



Conditioning for Sport:
Driving Adaptations
for Performance



A.K.A.

**Are you making them
better or just tired?**



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This Presentation:

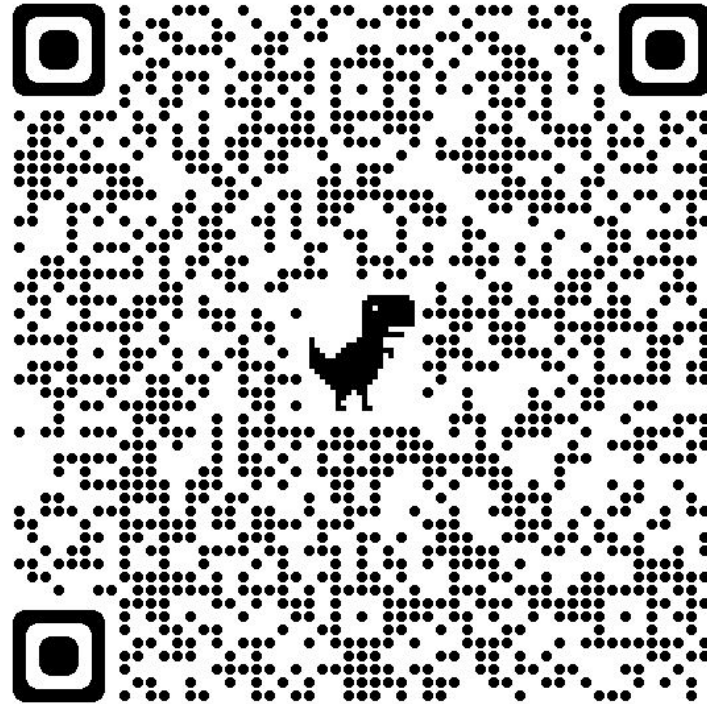




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How much? When? Is more better?

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The background features a white canvas with scattered red and grey circles of various sizes. Overlaid on this are several dark blue, hand-drawn style lines that meander across the page, some forming jagged, zig-zag patterns.

01

Why condition? Pt. 1

What are your current beliefs and practices?

The background features a white canvas with abstract elements: several solid red circles of varying sizes, a few solid grey circles, and dark blue lines that are either straight or wavy, some extending from the edges of the frame.

“All improvement
starts with the truth.”

—**Jeremy Boone**

Questions:

What is your current definition of 'conditioning'?

How much do you know about the physiology of conditioning?



What are your current 'conditioning' practices/methods?

What are you trying to achieve?

Goals:

- Updated understanding of the science
- When/how/why?
- Applicable ideas to assist in your practice design.





02

Why condition? Pt 2

What does the
science say?

Updates from the field of exercise physiology:



What we used to know:

- Training at low intensity for long duration improves O_2 delivery and endurance capacity
- Training against a heavy load increases size and strength of muscle
- Volume dictated by progress



What we know now:

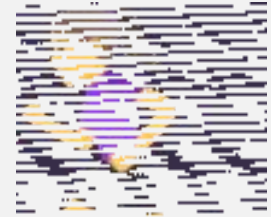
- Recent studies are challenging the idea of training specificity
- True 'strength' and 'endurance' rarely exist
- Signaling molecules and molecular mechanisms are driving muscle phenotype change

Updates from the field of exercise physiology:



Strength

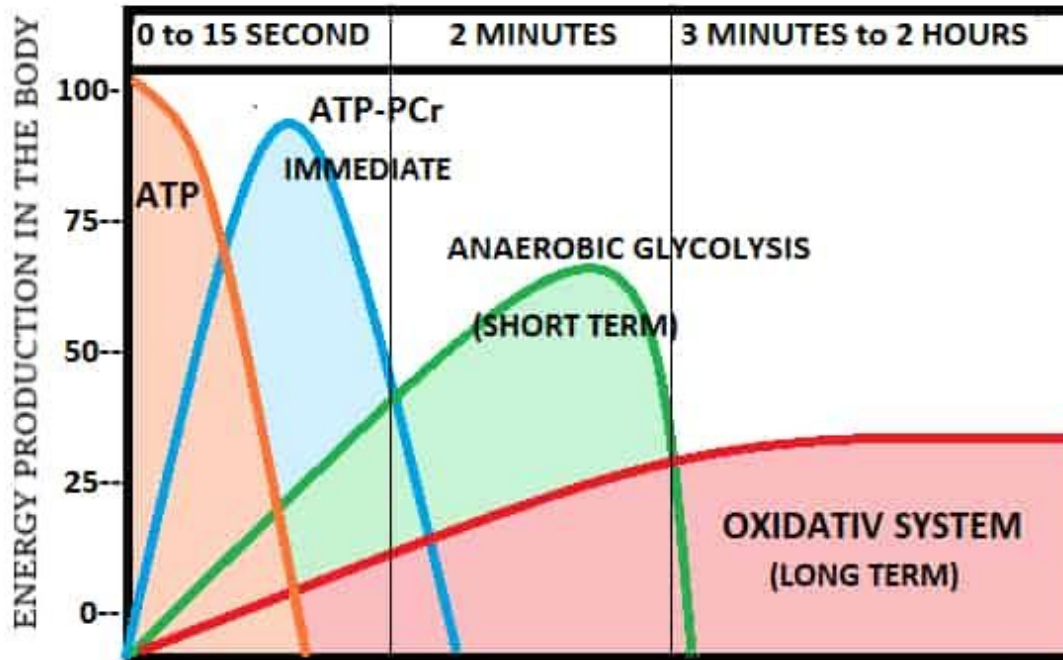
Endurance



S S&E E

Energy System Adaptation

THREE ENERGY SYSTEM IN THE BODY



REPS	MUSCULAR STRENGTH	STRENGTH + MUSCLE MASS	MUSCLE MASS	MUSCLE MASS + ENDURANCE	MUSCULAR ENDURANCE
1 - 5	Dark Green	Dark Green	Medium Green	Light Green	Light Green
6 - 12	Medium Green	Dark Green	Dark Green	Medium Green	Light Green
15+	Light Green	Light Green	Light Green	Medium Green	Dark Green

***Darker Green Represents Greater Effect**



Strength

Ability to generate force.

Muscle Mass = Hypertrophy

Size of muscle, and therefore muscle fibers.

Muscular Endurance

Ability to repeat a strength effort.

The background features a white canvas with scattered red and grey circles of various sizes. Overlaid on this are several dark blue, jagged lines that resemble stylized mountain ranges or abstract wave patterns, extending across the top and right sides of the frame.

03

Adaptations

The methods you use will drive the physiological adaptations you get.

Muscle Adaptations Are Complex and Varied



Individual Variation

Age
Genetics
Biological Sex
Fueling
Training History



Training

Frequency
Intensity
Duration

=



Conditioning Adaptations

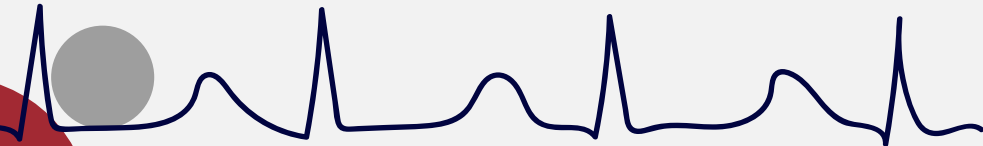
Nutrient Stores
Metabolic Enzymes
(type and amount)
Contractile Proteins
Connective Tissue
Stiffness



