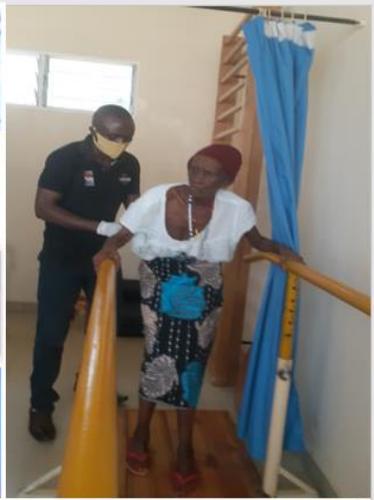


# The Role of Sports Technology in Enhancing Athletic Performance and **Injury** Prevention

by

Dr. Japhet Ndayisenga, M.Or, Ph.D.





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Name: Japhet Ndayisenga, M.Or, Ph.D

**Physical Education Lecturer at Institute of Physical Education and Sports**

Researcher-Lecturer in Indonesian Universities.

Physiotherapist in the Center of the University Research Laboratory in Physical and Sports Activities for Social Development and Health (LURADS).

Vice-President of the research centre of the Institute of Physical and Sports Education.

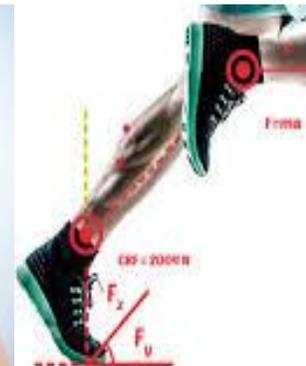
Physiotherapist in the Reference Clinic in Burundi (Prince Louis Rwagasore Clinic).

Editor and Reviewer of international publication journals in the field of Sports Science.



# TABLE CONTAIN

- **What is sports technology?**
- **list of Summer Olympic Sports for Paris 2024**
- **The Common and Causes of Injuries**
- **Diagnostic and Treatment of Injuries**
- **The role of Sports Technology in enhancing Performance and Injuries Prevention**



# What is sports technology?

Sporting technologies are **man-made methods**, developed to reach human **interests** or **goals** in or relating to a **particular sport**. Technology in sports is a technical means by which athletes attempt to improve their **training** and **competitive** surroundings in order to enhance their **overall athletic performance**.

# What are the best sports technologies?

TOP 7 Sports Technology Trends and Innovations to

Adopt in Sports Apps in 2024

Trend 1: AI coaching Bot.

Trend 2: Wearable Tech and Performance Analytics.

Trend 3: Immersive Broadcasting with AR.

Trend 4: Video Assistant Referees.

Trend 5: Digital Injury Prevention.

Trend 6: Data-Driven Talent Scouting.

Trend 7: Virtual Reality and Game Simulations

# SPORTS TECHNOLOGY

Game – Changing Benefits of Technology in Sports



# SPORTS TECHNOLOGY

What is Sports Technology?

