





Future Directions



Best Practice

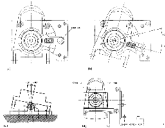

- Interview
 - Effective communication (personality style)
 - Establish relationship and needs
 - Goals – Performance, Comfort and Safety
- Assessment
 - Anthropometry (inseam length, shoulder width)
 - Flexibility
 - Technique
- Position – minimize excessive movement
 - Foot
 - Saddle
 - Bars
- Evaluation and Follow-up
- Get help with clinical problems

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Recommended Foot Position

- Fore/Aft
 - Metatarsals over spindle
- Medial/Lateral
 - Aligned with hip joint
- Internal/External rotation
 - Floating pedal system
- Inversion/Eversion
 - Linear knee tracking

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Position Rationale: Foot Inversion/Eversion

- Inversion/Eversion – “neutral”
 - Align knee with foot/hip to improve power transfer and reduce injury risk
 - Scientific data: reduction in knee loads with eversion (Gregersen and Hull, 2006)
 - Anecdotal: reducing pronation (foot support) can reduce injury risk

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Position Rationale: Saddle

- Saddle Height – 25-35° max knee flexion
 - Power transfer, reduce injury risk
 - Scientific data:
 - VO2 minimum at ~100% leg length (Nordeen-Snyder, 1977)
 - Reduced ITB risk at <30° knee flexion
 - Anecdotal: knee pain can be reduced by changing saddle height
- Saddle Fore-Aft – KOPS
 - Power transfer, ability to change position (out of saddle)
 - Weight distribution
 - Scientific data: no change in economy, more power from knee when move forward

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Position Rationale: Handlebars

- Reach – A frame (90° torso/hand)
 - Skeletal support for upper body
 - Elbows used to absorb vibration/shock
 - Weight distribution
 - Scientific data: limited
 - Anecdotal: excessive reach causes back/neck pain
- Height (saddle/bar drop) – based on flexibility and goals (~1-16 cm)
 - Power transfer/Aerodynamics
 - Weight distribution
 - Scientific data: Heil (1997) showed increased VO2 with aggressive aero positions
 - Anecdotal: hamstring flexibility and hip flexion ROM influences drop

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Best Practice Tools

- Adjustable Cycle on Platform
 - Adjustable cranks and stem
- Goniometer
- Power output
- Heart Rate
- Motion Capture

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Some things we may have learned

- Foot position is complicated
 - Eversion reduces non-driving knee moments
 - Reduced risk of PF and ITB problems?
 - Inversion and/or forefoot support common to reduce knee pain
- Tour de France is hard
- Knee overuse injuries can be reduced with a good position
- If someone wants a 177.5 crank – fine
- Cycling is good for everybody – especially the physically challenged

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Some things we may have learned

- Personality matters – both yours and the people you are trying to help
- Scientists can do relevant research, including how saddle design and body position affects performance
- You can pull up, but it may not make you faster
- Numbness should not be normal part of cycling
- Bike design could be simplified
- Wind tunnels are nice, but a power meter is better

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Some things we may have learned

- Saddles should be selected/designed individually
- Lumbar flexibility matters
- Pedal forces can tell you more than power

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Future Projects

- Are men and women the same?
 - Sex differences in optimal positions, performance and injury risk
- Empirical evidence to support clinical interventions
- Mid-Foot cleat position biomechanics
- Out of saddle biomechanics
 - Effects of handlebar position
- Uphill vs. level cycling – what are the differences and should position be changed?

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Future Projects

- Use of motion capture systems to build digital database
- Saddle Pressure as a clinical retail tool
- Pedal force measurement as a clinical/retail tool
- Handlebar position
 - Effects of flexibility on muscle activity
 - How low should you go?
- Increased participation from students
- Effects of obesity and age on optimal position
- Increasing cycling participation – how do we succeed?

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Thanks for Coming!

- Let us know how we can make the event better
- Suggestions for content/speakers
- Volunteers to help plan and organize are welcome!
- Where would you like to go next year?
- Best time of year?

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WELCOME!

- Retailers
- Industry
- Coaches
- Scientists/Academics
- Clinicians

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What we do

- Provide educational services to the cycling community that help to optimize the cycling experience
- We offer:
 - Classes
 - Tools
 - Consulting/Design
 - Special Events
 - Communication



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Why We Are Here

- Bring Together Diverse Groups
 - Academia, Retail, Industry, Performance and Health Care
- Great science
- Discuss what we know/do
- Determine what we would like to know
- Contribute to the future of cycling science
- Improve business

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What's Going On?

- 19 Lectures
- 10 Breakouts/Demonstrations
- Abstract Presentations
- Panel Discussions
- Open Fit Studio
- Tarryan Technologies Product Launch
- Bicycling Awards for Excellence in Applied Science
- Industry Expo (open daily)
- Yoga
- ACSM Certification

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What Should Happen

- Network – talk to your colleagues
- Educate – learn from our presenters
- Collaborate – establish new relationships
- Formulate new research ideas – help advance cycling science

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Announcements

- Fit Studio Hours
 - Monday 1-3:30 and 3:30-5:30pm
 - Tuesday 1-7pm
 - Wednesday 1-4pm
- Specialized presentations
 - Monday and Tuesday 6:30 pm (Orly)
- ACSM Certification?
 - See registration desk for attendance forms
- Evaluations
 - Sent via email after conference

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Presenters

- | | |
|----------------------------------|--------------------------------|
| • Hunter Allen | • Jim Martin, PhD |
| • Jeff Broker, PhD | • Guillaume Mornieux, PhD |
| • Todd Carver, MS | • Paul Levine |
| • Chris Bohannon, MS | • Heidi Ploeg, PhD |
| • Jay Dicharry, MPT | • Andy Pruitt, EdD |
| • Conrad Earnest, PhD | • Lori Richman |
| • Dan Empfield | • Stuart Rugg, PhD |
| • Joe Friel, MS | • Bjoern Stapelfeldt, PhD |
| • Robert Gregor, PhD | • Steve Schrader, PhD |
| • Dan Heil, PhD | • Paul Swift |
| • Maury Hull, PhD | • Darryl Thelen, PhD |
| • Therese Johnston, PhD, PT, MBA | • Katrina "Kit" Vogel, MS, DPT |

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- BikeFit.com
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- Lake Cycling
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- Training Peaks

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SICI Staff
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- Mare Tolbert
 – Event and Marketing Coordinator
- Chris Bohannon
 – Assistant Director
- Todd Carver
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