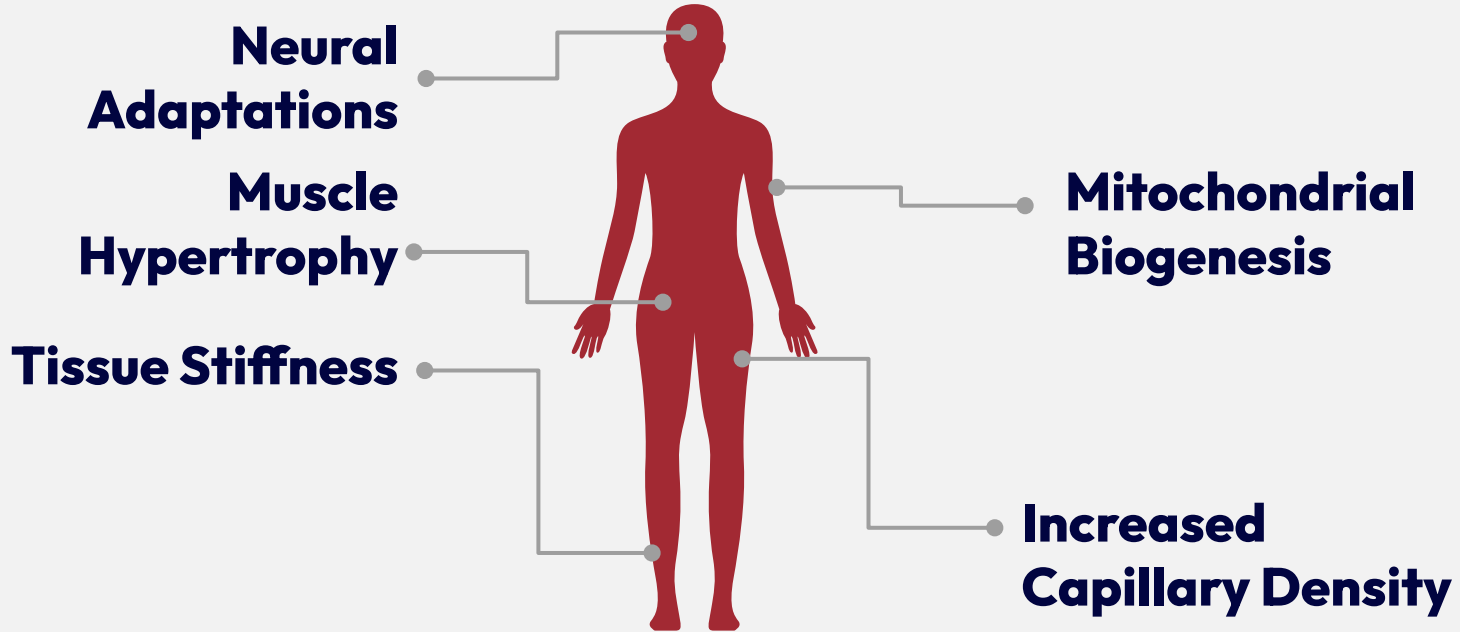
**What does that
mean for you as
a coach?**

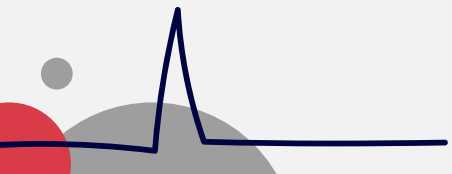
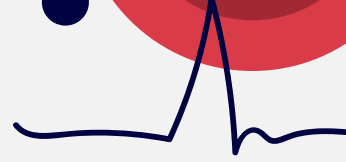
Be Aware:

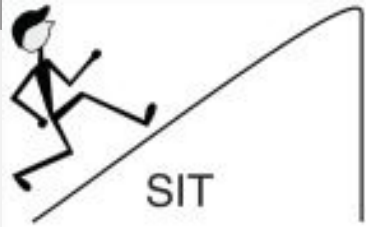
- Rates of Adaptation
- Conditioning Timelines
 - Especially for multisport athletes
- Genetic Potential
- Accumulation of base & tissue tolerance



