

RUNNING MECHANICS AND INJURIES  
AN OVERVIEW  
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THIS IS REALLY ABOUT BIOMECHANICS OR THE MECHANICS OF OUR MUSCLES, JOINTS AND TENDONS THAT ENABLE US TO MOVE. BAD MECHANICS LEAD TO INEFFICIENCY AND FATIGUE, THEN INJURY.

**ACUTE VS. OVERUSE**

ACUTE INJURIES ARE SUDDEN, TRAUMATIC, SUCH AS ANKLE SPRAIN, GETTING CLIPPED. THE REASON FOR THE INJURY IS FAIRLY CLEAR

OVERUSE INJURIES OFTEN CREEP UP ON US

WHY?

FRUSTRATED BECAUSE CAN'T REMEMBER A SPECIFIC INCIDENT

OFTEN TOLD TO REST FOR 2, 4 OR 6 WEEKS, TAKE ADVIL AND THEN START RUNNING AGAIN.

OR MAY BE TOLD THAT RUNNING IS BAD FOR YOU AND SO YOU SHOULDN'T RUN.

DEFINITION: OVERUSE INJURY IS RESULT OF REPETITIVE FORCE WHICH GOES BEYOND THE ABILITY OF THE AREA TO WITHSTAND THAT FORCE. RATHER THAN ONE LARGE, INJURY AT ONE MOMENT IN TIME, THERE ARE A NUMBER OF SMALL INJURIES OVER A LONGER TIME.

FREQUENCY OF OVERUSE INJURIES:

1. KNEE
2. LOWER LEG—SHIN SPLINTS, TIBIAL STRESS FRACTURES
3. HEEL AND ANKLE
4. FOREFOOT
5. HIP
6. LOWBACK

FACTORS CAUSING OVERUSE INJURIES ARE 2: INTRINSIC AND EXTRINSIC

INTRINSIC FACTORS

WHAT IN YOUR OWN PERSONAL MAKEUP MAY MAKE YOU MORE LIKELY TO GET INJURED?

- STRUCTURE AND ALIGNMENT
- STRENGTH AND FLEXIBILITY
- LEVEL OF FITNESS-HOW FIT ARE YOU FOR WHAT YOU'RE TRYING TO DO
- OPEN EPIPHYSES OR GROWTH PLATES, EG, OSGOOD-SCHLATTERS

EXTRINSIC FACTORS

WHAT IS IMPOSED ON YOU FROM OUTSIDE

- SHOES
- TERRAIN-TRACK VS. ROAD, HILLS, INDOOR TRACK
- TRAINING METHODS-OVERTRAINING, UNDERTRAINING

- IMPROPER TECHNIQUE OR FORM

TAKEN TOGETHER THESE FACTORS AFFECT YOUR MECHANICS  
 BAD MECHANICS—CAUSE INEFFICIENCY—FORCES COMPENSATION—PARTS DOING THE  
 COMPENSATION BECOME PAINFUL

FACTORS ARE MAGNIFIED BY RUNNING

- SPEED
  - WALKING=FORCE OF ONE AND A HALF TO TWO TIMES BODY WEIGHT
  - RUNNING-MOVING FASTER—FORCE OF 4 TIMES BODY WEIGHT
- DIRECTION-MANY SPORTS ALLOW CHANGE IN DIRECTION—BUT RUNNING IS UNIDIRECTIONAL—CONTINUOUS REPETITION OF A PARTICULAR MOVEMENT PATTERN—USING THE SAME MUSCLES, JOINTS, TENDONS OVER AND OVER IN PRETTY MUCH THE SAME WAY
- ANY MECHANICAL FLAW BECOMES SIGNIFICANT WHEN YOU'RE RUNNING

SO, NO ONE THING CAUSES OVERUSE INJURIES  
 HAVE TO DEAL WITH THESE FACTORS TO BECOME MORE EFFICIENT

- LESS LIKELY TO GET HURT
- ALLOW BETTER TRAINING
- IMPROVEMENT

## **INTRINSIC FACTORS**

### STRUCTURE/ALIGNMENT

TAKE YOUR SHOES OFF AND STAND UP

- ROLL FEET IN—PRONATION
- ROLL YOUR FEET OUT—SUPINATION

BOTH OF THESE MOVEMENTS ARE THE RESULT OF THE STRUCTURE OF YOUR FEET—  
 WHAT YOU'RE BORN WITH

LOOK AT LEGS AND KNEES WHEN YOU PRONATE AND SUPINATE

- LEGS AND KNEES ROLL IN WHEN YOU PRONATE
- LEGS AND KNEES ROLL OUT WHEN YOU SUPINATE

WHEN THESE ARE EXCESSIVE, IT CAUSES MUSCLE, TENDONS, ETC. TO COMPENSATE  
 INVOLVES NOT JUST YOUR FEET, BUT LEGS, KNEES, HIPS, LOW BACK

