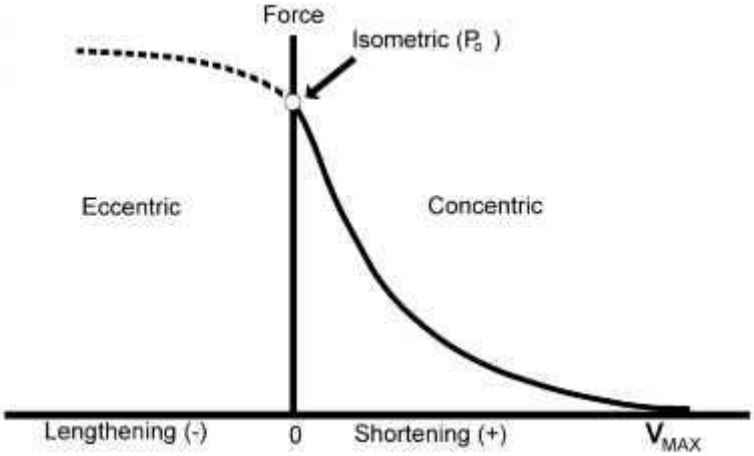
Motor muscle Summary 2020

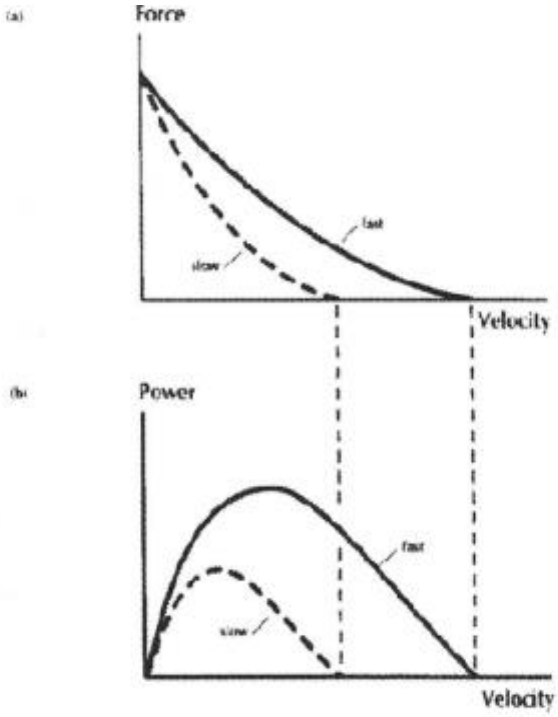
- **Kraft-Geschwindigkeitsdiagramm für langsame/schnelle Fasern in Diagramm einzeichnen + Koordinaten beschriften:**
  Kurven detailliert erklären + 5 Faktoren, die die Muskelkraft beeinflussen.

  The muscle actions eccentric, isometric & concentric are reflected in the graph. This curve explains that with increasing velocity, the muscle force decreases.

  Examples of **concentric** muscle activity are throwing or kicking a ball and examples of **eccentric** activities would be weight lifting and power-lifting.



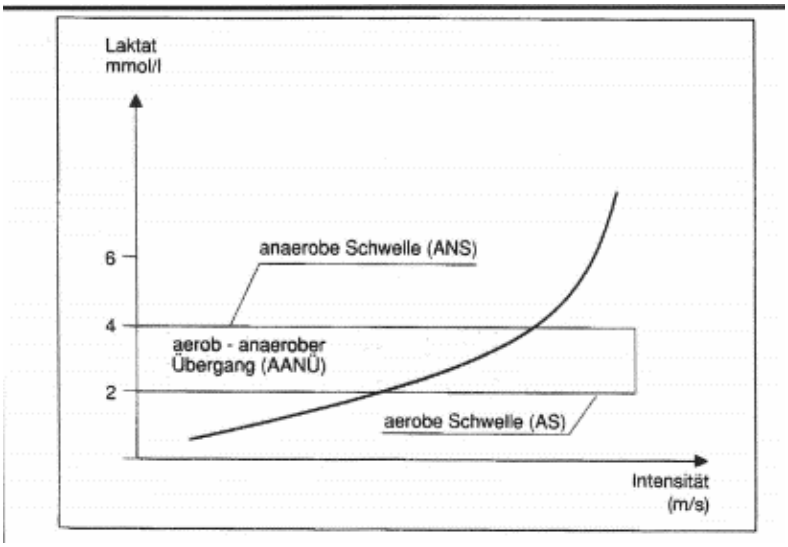
  The graph below shows the twitch response of *fast –twitch (FG)* and *slow-twitch (SO)* muscle fibers, where their fiber tensions differentiate affecting their speed of movement. Fast muscles have higher power consumption, whereas slow muscles have lower.

