "Predicting scoliosis progression from skeletal maturity: a simplified classification during adolescence." *The Journal of Bone and Joint Surgery.* 2008 Mar;90(3):540–53.

Kuru T, Yeldan I, Dereli EE, O Zdincler AR, Dikici F, Colak I. "The efficacy of three-dimensional Schroth exercises in adolescent idiopathic scoliosis: a randomised controlled clinical trial." *Clinical Rehabilitation.* 2015;30(2):181–190.

Monticone M, Ambrosini E, Cazzaniga D, Rocca B, Ferrante S. "Active self-correction and task-oriented exercises reduce spinal deformity and improve quality of life in subjects with mild adolescent idiopathic scoliosis. Results of a randomised controlled trial." *European Spine Journal.* 2014;23(6):1204–1214.

Schreiber S, Parent EC, Moez EK, et al. "The effect of Schroth exercises added to the standard of care on the quality of life and muscle endurance in adolescents with idiopathic scoliosis—an assessor and statistician blinded randomized controlled trial: " SOSORT 2015 Award Winner." *Scoliosis Journal* 2015;10(24).

Exercises Added to the Standard of Care Lead to Better Cobb Angle Outcomes in Adolescents with Idiopathic Scoliosis - an Assessor and Statistician Blinded Randomized Controlled Trial. PLoS ONE. 2016;11(12):e0168746.

Kuru T, Yeldan İ, Dereli EE, Özdinçler AR, Dikici F, Çolak İ. The efficacy of three-dimensional Schroth exercises in adolescent idiopathic scoliosis: A randomised controlled clinical trial. Clin Rehabil. 2015

Kwan KYH, Cheng ACS, Koh HY, Chiu AYY, Cheung KMC. Effectiveness of Schroth exercises during bracing in adolescent idiopathic scoliosis: results from a preliminary study-SOSORT Award 2017 Winner. Scoliosis Spinal Disord. 2017;12:32.

Liu D, Yang Y, Yu X, et al. Effects of Specific Exercise Therapy on Adolescent Patients With Idiopathic Scoliosis: A Prospective Controlled Cohort Study. Spine (Phila Pa 1976). 2020;45(15):1039-1046. doi:10.1097/BRS.0000000000003451

Monticone, M, Ambrosini, E, Cazzaniga, D, Rocca, B, Ferrante, S. Active self-correction and task-oriented exercises reduce spinal deformity and improve quality of life in subjects with mild adolescent idiopathic scoliosis. Results of a randomised controlled trial. European Spine Journal Eur Spine J. 2014:1204–1214.

Schreiber S, Parent EC, Khodayari moez E, et al. Schroth Physiotherapeutic Scoliosis-Specific Exercises Added to the Standard of Care Lead to Better Cobb Angle Outcomes in Adolescents with Idiopathic Scoliosis - an Assessor and Statistician Blinded Randomized Controlled Trial. PLoS ONE. 2016;11(12):e0168746.

Schreiber S, Parent EC, Moez EK, et al. The effect of Schroth exercises added to the standard of care on the quality of life and muscle endurance in adolescents with idiopathic scoliosis-an assessor and statistician blinded randomized controlled trial: "SOSORT 2015 Award Winner". Scoliosis. 2015;10:24.

Negrini S, Donzelli S, Aulisa AG, et al. 2016 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. Scoliosis Spinal Disord. 2018;13:3. Published 2018 Jan 10. doi:10.1186/s13013-017-0145-8

Roye BD, Simhon ME, Matsumoto H, et al. Establishing consensus on the best practice guidelines for the use of bracing in adolescent idiopathic scoliosis. Spine Deform. 2020;8(4):597-604.