OTHER STRUCTURAL PROBLEMS THAT COMPLICATE THINGS:

- LIMB-LENGTH DISCREPANCY—FUNCTIONAL OR STRUCTURAL
- CURVE OF LEGS AND KNEES
  - BOW LEGGED (TIBIAL OR GENU VARUS)
  - KNOCK-KNEED (GENU VALGUM)
- WIDTH OF PELVIS, ESP. IN FEMALES—INCREASES THE Q ANGLE

### STRENGTH AND FLEXIBILITY

QUESTION: ARE YOU MORE WILLING OR INCLINED TO WORK AT STRENGTH OR  
 FLEXIBILITY?

MOST PEOPLE WILL GO WITH STRENGTH

- CAN SEE THE RESULTS
- NEED STRENGTH TO PERFORM ATHLETICALLY

- TO RUN LONGER, FASTER, NEED TO BE STRONGER

ONCE MUSCLES FATIGUE—TIGHTEN—GO INTO SPASM—CAN TEAR, DEVELOP SCAR TISSUE

YOU END UP WITH PAIN AND LOSS OF FUNCTION—LOSS OF STRENGTH

NEED BALANCE, NEED TO INCREASE FLEXIBILITY IN ORDER TO BE ABLE TO WORK ON INCREASING STRENGTH

### LEVEL OF FITNESS

ARE YOU RUNNING AT THE LEVEL YOUR BODY IS READY FOR?

- GOING TOO FAR TOO FAST
- DOING TOO MUCH TOO SOON

EVERYONE MAY HAVE DIFFERENT ABILITIES AND ACHIEVE FITNESS AT DIFFERENT RATES

IN GENERAL, IF YOU'RE RUNNING 20 MILES PER WEEK AND YOU RAISE IT TO 50 MILES PER WEEK WITH LITTLE TRANSITION—TROUBLE

EVERYONE UNDERSTANDS WEIGHT TRAINING—START WITH LOW WEIGHT AND INCREASE INCREMENTALLY TO INCREASE MUSCLE STRENGTH

RUNNING NEEDS INCREMENTAL INCREASE IN ORDER TO SUSTAIN YOUR LEVEL OF FITNESS

### **EXTRINSIC FACTORS**

#### TERRAIN

- MORE SHOCK WITH HARDER SURFACES
- SOFT SURFACES CAN PRODUCE MORE INSTABILITY, MORE WORK AT PUSH-OFF
- INDOOR TRACK-MORE TURNS PER MILE—HARD ON KNEES AND HIPS
- HILLS—GOOD FOR ANAEROBIC WORKOUT AND BUILDING QUAD STRENGTH, BUT THEY'RE HARD ON KNEES
- CROWNING OR PITCH OF ROADS—IMPORTANCE OF CHANGING SIDES, EVEN RUNNING IN THE MIDDLE
- WINTER ICE—SLIPPING, GUARDING

#### TRAINING METHODS

OVERLAP WITH LEVEL OF FITNESS, IE OVERTRAINING

RUNNING 90 MILES PER WEEK VS. 20 MILES PER WEEK

OFF SEASON TRAINING?

- TRYING TO MAINTAIN FITNESS BY LOW LEVEL RUNNING SO THAT YOU'RE NOT SHOCKED WHEN THE SEASON BEGINS—ESTABLISHING A BASE
- "THOUSAND MILE CLUB"

INTENSITY—TOO MUCH SPEED WORK OR HILL WORK WITHOUT ESTABLISHING THE ENDURANCE BASE

STRENGTH WORK-NEED TO BE CAREFUL OF TECHNIQUE, ESP. LUNGES, SQUATS, PLEIOMETRICS

FLEXIBILITY-AVOID BOUNCING

WHO'S THE COACH?

### TECHNIQUE OR RUNNING FORM

IDEALLY EVERYTHING YOU DO SHOULD CONTRIBUTE TO YOUR FOREWARD MOMENTUM, AND ANYTHING THAT DOESN'T IS GOING TO MAKE YOU WORK HARDER

- CONTACT—FOOT SHOULD HIT THE MIDLINE OF THE BODY AND BE PARALLEL TO THAT LINE
- SWING—PROPER KNEE LIFT AND LEG EXTENSION
- PUSH-OFF—FOOT SHOULD STAY PLANTED LONG ENOUGH TO FEEL YOURSELF ROLLING OFF ALL 5 TOES

---LEADS TO A SMOOTHER, EFFICIENT STRIDE

VARYING FROM THAT -LESS EFFICIENT—WORK HARDER—INJURY

### EXAMPLES

- SHORT STRIDE—MORE IMPACT ON LOWER LEGS AND KNEES
  - USUALLY DUE TO FAVORING AN INJURY
  - TIGHT HAMS
- ABDUCTED GAIT—“RUNNING LIKE A DUCK”
  - STRESS ON INSIDE OF LEGS AND KNEES
  - ALSO CAUSES LOSS OF 100-200 FEET PER MILE—SPOTTING YOUR OPPONENT 50 YDS IN A 2 MILE RACE
- WIDE-BASED GAIT—OFTEN SEE WITH SHORT STRIDE—ROUGH ON HIPS

### SHOES

WHAT IS THE BEST SHOE?

