

A CALL FOR IMMEDIATE ACTION TO RESOLVE
A PROBABLE PUBLIC HEALTH EMERGENCY

1. THE IMMEDIATE FIRST STEP: CONDUCT THE MISSING RESEARCH TO PROVIDE ABSOLUTELY DEFINITIVE SCIENTIFIC CONFIRMATION OF ELEVATED SHOE HEELS AS THE ARTIFICIAL CAUSE OF SUBTALAR JOINT SUPINATION AND RESULTANT ABNORMAL DEFORMITY OF THE MODERN HUMAN BODY

The weight of the initial evidence already disclosed is strong and its implications appear to be critically important to a new, corrected understanding of human anatomy and greatly improved medical care based on it. However, the available research on the supination of the subtalar joint by elevated shoe heels and its direct effect on human anatomy and related medical care outlined here is so new and based on only a single study using the latest techniques of modern biomechanical measurement of joint motion. As a consequence, while compelling, the available evidence can only support a preliminary conclusion. Therefore, the artificial coupling evidence needs to be replicated and confirmed by better, more complete studies as soon as possible, so that future corrective action required by it, which is likely to be extensive, can be taken with confidence. Given the magnitude of the anatomical and medical stakes, this is an urgent issue.

To do so, the significant limitations of even the best of existing biomechanical research such as the new gold standard Peltz study must be overcome. Most critically, no test subjects from never-shod barefoot populations were included in that study, but must be now. That glaring gap must be filled. No accurate biomechanical studies currently exist to provide direct comparisons of never-shod barefoot populations with the habitually-shod populations of the same genetic background. Only such new studies that include never-shod barefoot populations can fully exclude from testing the artificial effect of shoes and elevated shoe heels on the human body and thereby provide completely reliable results.

A New, Fully Comprehensive Peltz et al. Study: The core of the Peltz study team has both the scientific expertise and industry funding resources to accomplish the crucial beginning step by performing a new, completely unique study using the same basic protocols using the new gold standard of measurement as their 2014 study. The major point of distinction of the new study would be to include never-shod test subjects with genetically identical habitually shod test subjects. The two groups are expected to show significant differences that would be attributed to the modern footwear.

Both groups also should be differentiated by sexes, which also are expected to show significant differences. Previously identified limitations of the 2014 study such as lack of an

adaption period must also be addressed by using an intermediate adaptation period between test conditions, such as an hour or two, and a longer adaptation period, such as a day and/or week and/or month.

Commonly used racial distinctions are highly inaccurate at best, and their use was widely abused and misinterpreted in older anatomical and physical anthropological studies. Far more accurate genetic testing should be employed now in the new study to screen test subjects to ensure that any observed variations between habitually-shod and never-shod test subject measurements are not due to genetic influences. Genetically-based male/female sex distinctions are likely to be meaningful and should be tracked separately.

The results of this unique single new study should provide a relatively quick and highly probable confirmation or initial proof based on its reliably definitive data that has never been available. The enhanced new Peltz study can provide a reliable basis for action in the form of a major new, multi-disciplinary research effort, including follow-on similar studies with other population groups to provide absolute confirmation.

A Barefoot Grand Challenge: There is a longstanding and critical lack of essential biomechanical data based on the new gold standard of joint motion measurement. Since virtually all prior running studies are obsolete, all of the required biomechanical knowledge about functionality and normalcy depends upon new gold standard-based data. What is now required is no less than a significant and focused effort along the lines of a scientific Grand Challenge. A general example of such a proposed **Grand Challenge on the Comparative Human Anatomy of Habitually Shod and Always Barefoot Runners** is the recent Grand Challenge on predicting *in vivo* knee loads.

It should be led by two outstanding leaders, both with unique qualifications. The first was one of the leaders of that earlier Grand Challenge, Dr. Thor Besier, who has extensive footwear research experience. The second is the distinguished researcher, Dr. Toni Arndt, who pioneered the first major multi-disciplinary effort to obtain ultra-precise measurement of foot, ankle, and lower leg bones and joints during running.

Dr. Arndt also recently finished his term as the President of the **International Society of Biomechanics (ISB)**, an organization which is in a position to coordinate the efforts of the other professional organizations in related fields that should be directly involved, such as anatomy, orthopedics, podiatry, physical anthropology, footwear, physical therapy, computer technology, and others, as well as government agencies such as the CDC, NIH and FDA in the U. S. and abroad.