Mental Health Program

At the Pediatric Orthopedic Department at CUIMC, we are proud to be at the forefront of integrating mental health care into orthopedic care. We recognize the significant impact that mental health can have on a child's overall well-being and healing process. Research has shown that scoliosis can greatly influence mental health, including increased rates of anxiety and depression. We are proud to offer an integrated mental health program to all of our patients. The program ensures that mental health assistance is not just an afterthought, but a core component of the care we provide. Our dedicated Mental Health Coordinator works closely with both our patients and their families to connect them with mental health resources.

Here are some of the ways that we integrate mental health support into the care we provide:

- Screening for Mental Health Needs: We regularly use the PROMIS Pediatric Anxiety and PROMIS Pediatric Depressive Symptoms questionnaires to identify patients who may benefit from mental health support. These screenings help us to understand your child's emotional and psychological needs.

- Access to Specialized Care: Our Mental Health Coordinator can assist you to find pediatric mental health clinicians through the Columbia system or a trusted local provider in your community. These clinicians have completed specialized training, including Scoliosis Training for Mental Health Providers, so they are well equipped to understand the unique challenges our patients face.

- Personalized Approach: We recognize that every family's needs are different. Our Mental Health Coordinator will take the time to understand your unique situation and preferences. They will assist you in coordinating appointments based on your schedule, insurance, and budget. We handle logistics, so you can focus on your child's health and well-being.

We encourage you to reach out to your surgeon and their team if you are concerned about your child's mental health at any stage of the treatment process. We are here to help you connect with the appropriate resources.

Contact:

Julia Rakin, Mental Health Coordinator

Jr4593@cumc.columbia.edu or call (212) 305-5475 and ask to be transferred.

#HealingSpinesandMinds

Scoliosis Resources

Apps and Websites

- Dr. Vitale's Website Pediatricscoliosissurgery.com
- *Scoliosis Tracker* App
- *BraceTrack* for Scoliosis
- Pediatric Orthopaedic Society of North America (POSNA) Patient Education Site https://orthokids.org/

Non Fiction Books

- Scoliosis A Guide for Children and Their Families by Michael G. Vitale and Amber Sentell, Mizerik, PA-C
- Straight Talk with the Curvy Girls by Theresa Mulvaney and Robin Stoltz
- Straight Talk Scoliosis The Journey Continues by Theresa Mulvaney and Robin Stoltz
- Finding Curvy Girls Activity Book
- For providers: Staying Out of Trouble in Pediatric Orthopedics (textbook)
- Tangled in the Curves: Real Life with Idipathic Scolioisis by Caroline Bell

Fiction Books

- Braced by Alyson Gerber
- Dear Isaac Newton You're Ruining My Life by Rachel Hruza
- When Life Throws You a Curve by Elizabeth Golden
- I'm Bent Not Broken by Caroline Bielen
- Deenie by Judy Blume
- Beautiful Crooked Letter I by Shae Smith
- The Back Brace Bully by Joe Capi
- Mannuquin Girl by Ellen Litman
- The Triumphs of Scoliosis by Kimberly Ann Cunanam Garza
- Cole and the Crooked Flower
- Being Grace by June Hyjek
- Beautiful Crooked Letter I by Shae Smith
- No More Curves for Doris the Spinosaurus by Christine Cirillo

Support Groups

- Curvy Girls – Support Group
- SCOLIOS-US – Mentoring Resources

Organizations

- Pediatric Spine Foundation
- Setting Scoliosis Straight Foundation
- Higgy Bears
- National Scoliosis Foundation

For Providers (Associations, Groups)

- SOSORT
- POSNA/POSNA OrthoKids
- HARMS Study Group
- Safety in Spine Surgery
- AAOS
- Scoliosis Research Society

Clothing

- Brace Buddies
- Hope's Closet
- Embraced in Comfort

Other/Misc:

- Columbia's Patient to Patient Program
- Facebook Support Groups
- NY Times Article on Schroth Therapy: https://bit.ly/s-shape

Notes

Brace Protocol

You will have a total of four appointments with our team. The first three appointments will take place at either NYP/Morgan Stanley Children's Hospital in New York City or the ColumbiaDoctors Tarrytown Office in Tarrytown, NY with John Tunney, orthotist, and Brianna Campbell, NP. The final appointment will be with your orthopedic provider.