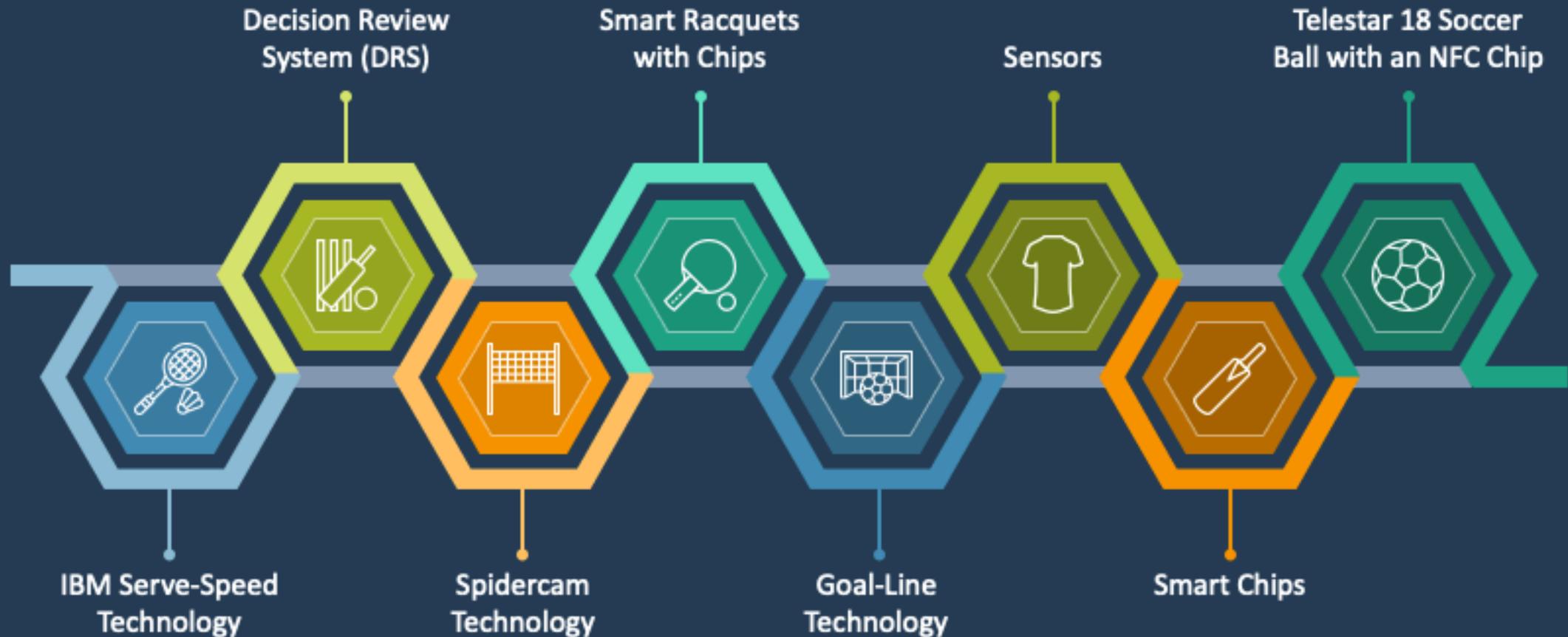


## SPORTS TECHNOLOGY

Sports Technology is part of the Applied Science program. It is an incredibly diverse, interdisciplinary field that can lead to research in fields such as the modeling of movement, sports performance analysis, athlete workload monitoring, brain-blood flow neurophysiology, and the broadcasting of sporting events (e.g., 3D animation, computational modeling).