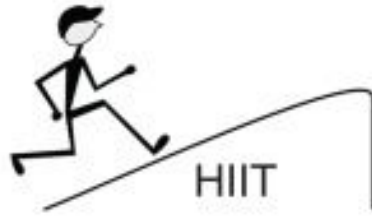
Conditioning Adaptations







SIT



HIIT



LSD

↑ Intensity

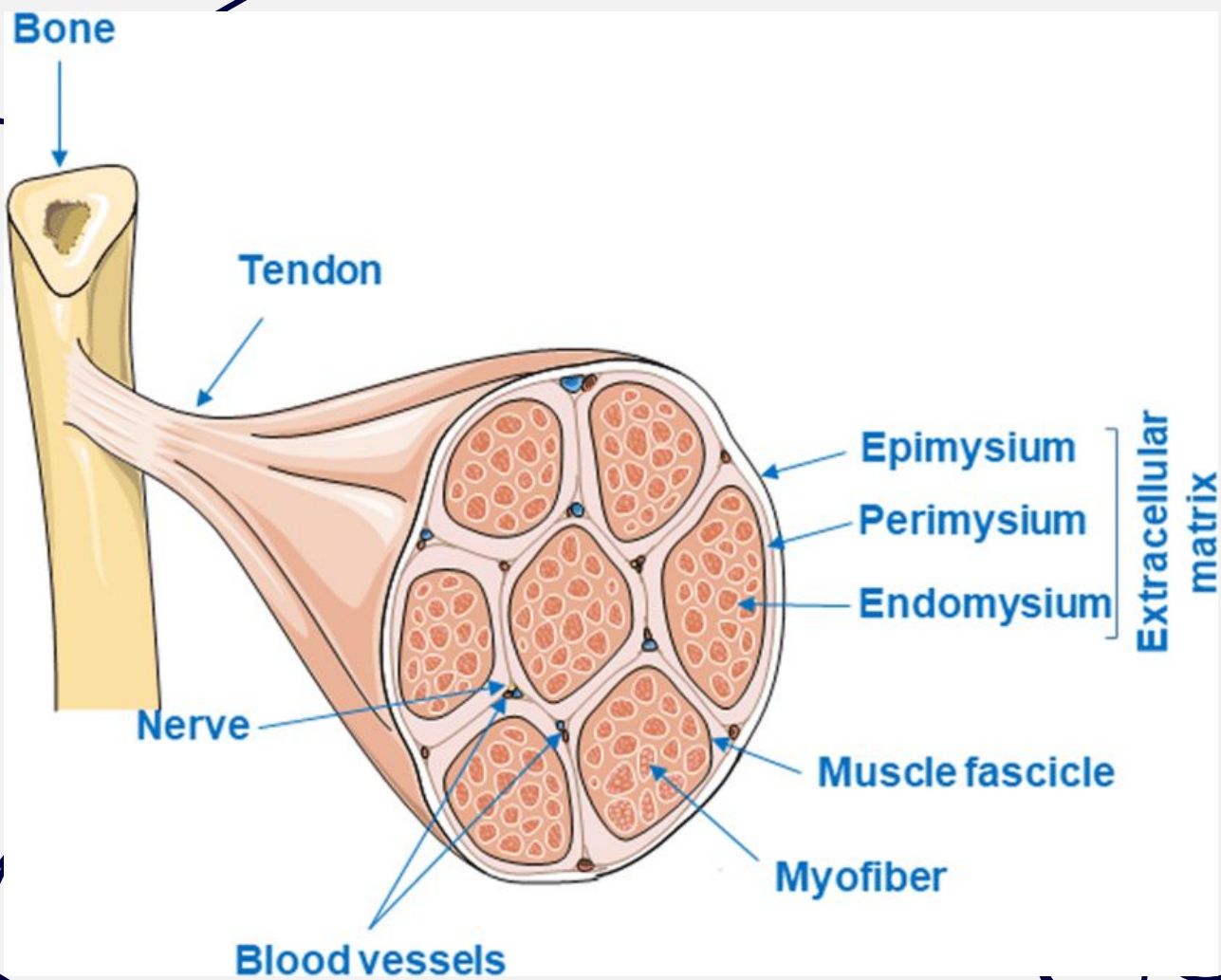
↑ Volume



↑ Mitochondrial respiration



↑ Mitochondrial content



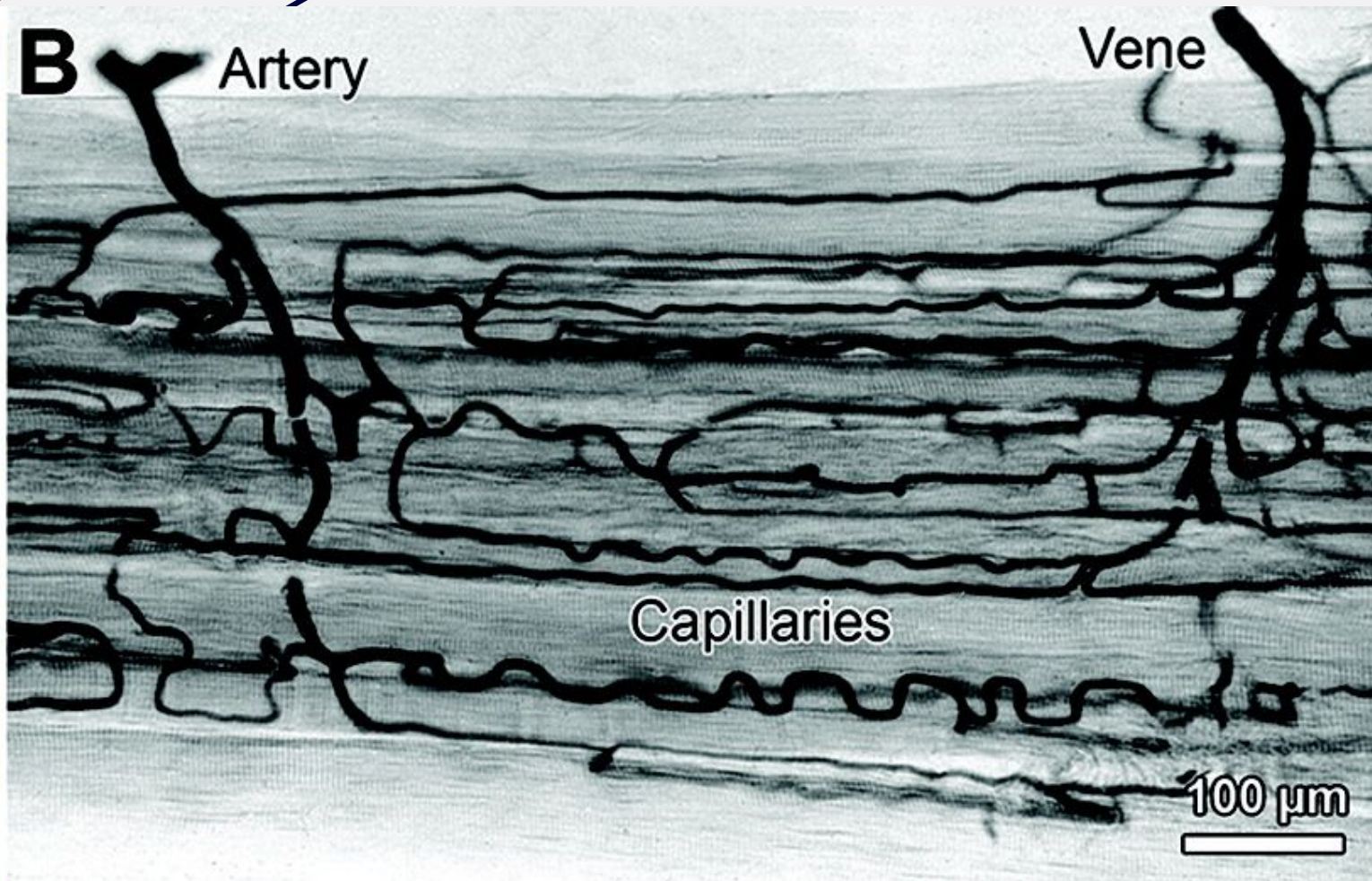
B

Artery

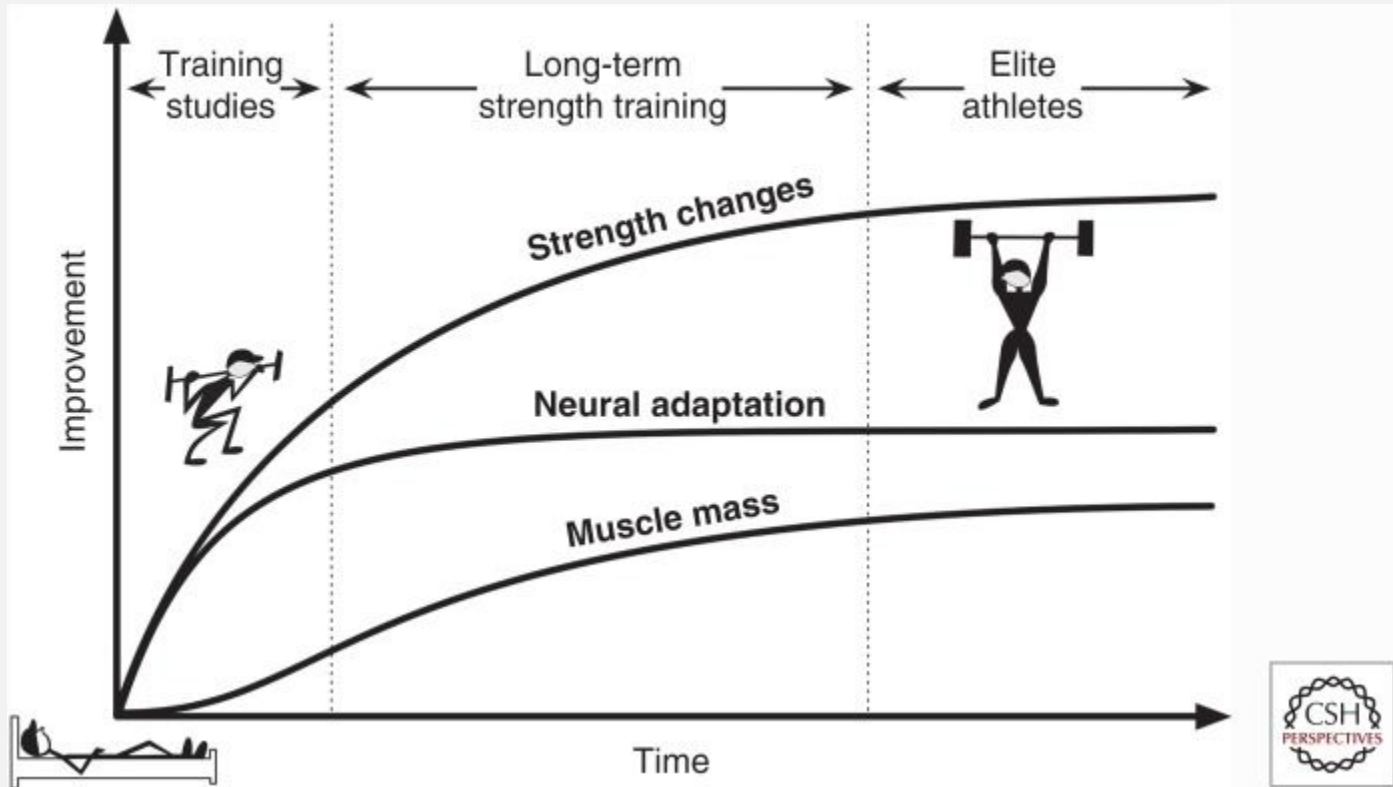
Vene

Capillaries

100 μm



Strength Training Adaptations





↑ Exercise Capacity

**↑ Exercise
Performance**



04

What counts?

What methods could
you incorporate?

Conditioning Methods

Zone 2

Continuous effort,
60-70% HR max.

01

Extensive Intervals

Submaximal intensity,
60-80%. Complete
recovery..

02

03

Intensive Intervals

Near max intensity,
70-90%. Incomplete
recovery.