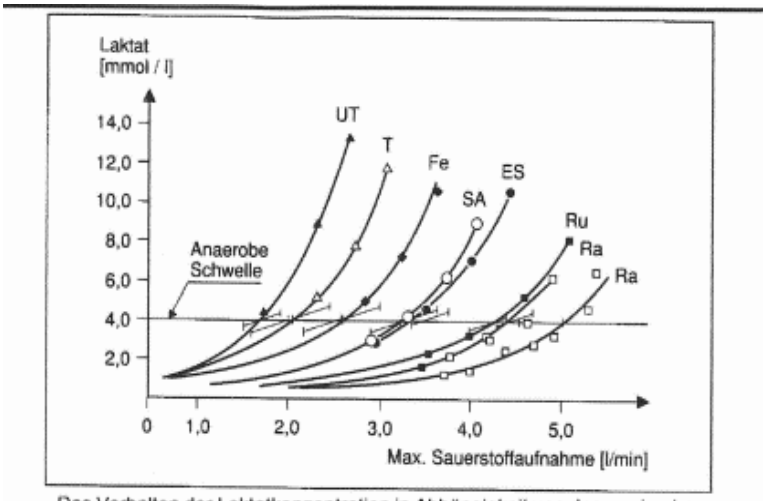


  Factors which affect muscle strength are stimulus strength, Hormones, Genetics, and Diet, Exercise & movement, muscle speed, and neural efficiency.

- **2 Diagramme mit 2 Laktatkurven, in welchem Bereich trainiert wird**

  The training interval usual takes place between the **Aerobic** threshold (AS) and **anaerobic threshold** (ANS). In this graph the anaerobic line has a lactate of 4 mmmol/L for various sport activities.

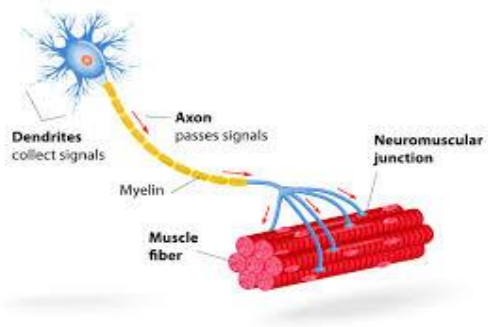




Das Verhalten der Laktatkonzentration in Abhängigkeit von der maximalen Sauerstoffaufnahmefähigkeit bei Untrainierten (UT) und ausgewählten sportrepräsentativen Leistungsgruppen verschiedener Sportarten: (T) = Touristik, (Fe) = Fechten, (ES) = Eisschnelllauf, (SA) = Spielsportarten, (Ru) = Rudern, (Ra) = Radsport.

- **Was ist eine motorische Einheit?**

  Within a muscle, the muscle fibers are functionally organized as motor units. A motor unit consists of a single motor neuron and all the muscle fibers it innervates