# SPORTS TECHNOLOGY

## Timeline of Evolution of Sports Technology



# SPORTS TECHNOLOGY

## Why Study Sports Technology?



Engagement with  
entrepreneurs and businesses



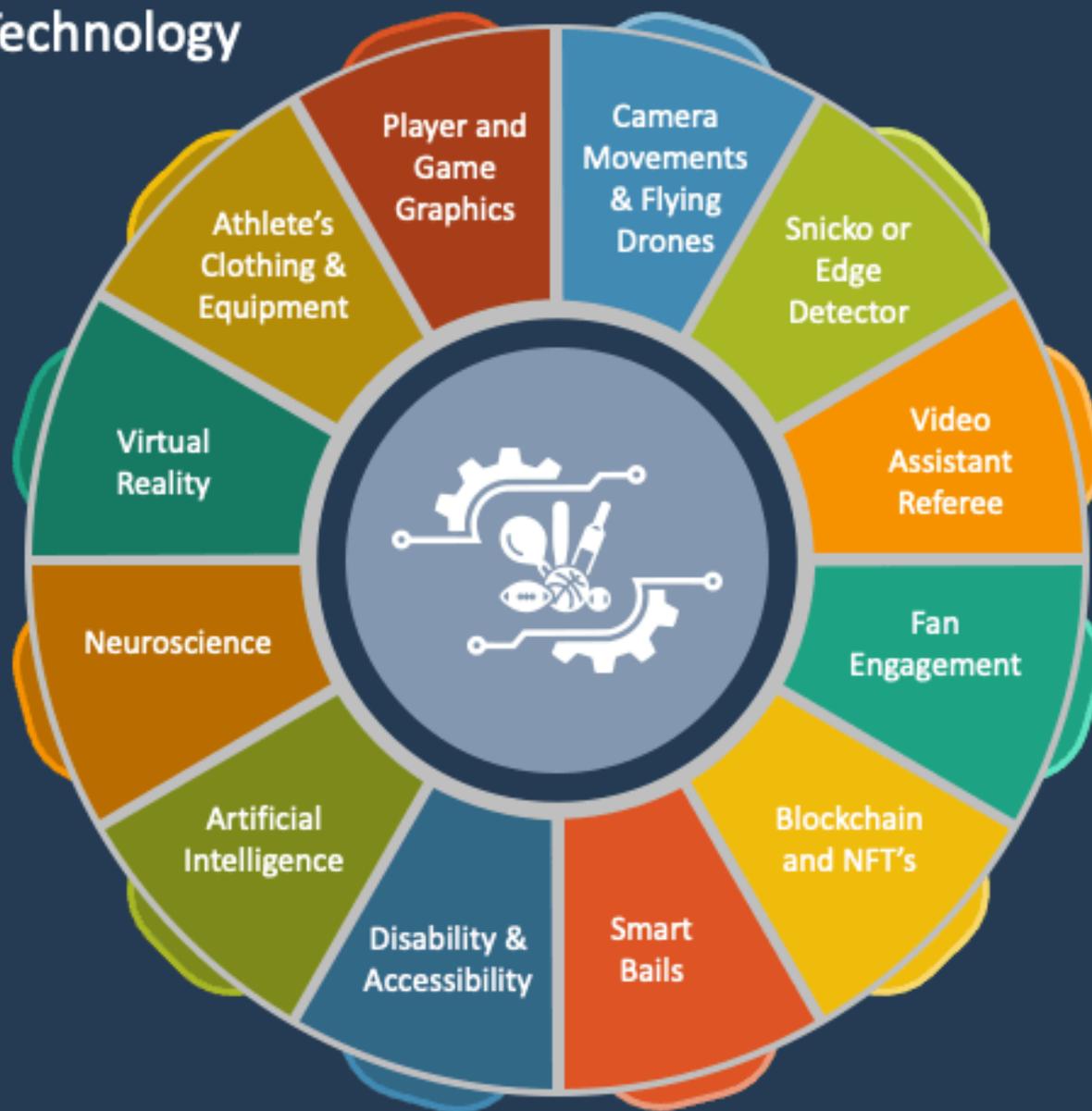
Development of new ideas, including  
products and technology-based  
services, by staff and students



Collaboration with key partners  
locally and internationally

# SPORTS TECHNOLOGY

## Top 12 Latest Sports Technology



# International technology gap

2008 Olympic Medal table:

Rank	Country	Gold	Silver	Bronze	Total	GDP rank
1	<b>United States</b>	36	38	36	110	1
2	<b>China</b>	51	21	28	100	4
3	<b>Russia</b>	23	21	28	72	11
4	<b>Great Britain</b>	19	13	15	47	5
5	<b>Australia</b>	14	15	17	46	15
6	<b>Germany</b>	16	10	15	41	3
7	<b>France</b>	7	16	17	40	6
8	<b>Korea</b>	13	10	8	31	14
9	<b>Italy</b>	8	10	10	28	7
10	<b>Japan</b>	9	6	10	25	2

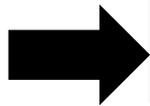
'Missing' top GDP countries?