04

Maximum Effort

Full effort sprint, not
sustainable

Heart Rate Zones

	INTENSITY	BENEFIT	HOW DOES IT FEEL?
5 MAXIMUM	90-100% OF HR MAX	Improves maximum performance. A lot of lactate is building up and you won't be able to continue for long.	It feels exhausting for breathing and muscles.
4 HARD	80-90% OF HR MAX	Increases maximum performance capacity, and your body gets better at using carbohydrates for energy. It also improves your body's ability to withstand higher levels of lactate in your blood.	You feel fatigue in your muscles and breathe heavily.
3 MODERATE	70-80% OF HR MAX	Improves your aerobic fitness. Lactate starts to build up in your bloodstream, but it won't yet affect your performance.	You start breathing deeper and feel a moderate effort.
2 LIGHT	60-70% OF HR MAX	Develops general endurance and your body's ability to burn fat.	It still feels comfortable and easy. You could go on for hours.
1 VERY LIGHT	50-60% OF HR MAX	Improves your overall health and helps you recover from more demanding training.	It feels very easy. You could go on for hours.

$$HR_{\max} = (220 - \text{age}) \quad \text{or} \quad HR_{\max} = 208 - (0.7 * \text{age})$$

The background features a white canvas with scattered red and grey circles of various sizes. Overlaid on this are several dark blue, jagged lines that resemble stylized ECG waveforms or abstract paths. The overall aesthetic is clean and modern.

05

Prescription

How much? When? Is more better?

Assessment → Differentiation

How do you currently assess your athlete's conditioning level?

What are common practices that are used for assessing conditioning level?

How long does it take and what information do you get?

Assessment → Differentiation



Ratings for Women, Based on Age

	18-25	26-35	36-45	46-55	56-65	65+
Excellent	52-81	58-80	51-84	63-91	60-92	70-92
Good	85-93	85-92	89-96	95-101	97-103	96-101
Above Average	96-102	95-101	100-104	104-110	106-111	104-111
Average	104-110	104-110	107-112	113-118	113-118	116-121
Below Average	113-120	113-119	115-120	120-124	119-127	123-126
Poor	122-131	122-129	124-132	126-132	129-135	128-133
Very Poor	135-169	134-171	137-169	137-171	141-174	135-155

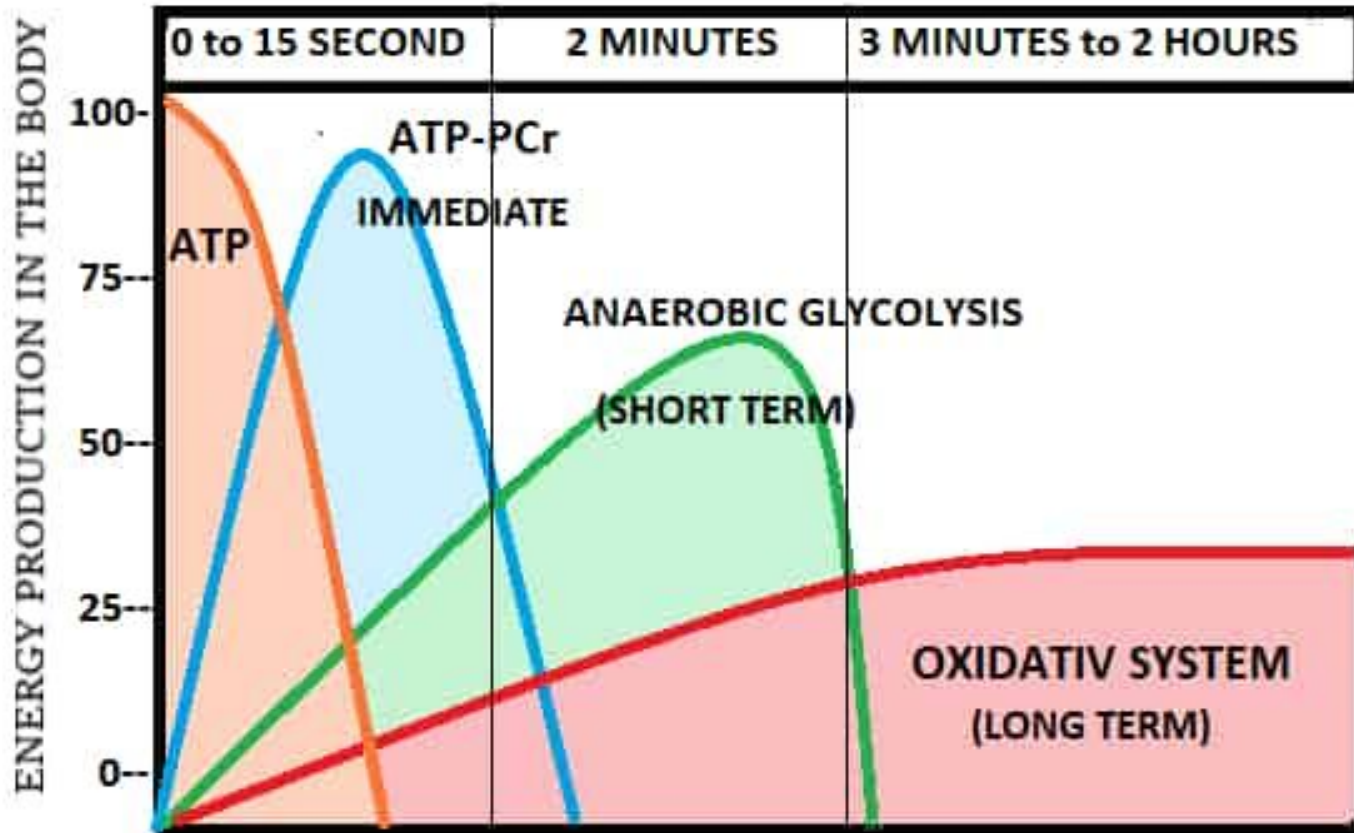
Ratings for Men, Based on Age

	18-25	26-35	36-45	46-55	56-65	65+
Excellent	50-76	51-76	49-76	56-82	60-77	59-81
Good	79-84	79-85	80-88	87-93	86-94	87-92
Above Average	88-93	88-94	92-88	95-101	97-100	94-102
Average	95-100	96-102	100-105	103-111	103-109	104-110
Below Average	102-107	104-110	108-113	113-119	111-117	114-118
Poor	111-119	114-121	116-124	121-126	119-128	121-126
Very Poor	124-157	126-161	130-163	131-159	131-154	130-151

Assessment → Differentiation



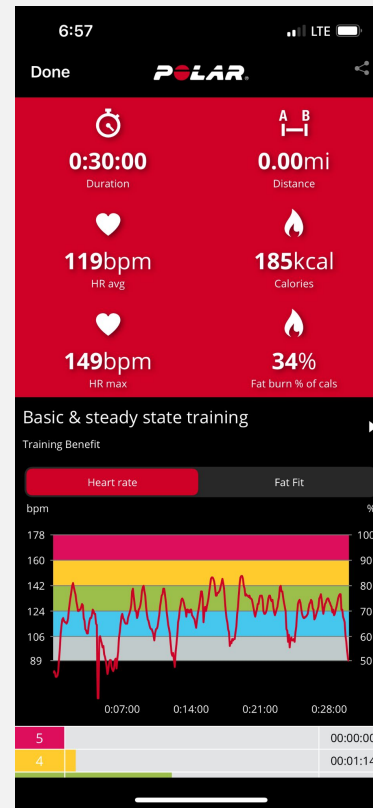
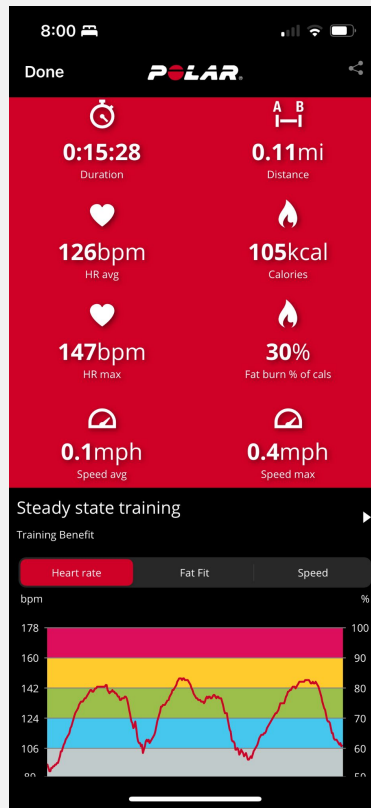
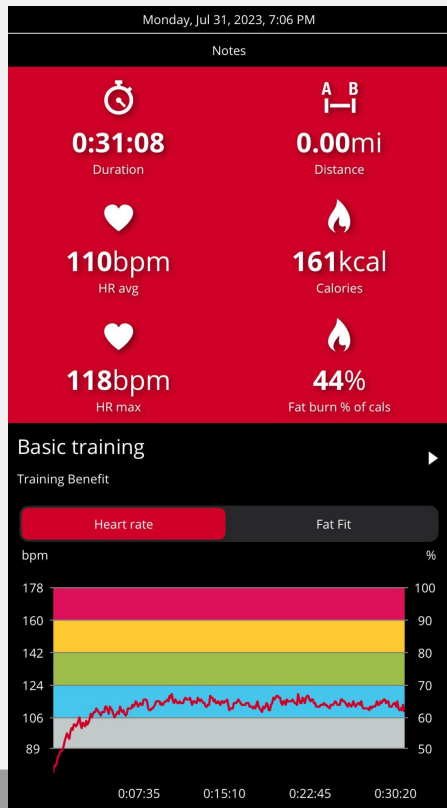
THREE ENERGY SYSTEM IN THE BODY