As a leader in the field of the new gold standard of joint measurement, Dr. Michael Rainbow can provide critical technical support to the Grand Challenge to ensure its consistently correct use in a multitude of separate research efforts. The leadership of the Grand Challenge should provide general oversight and final review of the new enhanced Peltz study.

But more than just new studies are required immediately.

SAVE THE CHILDREN NOW: IT IS POSSIBLE TO PROVIDE IMMEDIATE AND COST-FREE PROTECTION FROM THIS MEDICAL CATASTROPHE FOR OUR YOUNGEST CHILDREN AND FOR ALL FUTURE GENERATIONS OF CHILDREN

The other critical immediate step is the prevention of this artificial deformity in our youngest children. Unlike adults, for whom effective treatment is unknown today, prevention is simple and effective for all those very young children who have never worn modern shoes or have done so only briefly. Without that prevention, studies indicate the onset of deformity occurs as rapid as just a few months. Most young children who have worn conventional modern footwear for several years have already developed the elevated shoe heel-based tilted and twisted misalignment and associated deformities to a significant degree, as shown by the tilted lower legs of children in a race in **FIGURE 29**.

It is therefore absolutely critical that all toddlers who are starting to walk and run are kept away from modern footwear with elevated heels. They should go barefoot as much as possible.

They should be exposed only to the most minimal of existing footwear that is without elevated heels throughout their childhood. The children's footwear industry needs to immediately identify on their respective websites and wholesale and retail outlets which current shoe models by name are flat, with no elevated shoe heels, and which shoe models have elevated heels, indicating the height exactly, preferably in both millimeters and inches. Caring parents must be provided the critical information they need to make informed footwear decisions for their children to save them now from a lifetime of ever more serious, non-reversible deformity.

The footwear industry also needs to redesign immediately any baby or toddler or child footwear with elevated shoe heels. All existing baby or toddler footwear with elevated heels should immediately include warning labels provided by shoe companies, retailers and wholesalers. Future generations can avoid, easily and entirely, the otherwise mandatory participation in the current medical catastrophe, but only if the footwear companies provide them with footwear without elevated heels at every stage of their walking and running lives.

Any delay in this easy prevention measure potentially dooms all of those young children – hundreds of millions of them worldwide every year – to be left behind, doomed to a life of ever-increasing structural misalignment and unnatural deformity, deformity for which no cure is currently known (and may not exist for the foreseeable future or perhaps never). Once the artificial malalignment is triggered, perhaps in only a few months, there is no way now known to undo it.

A major public information campaign by the leadership of the footwear industry needs to be undertaken now to alert the public as to the possible danger of non-reversible deformity from use of conventional modern footwear for toddlers and young children, both for them now and as they grow. Children's hospitals, the pediatric departments of general hospitals, and public health services at the county and state levels should be utilized by the U.S. Department of Health and Human Services (HHS) to spread the warning to parents. This public warning needs to be made

as soon as possible, since there is absolutely no downside risk of potential physical injury to children from such a public alert. They cannot be harmed by avoiding footwear with elevated heels.

On the other hand, there also is no known benefit for these young children to gain from wearing shoe with elevated heels anyway, only the potential danger of lifelong deformity. So it is a no-brainer to avoid them for now, if only the public is informed to do so.

Therefore, taking this initial public warning step now, concurrent with undertaking confirmation studies, to publicize the significant potential deformity danger should be considered as the only reasonable precautionary course of action, given the weight of available evidence.

SAVE THE SENIORS: PROVIDING EFFECTIVE TREATMENT NOW FOR THE MOST DEFORMED AND MOST EXPENSIVE MEDICALLY

It is obvious that most seniors do not run at all and many do not even walk very much or at all, so attempting to provide a footwear solution that somehow undoes the advanced state of their structural bone and joint deformities (originally formed by running) is extremely unlikely to be effective, even if a footwear solution were known today, which it is not. Nor is future success in finding a footwear solution at all certain or, if it is, when it might be available.

Fortunately, a non-footwear treatment is likely to be at least beneficial, if not curative or preventive, including for seniors who do walk or otherwise exercise to gain its proven health benefits. A new program of stretches and exercises is currently under development that does appear to at least counteract the worst effects of the shoe heel-induced deformities, improving both function and quality of life and potentially reducing medical costs.

It should be particularly useful for seniors, who have no other recourse now, but will also help reduce the effects of the artificial deformity that has already developed in younger adults and older children, and even in elite athletes, perhaps slowing or ending the progressive development of the deformity. The new program is still in a development and testing phase, but a limited, initial version is expected to be released for initial public testing as soon as possible.