# LIST OF MEDAL IN OLYMPIC GAMES IN PARIS

2024

Order	NOCs					
1	 United States of America	40	44	42	<b>126</b>	
2	 People's Republic of China	40	27	24	<b>91</b>	
3	 Japan	20	12	13	<b>45</b>	
4	 Australia	18	19	16	<b>53</b>	
5	 France	16	26	22	<b>64</b>	
6	 Netherlands	15	7	12	<b>34</b>	
7	 Great Britain	14	22	29	<b>65</b>	
39	 Indonesia	2	0	1	<b>3</b>	



# Jeux olympiques de Paris 2024

26 juillet 2024 – 11 août 2024

## Médailles

Équipes



Aperçu

Médailles



Équipe

① ② ③

1  États-Unis

40 44 41 125

2  Chine

40 27 24 91

3  Japon

20 12 13 45

4  Australie

17 19 16 52

-  Burundi

0 0 0 0

Plus de statistiques sur [olympics.com](https://olympics.com)

# Full list of Summer Olympic Sports for 2024

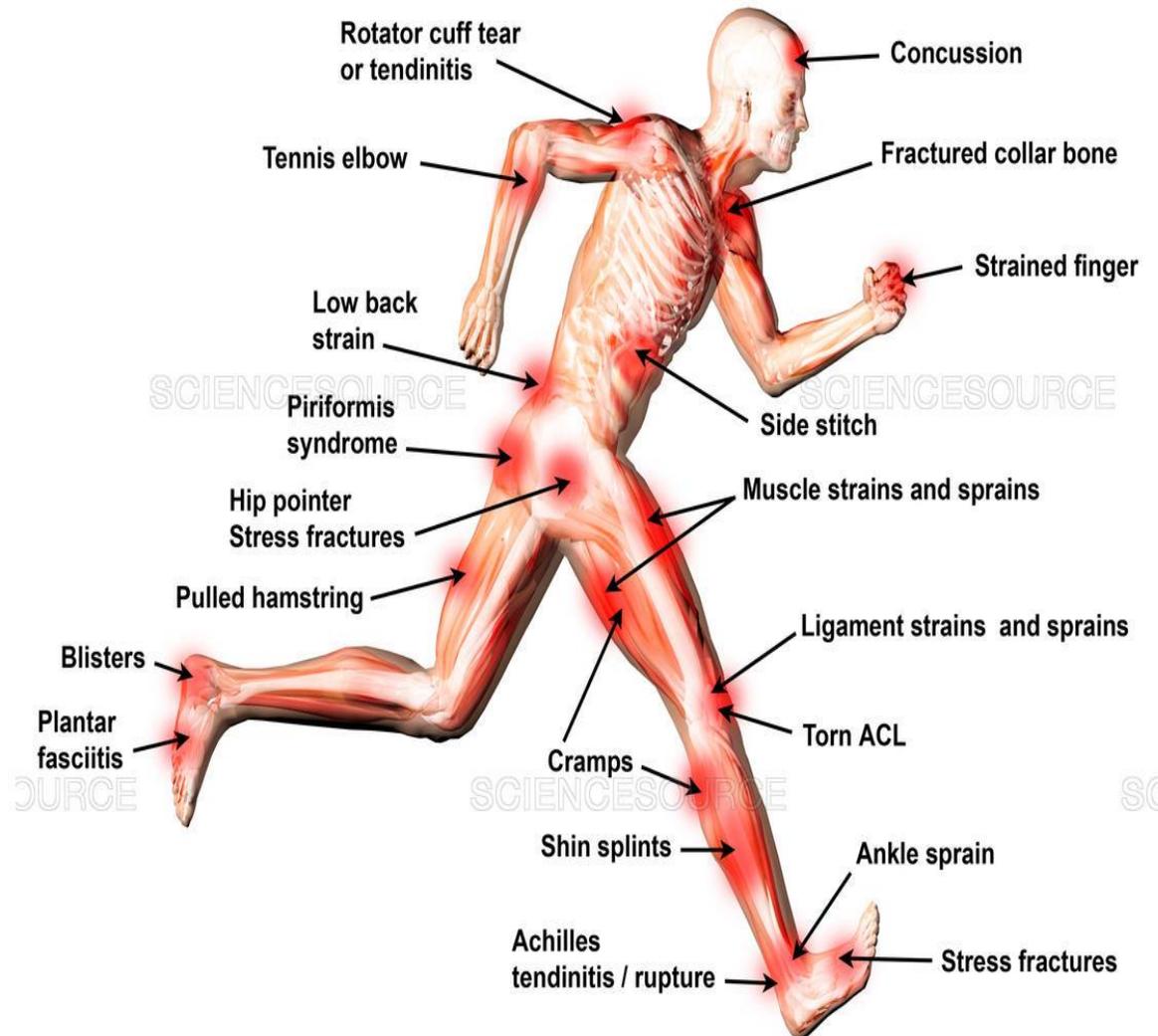
- 1. Aquatics** (swimming, marathon swimming, diving, water polo, artistic swimming)
- 2. Archery**
- 3. Athletics**
- 4. Badminton**
- 5. Basketball (3x3, basketball)**
- 6. Boxing**
- 7. Breaking\***
- 8. Canoe (canoe sprint, canoe slalom)**
- 9. Cycling** (BMX freestyle, BMX racing, road cycling, track cycling)