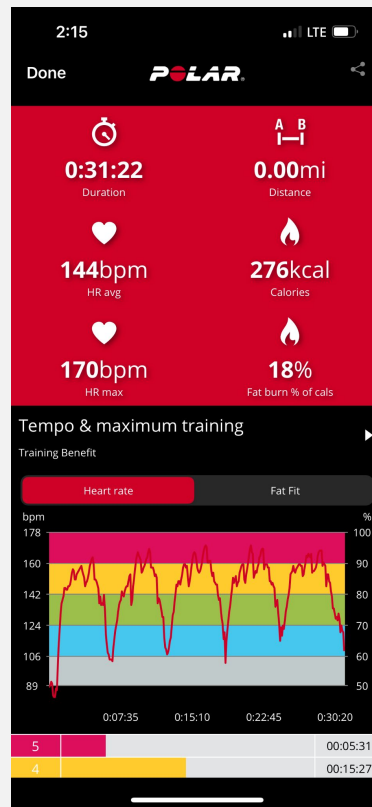
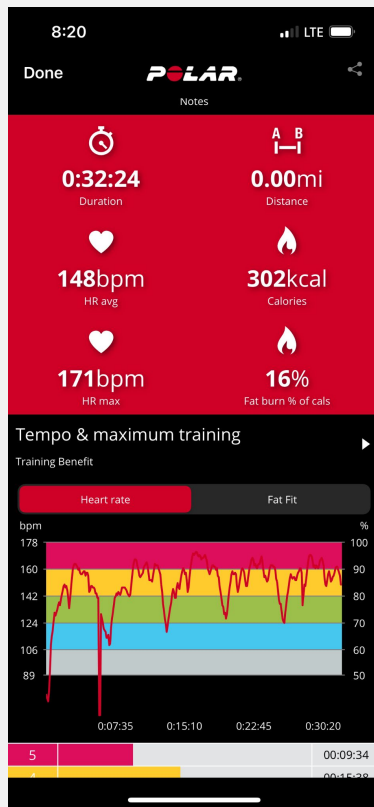
B

es

Examples



Examples





On Ice?

Off Ice?

Want help?

**Consult your athletic trainer
or S&C coach!!!**



06

Questions and Resources

What else do you want
to know?

The Conditioning Project

www.conditioningproject.com

@c4conditioning

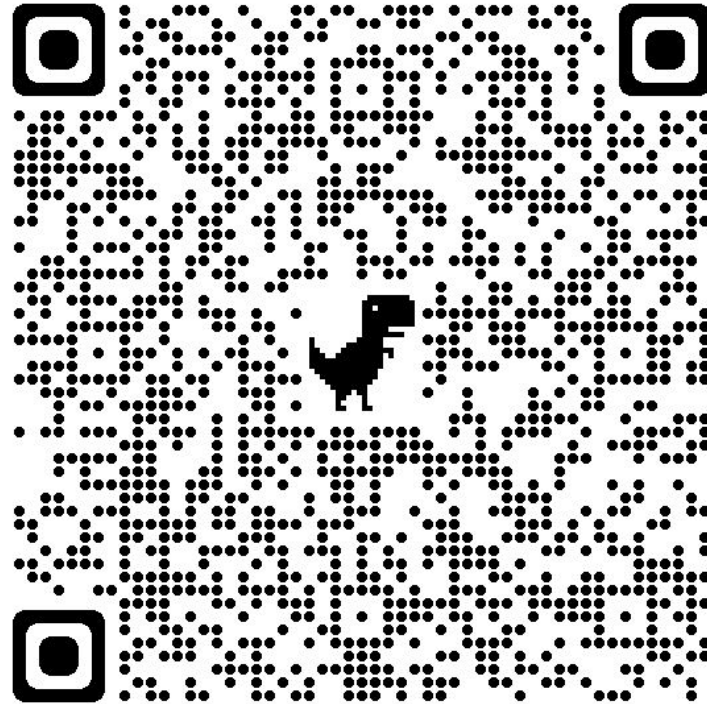
@timkettenring

@missyMmcbeth

Polar HR Monitors

<https://www.polar.com/us-en/sensors/h10-heart-rate-sensor>

This Presentation:



Thanks!