2. THE SECOND STEP: THE MOST EFFECTIVE WAY TO OVERCOME THE UNNATURAL MEDICAL CATASTROPHE FOR THE BILLIONS WHO ARE ALREADY DEFORMED

The only good news is that the actual cost to fix this catastrophic medical problem for the existing billions of already deformed older children and adults will be far less than continuing to do nothing for these involuntary human Guinea Pigs, since the payback in health care savings should be immediate and significant and continually growing. Over a multi-generational period of many decades the eventual savings may be as high as \$1.5 trillion each year in the U.S. when the unnatural deformity is finally eradicated, as well as a huge increase in quality of life throughout each individual's lifetime, particularly when elderly.

That tremendous payback is in contrast, for example, to comparable investments in

massive space-based or terrestrial telescopes or gigantic particle colliders or detectors – each one involving funding in the billions – for which it is difficult to identify cost savings or tangible benefits. After years of delay and cost overruns, the final cost of the James Webb Space Telescope is about \$10 billion.

Moreover, the non-tangible benefits are often random incremental increases in human knowledge, although ironically in those two exemplary scientific fields it sometimes seems that the more that is discovered at great financial cost, the less is understood about both the universe and matter. Dark matter, dark energy, multiple universes, string theory, and even the big bang – all seem almost incomprehensible.

Nevertheless, astronomy and particle physics receive vastly more research funding today than gross human anatomy or the biomechanical study of the human body in motion, particularly in the field of running, despite the need for reliable answers to the urgent questions raised in this article.

Unfortunately, the current reality is that biomechanics research is so drastically underfunded that it is impossible for it to accomplish the basic mission so urgently required now. There is not a single biomechanics laboratory in the world, including at any of the shoe companies, sufficiently equipped and staffed to investigate the complexity of important data that is being ignored in current studies.

Even the new LeBron James Innovation Center at Nike that opened in October, 2021, five times larger than its predecessor facility, only extends and elaborates existing methods and standards of research and development instead of being configured to pioneer new and better ones. For example, the Innovation Center has hundreds of new motion capture cameras, but the only part of the lab photographed publicly at the opening shows a multitude of cameras all elaborately located in the least useful positions to produce meaningful experimental results on footwear performance.

Simply going barefoot or eliminating elevated shoe heels is not the answer for most adults. For those with significant structural deformity with the greatest need for help, the artificial shoe heels having become de facto an essential structural prop, and removing that artificial prop leads to a further physical collapse into bilateral asymmetry, which only gets worse over time. There are no known answers now, no simple answers and no general answers.

It is therefore urgent that we, for the first time, focus on the true cause – elevated shoe heels – of this global mass epidemic of modern human deformity, with its untold level of cost and misery, and that we focus on finding effective treatment for the direct effects of that cause, rather than blindly continuing the mere treatment of its multitude of seemingly unrelated symptoms.

A New Center for Theoretical Human Anatomy: The most effective way to solve the critical medical problem described in this article is with the creation of a major non-profit foundation, a new Center for Theoretical Human Anatomy, dedicated to independent basic

research on the currently unknown natural barefoot human body and development of effective treatments for the deformed modern body.

The Center would be focused on uncovering a detailed description of the natural human body, which would be a major new scientific discovery, currently unknown and required as a basis for far better health care treatments for deformity-related medical issues that finally treat the underlying causes, not just the symptoms. The natural human body is defined as that which has been born and grown totally devoid of any artificial structural influences like modern footwear with elevated heels.

Equally important for the Center, but far more difficult and time-consuming, would be finding effective treatments for the widespread existing artificial deformity induced by elevated shoe heel and its effects. This might take a decade or more, but the critical work must begin now.

All of the operations of the Center would need to be strictly independent of direct commercial conflicts of interest, such as those that would be expected to unavoidably arise with footwear companies, whose focus is commercial product development rather than basic research. In fact, the most critical role of the Center is to provide the highest possible level of independent research, a level of independence impossible within the industry, as even existing academic research strongly indicates. The Center should be led by medical, anatomical, and biomechanical specialists, all as independent of the footwear industry as possible contractually, so as to provide trustworthy basic research that is conducted firmly isolated from commercial conflict of interest.

Some form of government regulation of the footwear industry is likely in the absence of decisive action by industry members to preempt that regulation by voluntarily providing for the missing basic research. In the absence of that voluntary action, an effective governmental role might be to tax footwear companies directly with an offsetting tax credit for funding independent basic research, such as independent and credible basic research that would be done by or through the **Center**.