1. Brace Measurement Appointment

- **Purpose:** To take the necessary measurements for your scoliosis brace.
- **Location:** NYP/Morgan Stanley Children's Hospital **OR** ColumbiaDoctors Tarrytown Office.
- **With:** John Tunney, Orthotist.
- **Duration:** 1 hour.
- **Date:** _____
- **Preparation:** If possible, please wear relatively tight-fitting and seamless clothing. For girls, leggings and a sports bra are recommended.

2. Brace Fitting Appointment

- **Purpose:** To receive and be fitted with your scoliosis brace.
- **Location:** NYP/Morgan Stanley Children's Hospital **OR** ColumbiaDoctors Tarrytown Office.
- **With:** John Tunney, Orthotist.
- **Duration:** 2 hours.
- **Date:** _____

3. Brace Check Appointment (with In-Brace X-ray)

- **Purpose:** To check the effectiveness of your brace with an in-brace X-ray and discuss your progress with weaning into the brace.
- **Location:** NYP/Morgan Stanley Children's Hospital **OR** ColumbiaDoctors Tarrytown Office.
- **With:** Brianna Campbell, CPNP, and John Tunney, Orthotist.
- **Approximate Timing:** 6 weeks after your Brace Fitting Appointment.
- **Date:** _____
- **Important Instructions:**
    - Please arrive **1 hour early** to your appointment to meet with John Tunney *before* your X-ray. This will allow him to help you put on your brace correctly for the in-brace X-ray.
    - **Option for In-Person Appointment with Both Brianna and John:** To schedule an in-person appointment with both Brianna and John on the same day:
        - Call Columbia Orthopedics at **(212) 305-4565** to schedule a brace check appointment with Brianna. Please ask to schedule a day that John is also in the office.
        - Then, call Angela Berberich at **(631) 392-2237** to schedule an appointment with John for the same day.

  - Joint appointments with both Brianna and John are typically available on **Tuesday mornings, Mondays, and select Tuesday afternoons at Morgan Stanley Children's Hospital**, and **Wednesday mornings at Tarrytown**.
  - You may also see Amber Mizerik, PA, if you have an in-person appointment with John on Friday afternoon in Tarrytown.
- **Option for In-Person Appointment with John and Telehealth Appointment with Brianna:** If you prefer a video visit with Brianna:
  - Then, call Angela Berberich at **(631) 392-2237** to schedule an appointment with John anytime up to 7 days *prior* to your telehealth appointment with Brianna.
  - Call Columbia Orthopedics at **(212) 305-4565** to schedule a telehealth appointment with Brianna.

4. Appointment with Your Doctor (with Out-of-Brace X-ray)

- **Purpose:** To review your progress and obtain an out-of-brace X-ray.
- **Location:** To be determined by your doctor's office.
- **With:** Your Scoliosis Doctor.
- **Approximate Timing:** Approximately 4-5 months after your Brace Check Appointment
- **Date:** _____
- **Important Instruction:** *DO NOT WEAR YOUR BRACE FOR 24 HOURS PRIOR TO THIS APPOINTMENT!*

Questions?

- **For questions regarding insurance authorizations for your brace, or to schedule an appointment with John Tunney for your Brace Measurement or Brace Fitting Appointment, please contact:**
  - Angela Berberich at East Coast Orthotics: **(631) 392-2237**
- **To schedule an appointment with a Columbia Orthopedics provider, please contact our appointment scheduling team at:**
  - Columbia Orthopedics: **(212) 305-4565**

What to Expect: **Non-Operative Care**

COLUMBIA UNIVERSITY
DEPARTMENT OF ORTHOPEDIC SURGERY
College of Physicians and Surgeons

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Morgan Stanley Children's Hospital

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