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Range of the disease



Simple discomfort

Venus has a beautiful name and is the second planet from the Sun



Fatal problem

Mercury is the closest planet to the Sun and the smallest of them all

Heart's rhythm abnormality



Too slowly

Mercury is the closest planet to the Sun and the smallest of them all



Too quickly

Venus has a beautiful name and is the second planet from the Sun



Irregularly

Despite being red, Mars is actually a cold place. It's full of iron oxide dust

Pathology

Failure sinoatrial node

Mercury is the
smallest planet

01

02

Irregular heartbeat

Jupiter is the biggest
planet of them all

Anatomical defects

Despite being red,
Mars is a cold place

03

04

Abnormal pacemaker

Saturn is a gas giant
with rings

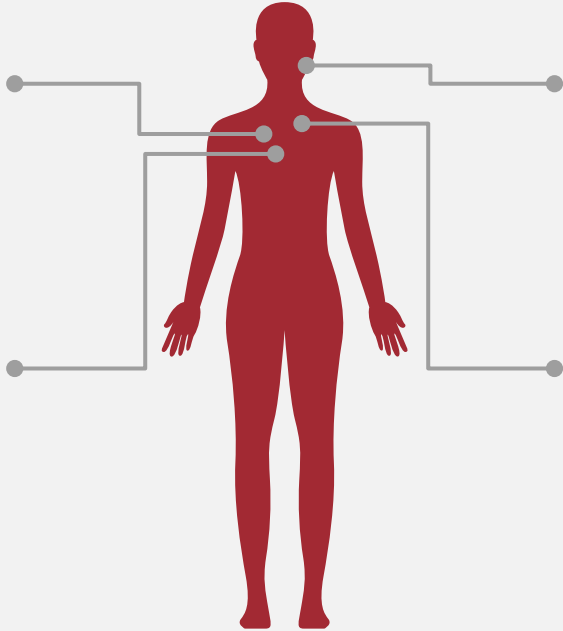
Symptoms of the disease

Fluttering chest

Mercury is the smallest planet of them all

Slow heartbeat

Jupiter is the biggest planet of them all



Shortness breath

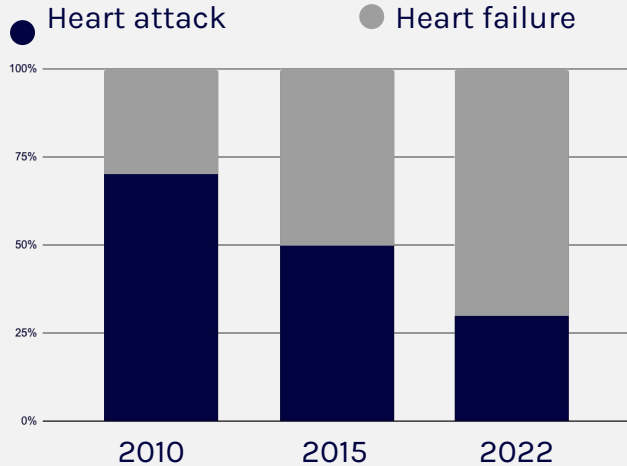
Despite being red, Mars is very cold

Racing heartbeat

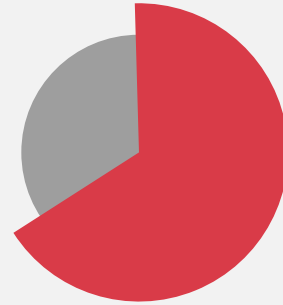
Saturn is the only planet with rings

Risk factors

Causes of arrhythmia

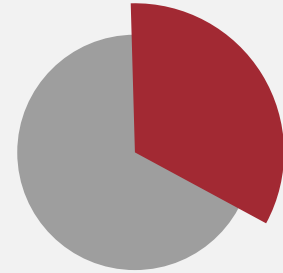


Follow the link in the graph to modify its data and then paste the new one here. For more info, [click here](#)



70%
People with narrowed arteries

Jupiter is the biggest planet of them all



30%
Abnormal heart valves or others

Mercury is the smallest planet of them all



11,000,000

Big numbers catch your audience's attention



213,000

The estimated total of deaths caused by Arrhythmia

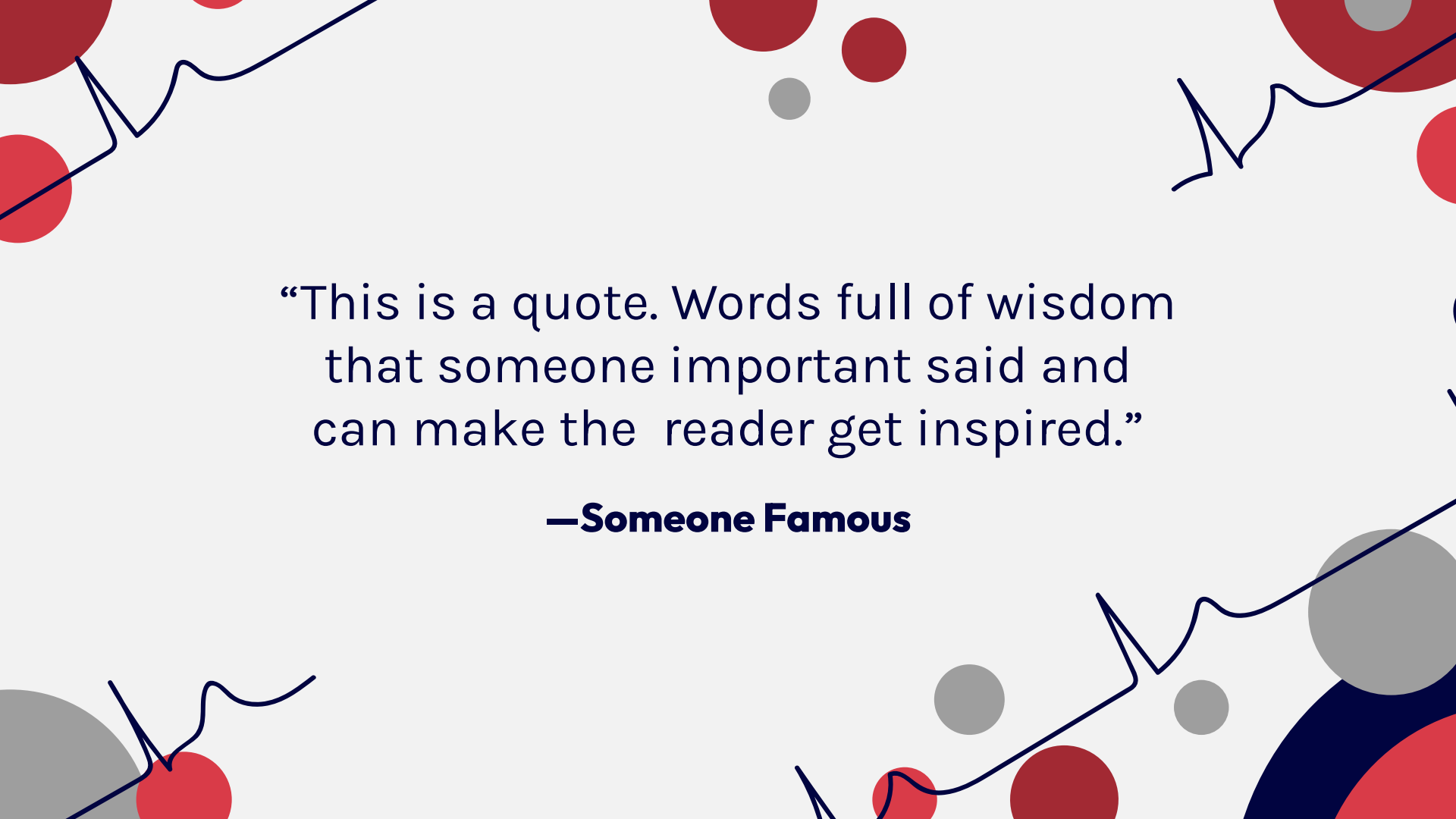
34,000

The estimated deaths caused by Arrhythmia in older people

20,000,000



Patients that had Arrhythmia after a heart attack

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“This is a quote. Words full of wisdom
that someone important said and
can make the reader get inspired.”

—**Someone Famous**

Diagnosis



Mercury

Mercury is the smallest planet of them all



Venus

Venus is the second planet from the Sun



Mars

Mars is actually a very cold place



Jupiter

Jupiter is the biggest planet of them all



Saturn

Saturn is the only planet with rings



Neptune

It's the farthest planet from the Sun

Prevention



Advice 01

Jupiter is the biggest planet of them all



Advice 02

Mercury is the smallest planet



Advice 03

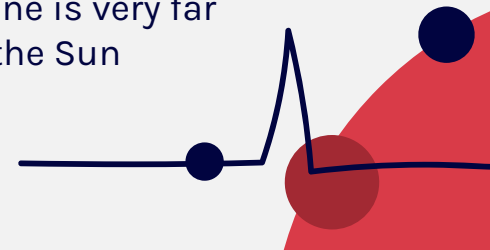
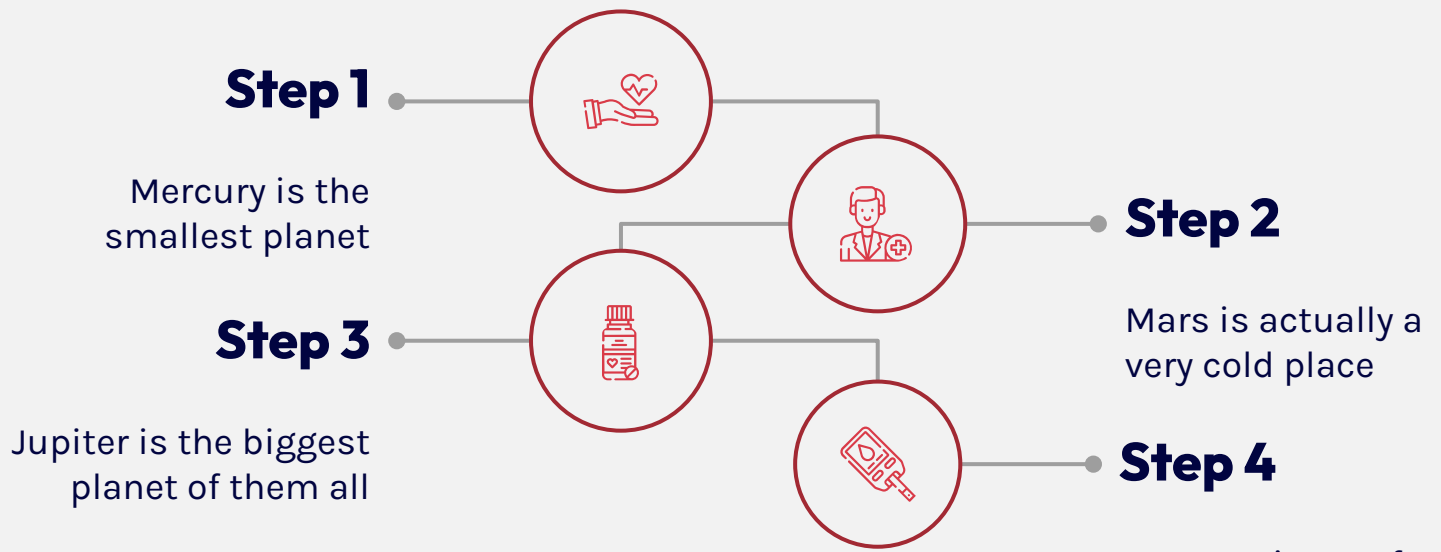
Mars is actually a very cold place