To preempt the imposition of government regulation, large and highly profitable footwear companies probably need to make substantial voluntary contributions on the order of 2% of annual revenues to the non-profit research Center necessary to obtain the independent and credible basic research it urgently needs now to replace the deeply flawed designs in current use, as well as to maintain good relations with a public dissatisfied with the serious public health problems caused for many decades by a defective basic design in footwear soles.

In doing so, the footwear industry will be playing catch-up in funding basic footwear research. For many decades the largest footwear companies spent less than 10% of the U.S. all-industry average on R&D, while at the same time spending about 40 times more on marketing in the form of superstar athlete and university endorsements. Moreover, virtually all of the footwear industry R&D goes exclusively to the development of commercial products, not to basic research. If only to avoid an unduly challenging public relations scenario, the footwear

industry must redirect a meaningful portion of its operating funds from its traditional marketing to basic research done by the Center.

Ironically, doing so would be brilliant marketing for the footwear companies. In addition, it will likely enable them to be transformed into true high tech companies with highly sophisticated products that incorporate electronically controlled footwear capable of such a greater user benefit than their current products – likely including major increases in health and quality of life, as well as critical medical care savings – that they have the realistic potential to be worthy of the valuations of today’s leaders of Silicon Valley, as discussed below.

It cannot be overemphasized that all parties – the public, the footwear companies, the health care industry, and the biomechanics, anatomy, and other research scientists – are likely to benefit very substantially in every way from finding the most effective solutions to this challenging footwear-induced problem as soon as possible. This should be a massive win-win situation for everyone.

FILLING THE INEXCUSABLE VOID OF FORMAL ACADEMIC RESEARCH ON FOOTWEAR SOLE STRUCTURE AS THE CRITICALLY IMPORTANT STRUCTURAL FOUNDATION OF THE MODERN HUMAN BODY

Phil Knight is the co-founder and former CEO and Chairman of Nike, which is the most profitable footwear company in the world by far. He is personally in a unique financial position (with reported assets of about \$50 billion) to massively jumpstart the enormous effort urgently needed to close the gigantic gap in basic research mentioned previously.

There are about 60 U.S. university academic programs on the architecture of buildings (and about 700 programs worldwide), but not a single university academic program anywhere on the structural engineering of footwear soles, despite their key role as the artificial structural foundation of the modern human body, upon which depends the body’s medical care and well-being. In that absence of structural engineering, most existing shoe designers today are educated in art schools and focus much more on appearance and commercial appeal than structure and function.

The need is extreme. Currently, it is the Wild West in shoe sole commercial products. Quite literally, anything goes. There are no required safety or injury-avoidance standards for the physical structure of shoe sole, even for athletic or everyday work shoes.

Unnatural instability is unquestioned and universal, and the epidemic of related injuries has never been recognized. Hidden defects in the most basic designs have persisted unquestioned for centuries until now. There is essentially no governmental regulation nor is there any established scientific basis or qualified personnel for instituting it.

Quality control is almost entirely focused on mechanical testing of materials. Quality control based on testing actual human use excludes nearly all categories of actual footwear users. For example, for running shoes, human run testing occurs only with runners who are consistently

uninjured, a tiny fraction that is completely unrepresentative of all users. Such testing is never performed on actual everyday runners, most of whom are often injured, and never on those runners while they are injured in order to find out what is going wrong.

It is also never performed on non-runners, the group that constitutes nearly all the users of running shoes, but whose actual use is limited to walking. How many of them do not run because they tried in the past but could not do so without injury? That question is unasked and unanswered.

If we were ‘born to run’, as studies of barefoot populations seem to indicate, why is that impossible to do without injury for nearly all runners (and former runners) of the modern shod populations? That obvious question goes unasked and unanswered in the footwear industry.

In no other industry is outright experimentation on the general public with unrealistically tested products so completely tolerated. That overlooked situation has now been made known as intolerable and its continuation is unacceptable.

Phil Knight is in the ideal position of unique background and personal wealth to understand and fulfill the need to create a new **Knight Foundation for Footwear Research** with a primary mission to create elite academic programs to investigate the biomechanical effects of footwear sole structure on human anatomy and health care. The center of the Foundation could be located at Stanford University, his business school alma mater where his initial business plan for what became Nike was developed.