- **Welche Energiespeicher gibt es? Welche Produkte entstehen dabei?**

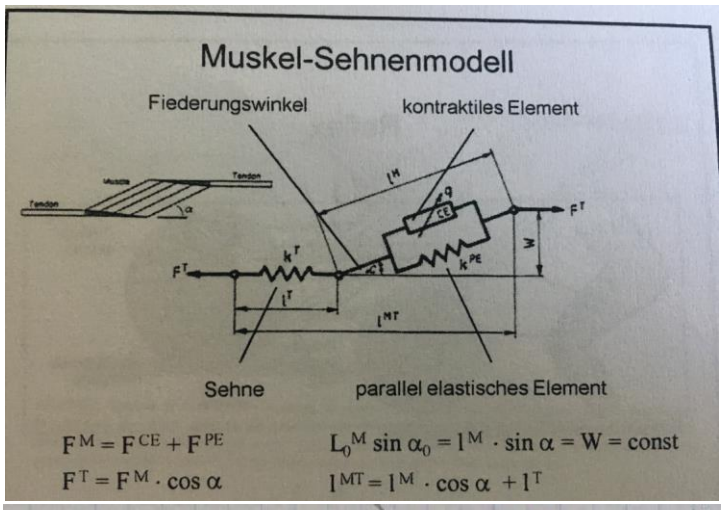
Sportbiologische Grundlagen zum Komplex Ausdauer

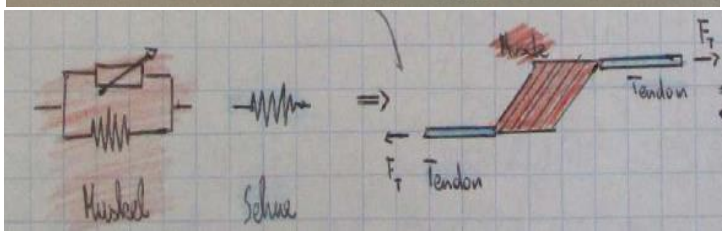
	Substrat	Menge in Phosphat-resten (-P) pro kg Muskel	maximale Einsatz-dauer
1. Speicher	ATP Adenosintriphosphat	ca. 6 mmol	(theoretisch) 2–3 s
2. Speicher	KrP Kreatinphosphat	ca. 20–25 mmol	–
	Phosphatspeicher insgesamt (Phosphagen)	ca. 30 mmol	7 s–10 s (20 s)
3. Speicher	Glykogen (Glucose)	ca. 270 mmol	(anaerober Abbau) 45 s–90 s
		ca. 3000 mmol	(aerober Abbau) 45–90 min
4. Speicher	Triglyzeride (Fette)	ca. 50 000 mmol	mehrere Stunden

Chemcial reaction:

1) ATP + H20 → ADP + P
2) KrP + ADP → ATP + Kr
3) Glucose + O2 → CO2 + H20 + ATP
4) Fettsäure + O2 → CO2 + H2O + ATP

- **mechanisches Modell vom Muskel (- AP-Fortbewegung im Axon) :**





CE contracting element
PE Parallel elastic element

- **Wieso Krafttraining bei Übergewichtigen?**

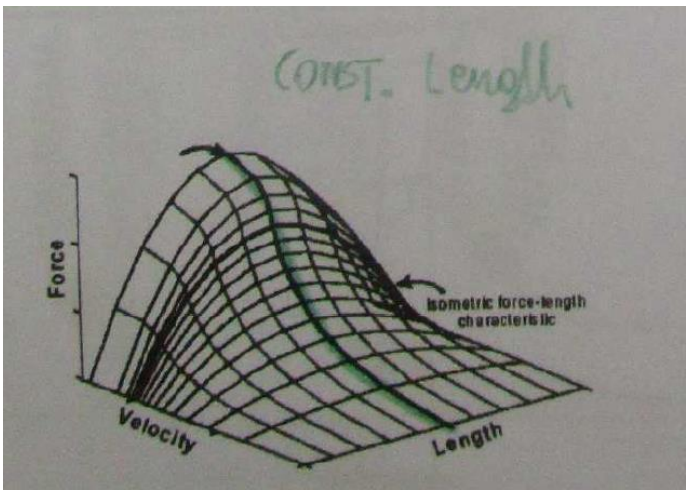
  If you are overweight, you also have more strength. Meaning, you can move more weight. Therefore you need more energy. When overweight people do endurance sports, they don't do as much until they are nearly out of breath, making it bad for them to run as well.
- **Was war die Aussage der BedRest-Studie in Berlin?**