# list of Summer Olympic Sports for 2024

- Equestrian** (equestrian eventing, equestrian dressage, equestrian jumping)
- Fencing**
- Football**
- Golf**
- Gymnastics** (artistic gymnastics, rhythmic gymnastics, trampoline gymnastics)
- Handball**
- Hockey**
- Judo**
- Modern Pentathlon**
- Rowing**
- Rugby** (rugby sevens)
- Sailing**
- Shooting**
- Skateboarding**\*
- Sport Climbing**\*
- Surfing**\*
- Table Tennis**
- Taekwondo**
- Tennis**
- Triathlon**
- Volleyball** (beach volleyball, volleyball)
- Weightlifting**
- Wrestling** (Greco-Roman wrestling, freestyle wrestling)

# The Common Athletic Injuries

- **Shoulder Injuries.** Rotator cuff injury. ..
- **Elbow Injuries.** Tennis elbow (lateral epicondylitis). ...
- **Knee Injuries.** Runner's knee. ...
- **Leg Injuries.** Groin pull. ...
- **Ankle Injuries.** Ankle sprain.



# Type of Injuries

- **Common injuries include**
- **bruises,**
- **sprains,**
- **strains,**
- **joint injuries and nose bleeds.**
- **Low back pain**
- **Sciatic nerv**
- **Osteoarthritis**
- **Osteoporosis**
- **Musculoskeletal Trauma**

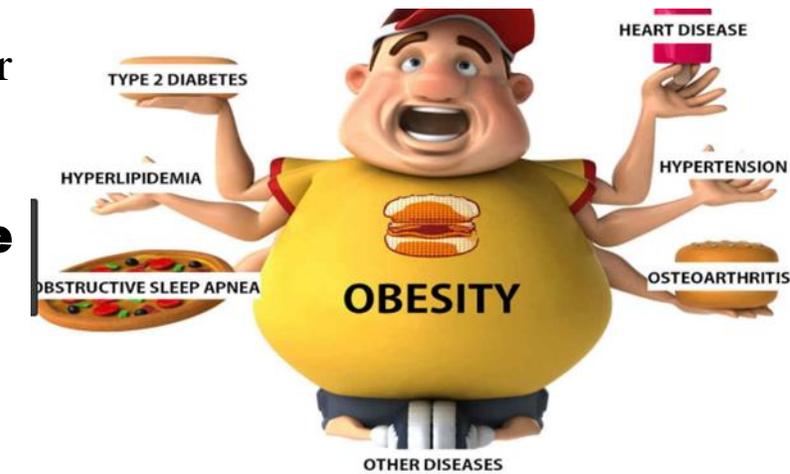


# IINJURIES and SPORTS AERAS



# The Common Causes of Injuries Are

1. **Daily activities** such as: sports for athletes and coaches,
2. **Degenerative diseases** like obesity, stroke, uric acid, cholesterol, gastric acid
3. **Unbalance** between **input** and **output** has a high average in causing the later problem Liu, C., Wan, Q., Zhou, W., Feng, X., & Shang, S. (2017),
4. General **work** or **professional** associated with **posture** and **long-time** taken during working are several causes of chronic injuries Nio Ong, B., Jinks, C., & Morden, A. (2011)