Advice 04

Saturn is a gas giant with rings

Treatment



Recommendations



What to do

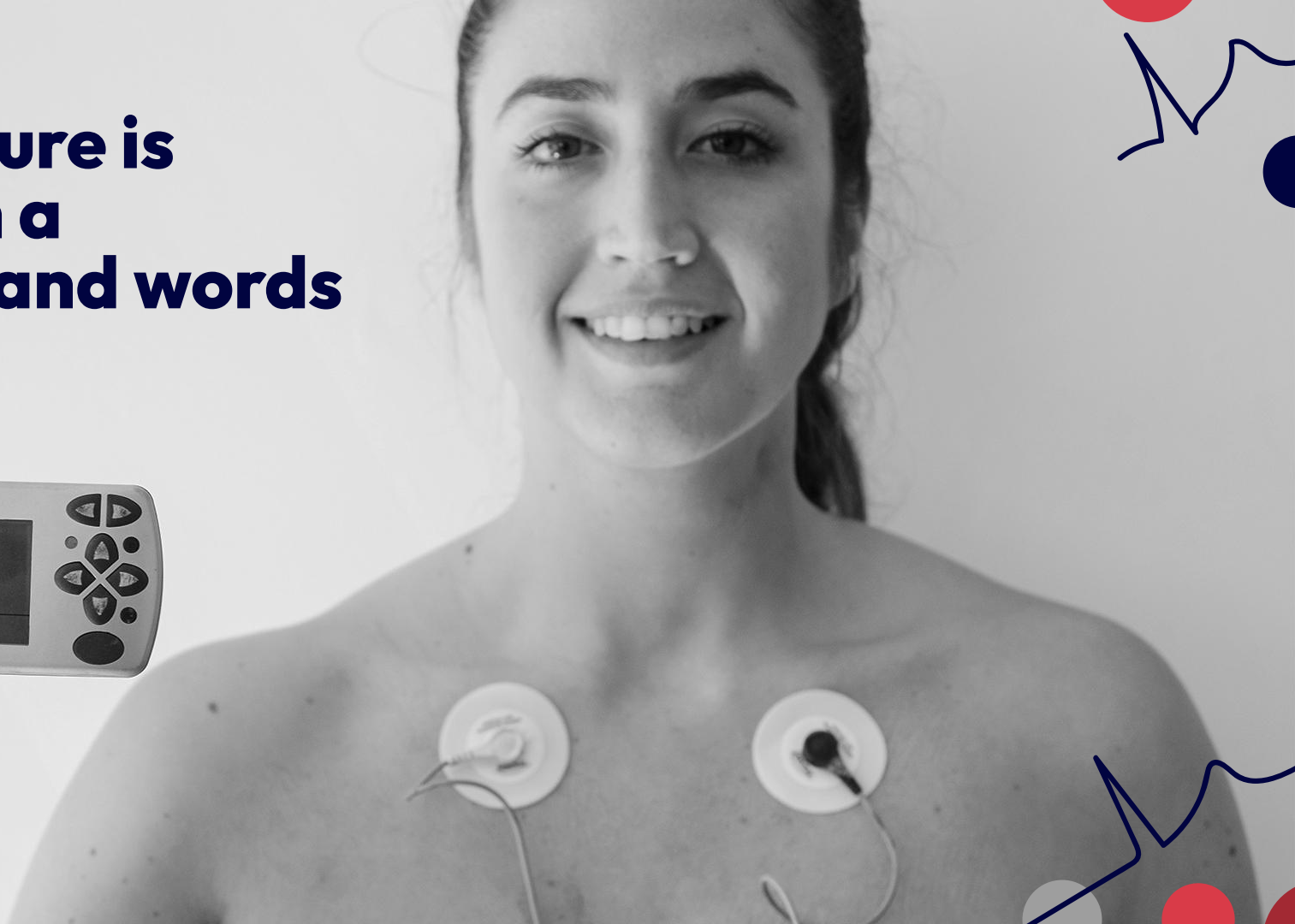
- Describe what the patient should do here
- Describe what the patient should do here
- Describe what the patient should do here



What not to do

- Describe what the patient should not do here
- Describe what the patient should not do here
- Describe what the patient should not do here

**A picture is
worth a
thousand words**



A picture always reinforces the concept

Images reveal large amounts of data,
so remember: use an image instead
of long texts