The Knight Foundation would establish and lead the new academic research field with the highest possible standard of scholarship. Since the results of the new field of research are likely to be developed in conjunction with massive data analytics and artificial intelligence, locating the central Knight Foundation research center in Silicon Valley would be logical. The **Center for Theoretical Human Anatomy** also would best be located at or near Stanford University to coordinate closely with the University’s academic footwear research program.

As soon as possible, the Knight Foundation for Footwear Research should also fund similar other such academic research programs at other elite research universities in the U.S. that include affiliated hospitals with major medical care research efforts, such as Harvard/MIT and Johns Hopkins Universities. His foundation should also fund such programs at the leading research hospitals such as the Mayo and Cleveland Clinics, as well as similar elite research universities and hospitals elsewhere in the U. S. and throughout the world.

Boston Children’s Hospital, the Children’s Hospital of Philadelphia, and the Children’s National Medical Center, as well as other elite children’s hospitals, should be included in this creation of new academic research program, since their patient populations provide unique opportunities for research on the progression of the artificial deformity during the critically important formative years of childhood growth.

Foremost among the major critical research projects to be undertaken by the Knight Foundation would be to provide the academic basis and resources for a fundamental revision of **Gray’s Anatomy**, the single most important medical reference, often referred to as the “doctor’s

bible.” The problem with the current and preceding forty-one editions of *Gray’s Anatomy* is that they describe the structure of many anatomical structures like the modern human knee joint as normal when they are in fact abnormal, while at the same time omitting a description of the knee’s true normal anatomical structure. This same fundamental error has been repeated for many or most important anatomical structures. An extraordinarily major undertaking in academic anatomical research over many years is required to support a full correction of this most fundamental error.

The most recent and now retired editor-in-chief, Susan Standring could play an essential role in at least starting up the revision effort, particularly since she previously led the most fundamental previous change to *Gray’s Anatomy*. That was its reorganization several editions ago from an anatomical system presentation, such as of the skeletal, circulatory, or nervous systems, to an anatomical region presentation, such as of the foot, heart, or head.

With the new basic revision effort now required, determining how to organize and present the normal and parallel abnormal anatomical structures in a manner that would be the most clinically and anatomically effective is the key question. Dr. Standring’s expertise could be critical at the start in best making that determination.

THE ESSENTIAL NEW TOOL: A SMARTSOLE WITH SENSORS AND CONFIGURABLE STRUCTURES CONTROLLED BY A SMARTPHONE WILL PROVIDE THE SOLUTION, WITH HELP FROM THE CLOUD

I firmly believe that it is impossible with current methods to find effective solutions to existing shoe heel-induced structural misalignments because they are extraordinarily complex and diverse. I think comprehensive solutions for all individuals will require high technology in the form of footwear **smartsoles** with sensors and configurable structures that are controlled by a wearer’s smartphone that is connected to other sensors on the body and to a cloud of computers. Artificial intelligence that utilizes machine learning techniques – typically referred to as “deep learning” – must be applied to the big data in the cloud that has been received from, at first, hundreds, then thousands, and eventually many millions of shoe wearers with smartsoles linked to smartphones.

Computer, network, and related technologies that have been developed for decades will soon make this comprehensive solution economically viable. As a result, the defective conventional shoe sole will be transformed from a dumb, passive structure that creates medically dangerous structural and functional deformities into an active smartsole that is capable of reducing or eliminating those same deformities by utilizing the most highly evolved tools of modern digital technology.

As an inventor, I filed U. S. and international patent applications, and received a U. S. Patent on this new basic approach in technology, Number US 9,030,335, on May 12, 2015. The title of the patent is “*Smartphone App-Controlled Configuration of Footwear Soles Using*

Sensors in the Smartphone and the Soles.” It is also available to view on the Internet at my website: www.AnatomicResearch.com or at the **USPTO** website, together with eight new and directly related patents: US 9,063,529, US 9,100,495, US 9,160,836, US 9,207,660, and US 9,375,047, US 9,504,291, US 9,709,971, and US 9,877,523. Others are pending.

A short time after I was awarded the ‘335 patent, an unsolicited but highly laudatory third-party **YouTube** video complete with animation appeared based on it. It was a complete surprise. The ‘335 patent was singled out from many thousands of other new patents for special praise. You can see it by searching for the title, “**Smart Shoe – finally humanity invents the shoe that it deserves**”, or at the link: www.youtube.com/watch?v=CjBhghWDMoM.

One of the interesting features of this new dual smartphone and **smartsole** technology is that it empowers millions of users to become active **citizen scientists**. Users can contribute the critical mass of personal data needed to provide the basis for the most effective solutions to extraordinarily complex imbalances caused by individual structural and functional asymmetries. Their smartphones can provide a real-time user window into the entire process via the smartphone and empower the user to retain overall control of their own personal system to repair the damage created by defective shoe soles.