DID NEW SHOES CAUSE MY PROBLEM?

WILL NEW SHOES CURE MY PROBLEM?

THERE ARE TWO BASICS TO KEEP IN MIND WHEN SELECTING SHOES

1. SHAPE—LOOK AT THE SHAPE OF THE SHOE—CALLED THE LAST  
3 TYPES
  - STRAIGHT
  - SEMI-CURVED
  - CURVED

LOOK AT THE SHAPE OF YOUR FOOT

- COMPARE THE BIG TOE JOINT WITH THE INSIDE OF YOU HEEL—WHERE DOES A LINE DRAWN FROM THE JOINT END UP
- STAND ON A PIECE OF PAPER AND TRACE AN OUTLINE OF THE FOOT

WANT THE SHAPE OR LAST OF THE SHOE TO CORRESPOND TO THE SHAPE OF YOUR FOOT

2. SIZE—HARDER THAN IT SEEMS BECAUSE SHOES KEEP GETTING SIZED SMALLER

THE HEEL SHOULD BE A THUMBS-WIDTH LONGER THAN YOUR LONGEST TOE WHEN STANDING

PRONATION AND SUPINATION FEATURES WILL BE MOSTLY TAKEN CARE OF BY DEALING WITH SHAPE

WEARING AN INAPPROPRIATE SHOE WILL AGGRAVATE PROBLEMS YOU ALREADY HAVE

### **HOW DO YOU GET BETTER?**

TREAT THE UNDERLYING PROBLEM. SINCE THERE IS NO ONE THING THAT CAUSES PROBLEMS, MOST OFTEN THERE IS NO ONE THING THAT CURES THEM

REST AND MEDICATION MOST OFTEN WILL NOT SOLVE THE PROBLEM UNLESS THE UNDERLYING CAUSE IS ADDRESSED

#### **STRUCTURAL PROBLEMS**

- ORTHOTICS TO CONTROL EXCESSIVE FOOT PRONATION AND SUPINATION
- HEEL LIFT FOR LIMB-LENGTH DISCREPANCY

#### **FLEXIBILITY AND STRENGTH EXERCISES**

PROPER TRAINING REGIMEN FOR RUNNER'S LEVEL, AND TIME OF RUNNING SEASON

#### **IMPROVE RUNNING TECHNIQUE**

- FORM DRILLS
- STRIDERS-INCREASING PACE HELPS LEAD TO BETTER FORM
- VIDEOTAPE

### **WHERE DO YOU GO FOR HELP?**

- FIRST STOP—COACH AND/OR YOUR TRAINER—THEY ARE THERE TO HELP AND THEY MAY BE ABLE TO DO OR SUGGEST SOMETHING TO TAKE CARE OF YOU
- IF YOU NEED TO SEE A DOCTOR THE COACH OR THE TRAINER MAY BE ABLE TO MAKE A REFERRAL
- TEAM MATES AND OTHER PARENTS CAN REFER

#### **WHOEVER YOU GO TO**

- ATTUNED TO THE NEEDS OF THE ATHLETE
  - CAN GET A SENSE OF WHETHER THERE IS UNDERSTANDING OF THE SPORT
- TAKE TIME TO EVALUATE THE ATHLETE TO FIGURE OUT WHAT'S WRONG BEFORE SUGGESTING TREATMENT
- SHOULD BE LOOKING AT ALL THE FACTORS THAT MAY BE INVOLVED BECAUSE TREATMENT WILL NEED TO DEAL WITH ALL THE FACTORS CAUSING THE INJURY

#### **ENCOURAGE COMMUNICATION**

- DID YOU UNDERSTAND THE DR?
- DID YOU TELL THE DOCTOR EVERYTHING?
- WILL DR COMMUNICATE WITH THE COACH AND TRAINER?
- IF PARENT, ACCOMPANY YOUR CHILD

- LESS ANXIETY FOR THE KID
- YOU AS A PARENT WILL KNOW WHAT'S HAPPENING
- THE MORE EVERYONE UNDERSTANDS THE PROBLEM AND WHAT THE GOALS ARE AND THE MORE THAT ALL INVOLVED PARTIES WORK TOGETHER, THE HAPPIER EVERYONE WILL BE

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