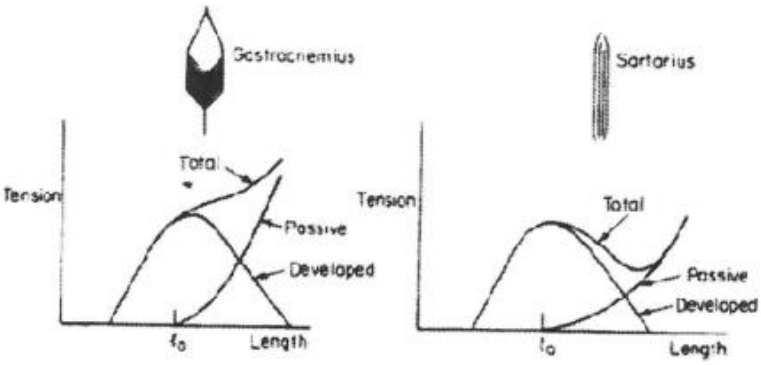
  The Bed-rest study is a 60-day study chosen for astronauts, which shows the effect lack of exercise has on reducing muscle and bone tissue. The participants were divided into two Groups. Group 1 would train on vibration platforms, stimulating the bone & tissue. Whereas, group 2 would have the task to remain horizontal with no physical activity.

- **Wie kann Ausdauerfähigkeit vorgetäuscht werden (legal/illegal)? [Höhentraining/ EPO]. Wie kann man bei einem Leistungstest legal(!) eine höhere Leistung vortäuschen)**

  In order to improve sea-level endurance performance in athletes, blood-oxygen capacity training is necessary. Erythropoietin (EPO) production in hypoxia is a key factor in altitude training. By exercising in high altitudes, EPO hormones produce more red blood cells in oxygen delivery to the muscles.
  However, there's also an illegal form of synthetic EPO that can mimic the body's natural process of red blood cell creation that would be used in sports. (doping)

- **Zeichnen sie einen langen und einen kurzen Muskel in das gleiche Kraft/Längendiagramm ein:**