The coordinating non-profit foundation, the Center for Theoretical Human Anatomy, must start up as quickly as possible with all the resources it needs to be effective. To assist in that regard, I am willing to contribute both my time to assist in starting up the Center and also to contribute my extensive patent portfolio of over 100 U.S. and foreign patents that enable most of the new technologies that I believe are most central to its success. My patent portfolio and the new technologies developed by the Center will be made available to be freely used by all companies that provide reasonable financial support and operational cooperation to the Center sufficient for it to function effectively in the interests of all parties: the public, the biomechanical, anatomical, and other research scientists, the health care industry, and the footwear companies.

LACK OF PRIVACY AND SECURITY OF HIGHLY PERSONAL DATA IN SMARTPHONES & THE CLOUD: AN INSURMOUNTABLE PROBLEM?

A major roadblock, however, threatens the potentially indispensable new approach I have just described. There is simply no safe way to create and store this sensitive personal data, not currently and not in the immediate future.

The continual theft of huge databases from both businesses and government provides constant proof of this never-ending and ever-increasing problem. Your smartphone and personal computer – like all other computers, including in the cloud - similarly lack reliable protection.

Current approaches in cybersecurity - all based on software – are inherently vulnerable and cannot be permanently fixed with better software, even in theory. With software alone, there can never be anything more than temporary fixes that are doomed to be eventually hacked, which often remains unknown for an extended period.

Only a basic change at the most fundamental possible level of hardware architecture can provide a practical, foolproof solution to this otherwise intractable problem. The solution is described in U.S. Patent 8,869,260 B2, issued October 21, 2014, titled “Computer or Microchip with a Master Controller Connected by a Secure Control Bus to Networked Microprocessors or Cores.” The secure control bus is isolated from input from networks including the Internet and isolated from input from components of the computer or microchip other than the master controlling device.

I provide more information on this problem and solution in Chapter 34 of my draft of the full book 2 under the “**Research**” tab at my footwear website: www.AnatomicResearch.com. You can also find more detailed information at my computer security architecture website: www.GloNetComp.com.

THE ONLY IMMEDIATE PHYSICAL RELIEF: NEW FORMS OF STRETCHING AND STRENGTH-BUILDING EXERCISES THAT SPECIFICALLY COUNTERACT THE ADVERSE EFFECT OF ELEVATED SHOE HEELS

It will, unfortunately, take time for anyone to develop and commercialize this new technology on a widespread basis. The complicated process is likely to take years, perhaps around three to five years to find and optimize effective solutions and another three to five years to commercialize at full mass market scale worldwide.

Therefore, in the immediate future, the only available relief in sight does not involve footwear. Instead, new forms of stretching and exercise are currently in the process of being developed and tested that specifically target the particular biomechanical misalignment problems caused by shoe heels.

Preliminary results suggest the high potential of a new exercise approach that provides substantial relief from the unnatural structural deformities caused by elevated shoe heels. Several specific stretching and strength-building exercises look very promising as potential “magic bullets” in effect by providing dramatic improvements in reducing the harmful symptoms caused by those deformities. I will post demonstration videos on my website, www.AnatomicResearch.com, as soon as they become available.

For now, if you are a diehard runner, like most, I would make two suggestions. First, switch to alternating between running and walking, or run/walking, instead of continuous running or jogging.

Second, alternate your exercise routine. For example, run or run/walk on one day, and switch to strength building and stretching on the other day. You should try to balance equal amounts of running and strength building/stretching.

Obviously, you can also add into your exercise schedule some other non-running aerobic exercises, such as cycling or rowing, as well as variable direction running sports such as soccer, basketball, and tennis, for examples, or dancing. However, racquet sports like tennis that typically involve swinging with one arm only, or golf with its twisting swing motion, probably

increase whatever asymmetry problems you may have.

Three aerobic exercises that I can think of may be uniquely helpful: rollerblading, ice skating, and the skating form of cross-country skiing, particularly as used when racing. They are unusual because they rely on an outward push to the side, skating motion of your legs that is similar to the frontend misalignment shown in FIGURES 10A&10B, rather than straight ahead motion required by running and walking. They are all artificial locomotion methods that may be better adapted for the abnormal structure of the modern human body.

Figure 29 A photograph of a local running race appearing in the **Brunswick News**, Brunswick, GA.

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