# The Causes of Injury

Sports injuries are commonly caused by

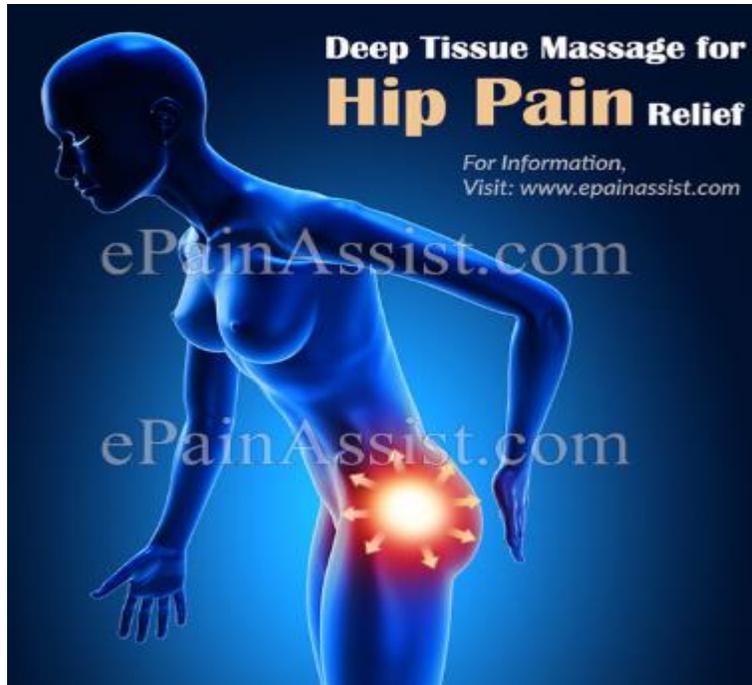
- Overuse of Joints, a group of muscles**
- Direct impact, or the application of force that is greater than the body part can structurally withstand.**
- Unfavourable Climate
- Inappropriate equipment( Shoes, playground...)**
- Inappropriate group of exercise training



# Injury Location



## Hips, Knee and Ankle



5 Signs of a Serious Knee Injury Never to Ignore



# Diagnostic and Treatments

To fight against Sports Injuries the following steps were used:

**Diagnostic**

**Desain the appropriate program therapy**

## Diagnostic

- **Medical History and Physical Examination**
- **MRI/RX: Imaging Techniques: Osteoarthritis,**
- **Osteoporosis, Scoliosis, Kyphosis**
- **IMC: Obesity**
- **Scale Pain/Pressing Tool: Level Pain**
- **Treadmill: Cardio-Respiratory**
- **Reflexology Diagnostic: Organ Illness**

## Programs Therapy

**Sports Medicine Therapy**

- Rehabilitation and Physical Therapy**
- Medications and Injections(NSAIDs)**
- Surgical Intervention**

**Therapeutic Exercise**

- **Stretching Exercise**
- **Strengthen Exercise**
- **Decreasing Weight Program**
- **Psychological Support and Motivation**
- **Mental Health Support**



- Ndayisenga, J. (2021a). *Combine Massage and Physiotherapeutic Exercise for Recovering Pain , Increasing Strength , and Flexibility*. 9(4), 725–737. <https://doi.org/10.13189/saj.2021.090417>
- NDAYISENGA, J. (2020). Effectiveness of Massage and Exercise Therapy on Healing Chronic Hips, Knee, and Ankle Injuries Supervisor. *Eprints.Uny.Ac.Id*. <https://eprints.uny.ac.id/69506/1/1>. FINAL THESIS - Ndayisenga Japhet ndayisengajaphet.2018.pdf