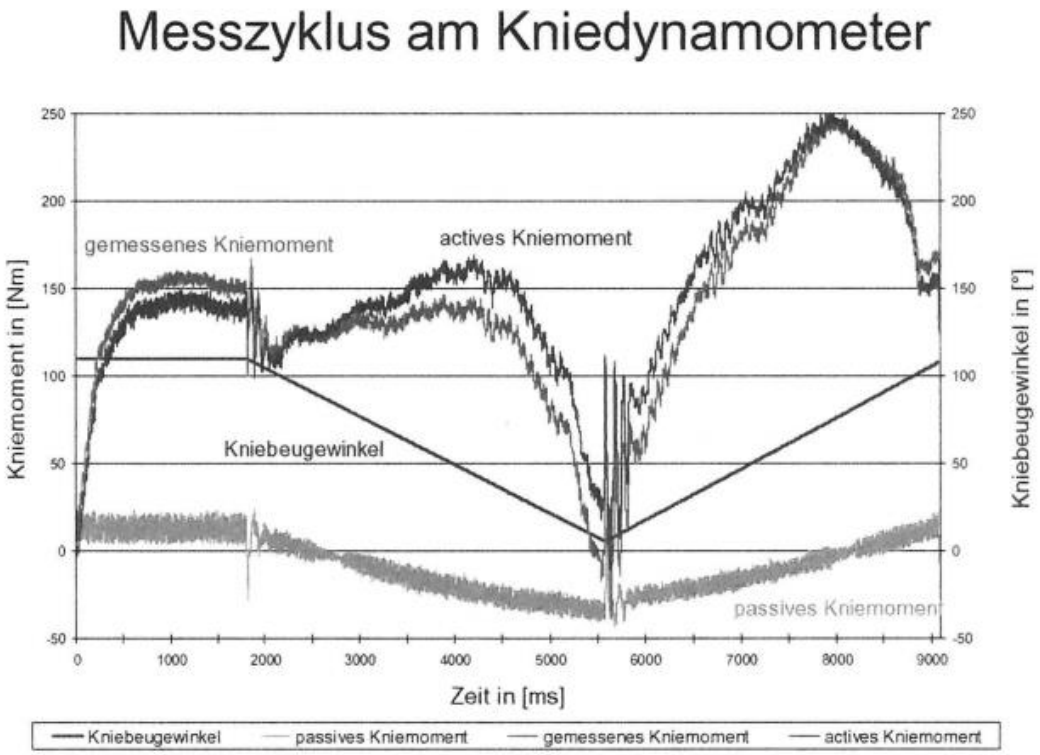


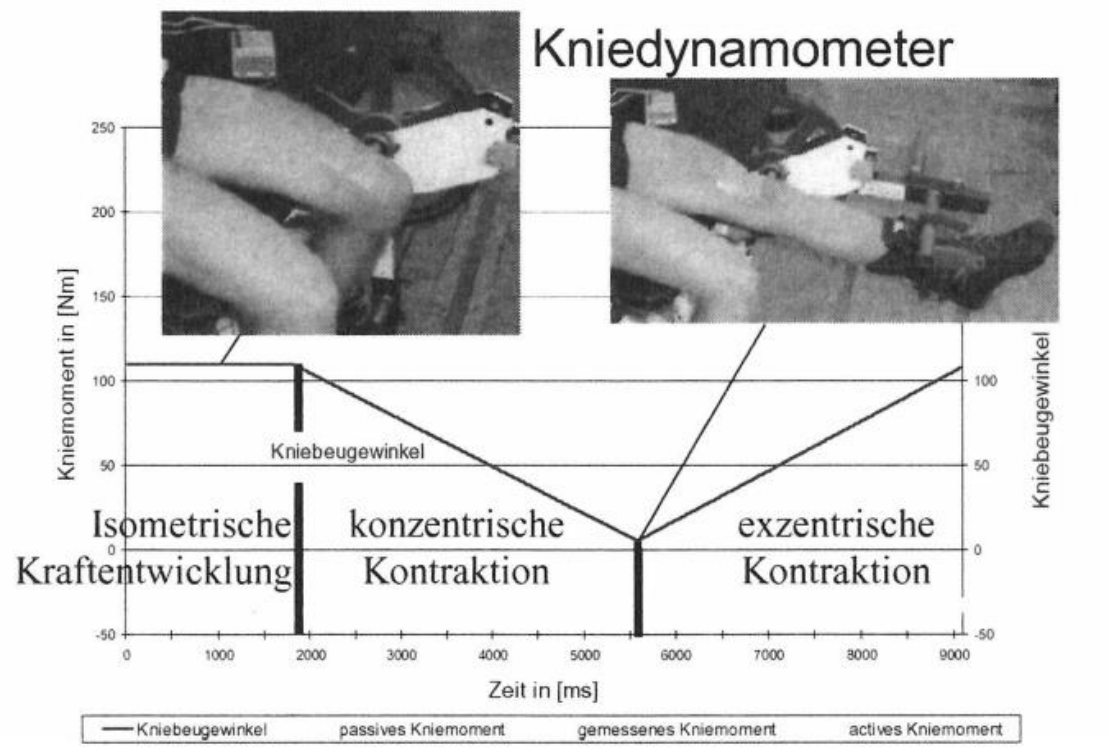
- **Ursachen für Muskelkater? [Mikroläsionen: Aktin reißt aus Z- Scheiben aus,…]**

  Muscle soreness is the result of micro-trauma, which is small scale mechanical damage (rupture) to the muscle. These ruptures are microscopic lesions at the Z-line of the muscle sarcomere. The soreness is a result of the increased tension force and muscle length during exercise.

- **Für wen können Vibrationsplatten verwendet werden? Physiologisches Prinzip hinter den Platten?**

  A vibration plate sends high-speed vibration through all the muscles of the body and stimulating them. This method forces your muscles to contract and relax between 30 to 50 times a second. They can be used to help Astronauts, weight-loss, toning muscles, decreasing stress and rehabilitation.
- **Ein Rechenbeispiel über die konzentrische Kraft des Beins am Kniedynamometer. Da sollte man aus einer Tabelle die Newton rauslesen, aus einer anderen Tabelle den Hebelarm und daraus mittels F=M/r die Kraft ausrechen.**



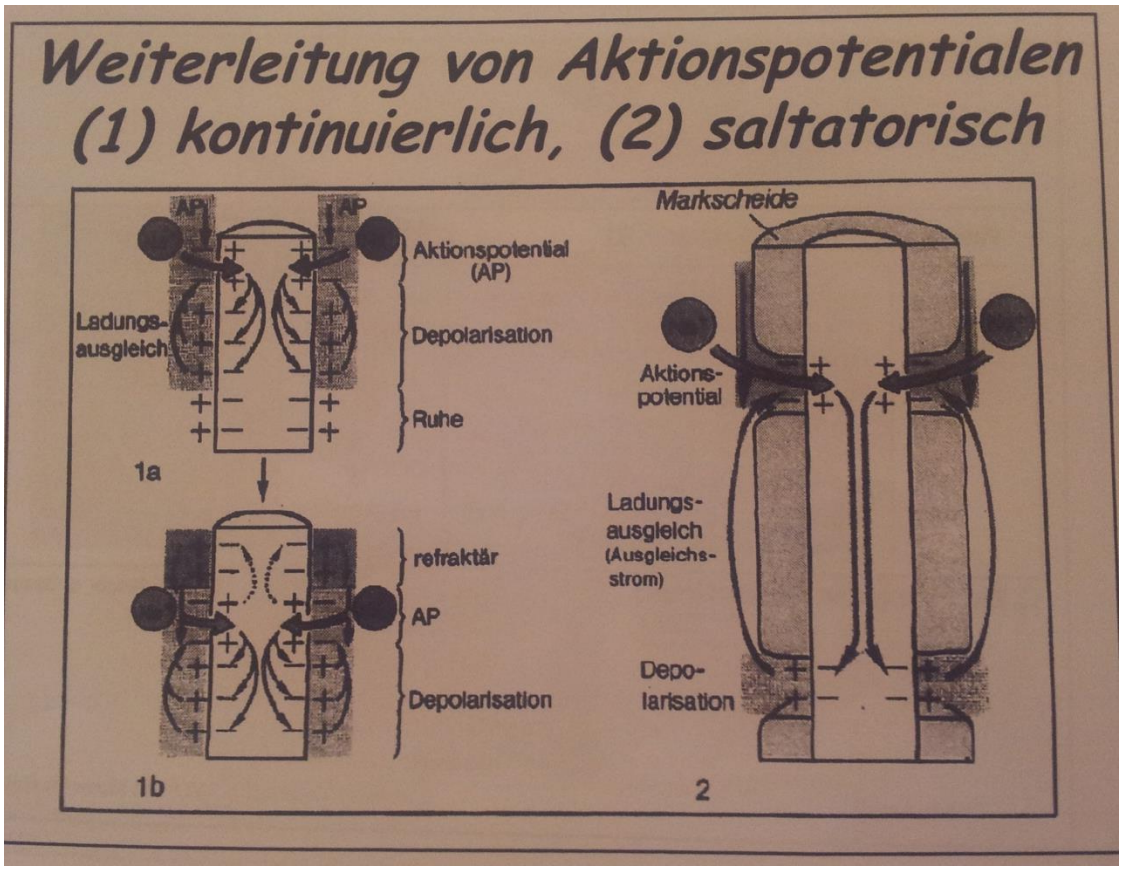


F = M / r **M * α = P** **max. Moment at 45°**

F: force
M: moment
R: radius
P: power
α: angle

- **AP-Fortbewegung im Axon:**

  Propagation along an unmyelinated axon is referred to as a continuous conduction, whereas along the length of a myelinated axon is referred to saltatory conduction. A continuous conduction is slow and has the voltage gated Na channels always opening. Saltatory conduction is faster due the Action Potential leaping from one node to the next.



- **Kraftverlauf zeichnen in Diagramm bei folgendem Bewegungsablauf:**
  Isometrisch Kontraktion - exzentrisch kontrahieren - isometrisch halten - konzentrisch kontrahieren - isometrisch halten - dekontrahieren.