**By**

**Japhet Ndayisenga**

**NIM: 18711259001**



# Benefits of Exercise

- Reduces risk of
  - Heart Disease ≈ **40%**
  - Obesity: ≈ **30-100%**
  - Stroke ≈ **50%**
  - Type 2 Diabetes ≈ **50%**
  - Hypertension ≈ **50%**
  - Disability delayed ≈ **15 years**
  - Colon Cancer ≈ **25-40%**
  - Breast Cancer ≈ **20%-44%**
  - Osteoporosis ≈ **20+%**
- As many as **250,000** deaths per year in the United States are attributable to a lack of regular physical activity



Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, et al. Heart disease and stroke statistics-2017 update: a report from the American Heart Association. Circulation (2017) 135:e146–603. doi: [10.1161/CIR.0000000000000485](https://doi.org/10.1161/CIR.0000000000000485)

### **Diabetes mellitus, type 2;**

1. Decreases incidence
2. Improves glycemic control
3. Decreases hemoglobin A1C levels
4. Improves insulin sensitivity

### **Osteoporosis**

1. Decreases bone density loss in postmenopausal women
2. Decreases hip and vertebral fractures
3. Decreases risk of falling

### **Other**

1. Decreases all-cause mortality
2. Decreases all-cause morbidity
3. Decreases risk of obesity
4. Improves symptoms in peripheral vascular occlusive disease

### **Osteoarthritis;**

1. Improves function
2. Decreases pain

### **Neuropsychologic health**

1. Improves quality of sleep
2. Improves cognitive function
3. Decreases rates of depression, improves Beck depression scores.
4. Improves short-term memory
5. Increase self-esteem

### **Cancer**

- Potential decrease in risk of colon, breast, prostate, rectum
- Improves quality of life and decreases fatigue

## Prescription should include

- FITT – PRO
  1. Frequency
  2. Intensity
  3. Type
  4. Time
  5. progress

# Intensity Using Heart Rate

- Target Heart rate  $\square$  Maximal heart rate = 220  
Maximal heart rate = 220-age
- $\square$  Based on level of intensity a heart rate range is selected.
  1. very light = <50 % of maximal heart rate
  2. Light = 50-63 % of maximal heart rate
  3.  $\square$  Moderate 64-76 % of maximal heart rate  $\square$
  4. Vigorous = 77-93 % of maximal heart rate  $\square$
  5. Very Hard = >94 % of maximal heart rate  $\square$
  6. Maximal = 100% of maximal heart rate

Billman GE, Huikuri HV, Sacha J, Trimmel K(2015)  
**doi:10.3389/fphys.2015.00055**

## Types of Aerobic Exercise

### Outdoor Activities

- Walking
- Jogging/running
- Bicycling
- Swimming
- Basketball
- Soccer
- Jumping Rope

### Indoor Activities

- Treadmill machine
- Stair climbing machine
- Stationary bike
- Elliptical trainer
- Rowing machine
- Aerobics, boxing...

Romer, L. M., & Polkey, M. I. (2008).  
[doi:10.1152/jappphysiol.01157.2007](https://doi.org/10.1152/jappphysiol.01157.2007)

# The role of Sports Technology in enhancing Performance and Injuries Prevention

- The use of smart sports material increase athletic performance
- The modern equipment and playground influence the performance and reduce the sports injuries
- The use of smart software in data analytic helped Coach trainer to know the weakness and strengthen of athletes( biomechanical analytic, Kino via.....)
- The use of Camera helps to know the qualification of the athletes



# The role of Sports Technology in enhancing Performance and Injuries Prevention

1. ↓ swelling, pain, inflammation
2. ↑ ROM: Flexibility
3. ↑ muscular strength, endurance, power
4. Maintain cardiovascular fitness
5. Re-establish neuromuscular control
6. Improve stability and resolve balance issues
7. Address psychological reaction to injury/pain
8. Posture & core stability
9. Protect/prevent further injury
10. Kinetic Chain/ it above/below (in balance)
11. Functional Progressions- sport specific
12. Return to Activity Criteria
13. Home Program



**THANK  
YUO!!!!!!**



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