Awesome words

Doctor appointments

Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3



Mercury

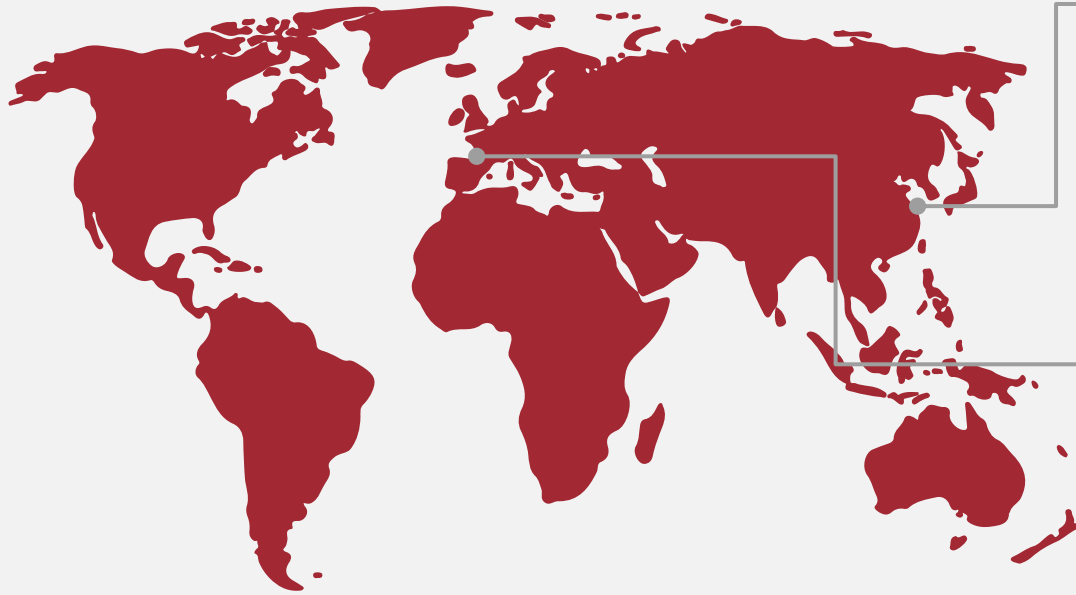
Mercury is the smallest planet



Venus

Venus is the second planet from the Sun

Prevalence



20%

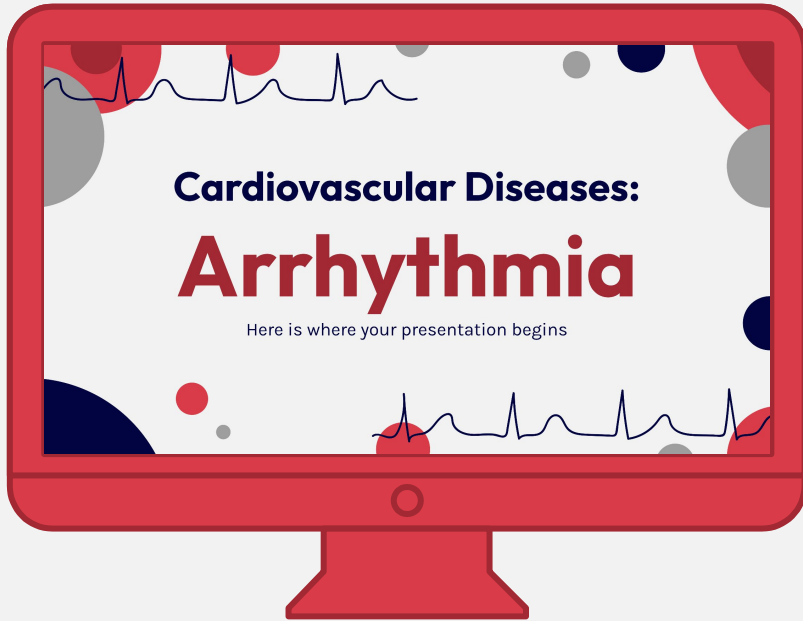
Mercury

Mercury is the smallest planet

80%

Jupiter

Jupiter is the biggest planet of them all



Website

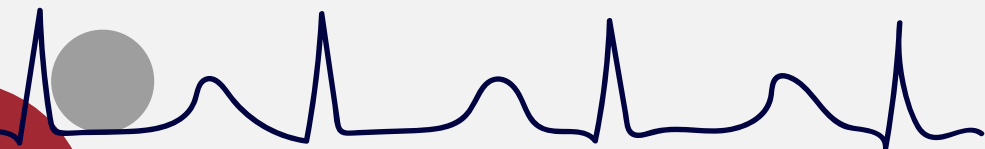
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Conclusions

Do you know what helps you make your point clear?
Lists like this one:

- They're simple
- You can organize your ideas clearly
- You'll never forget to buy milk!

And the most important thing: the audience won't miss the point of your presentation



Our team



Jenna Doe

You can speak a bit about
this person here



Sara Jimmy

You can speak a bit about
this person here



Susan Bones

You can speak a bit about
this person here

Thanks!

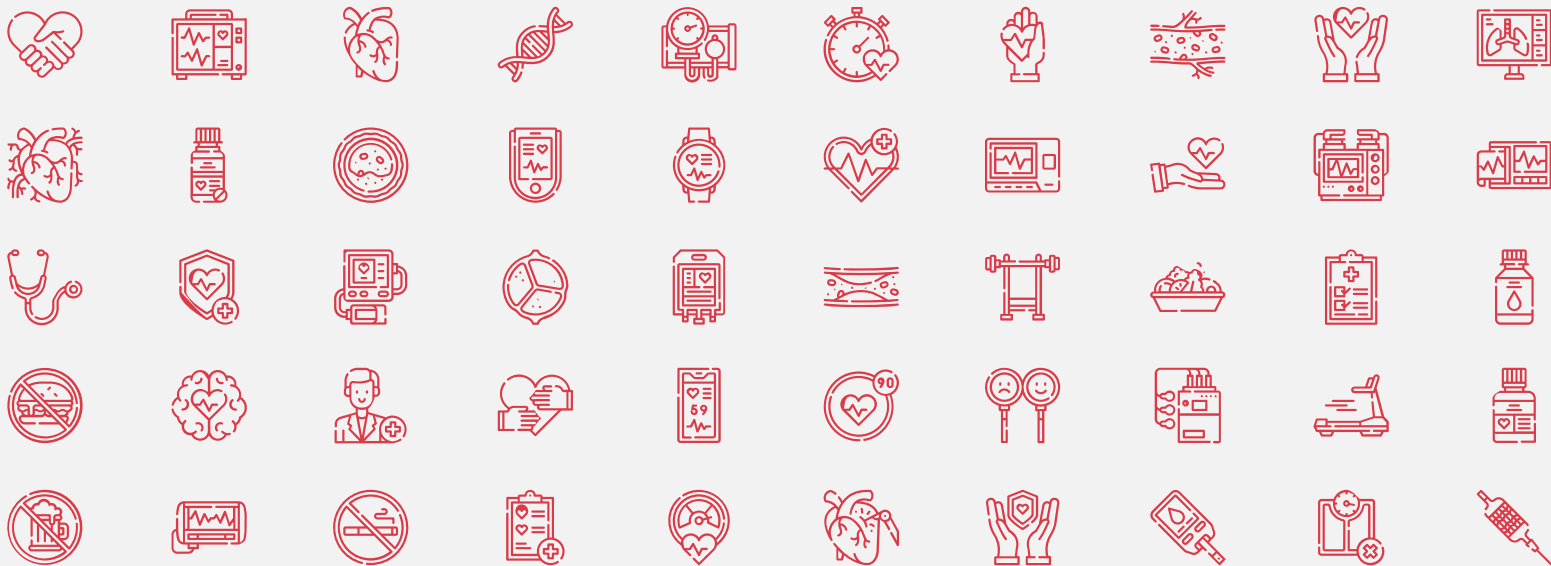
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- Smiley doctor at clinic medium shot
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Vectors

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Pana



Amico



Bro

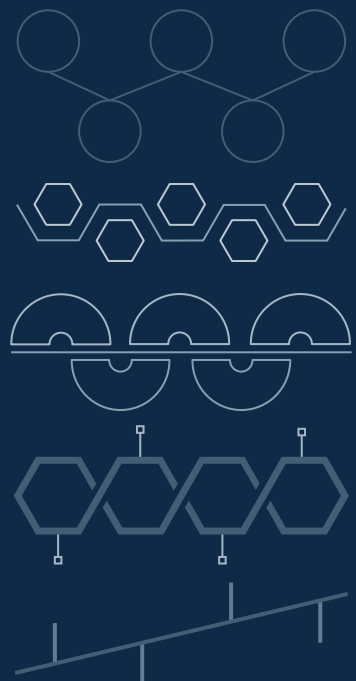
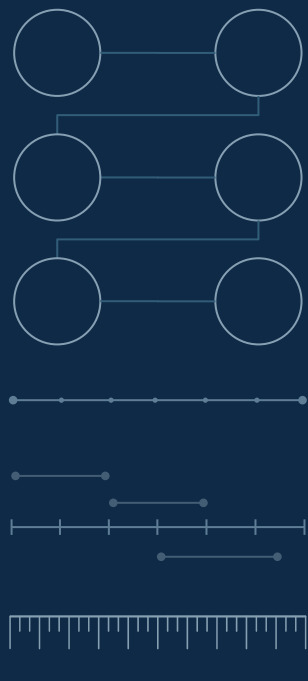
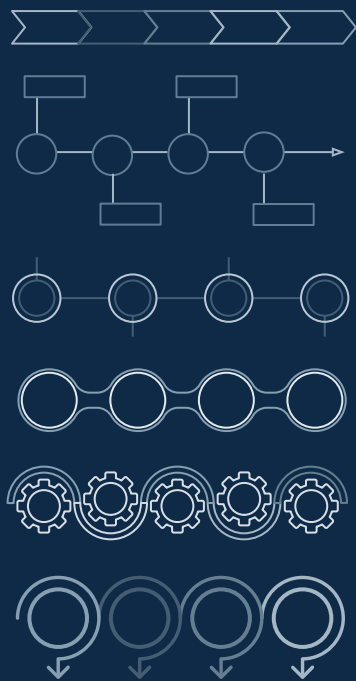
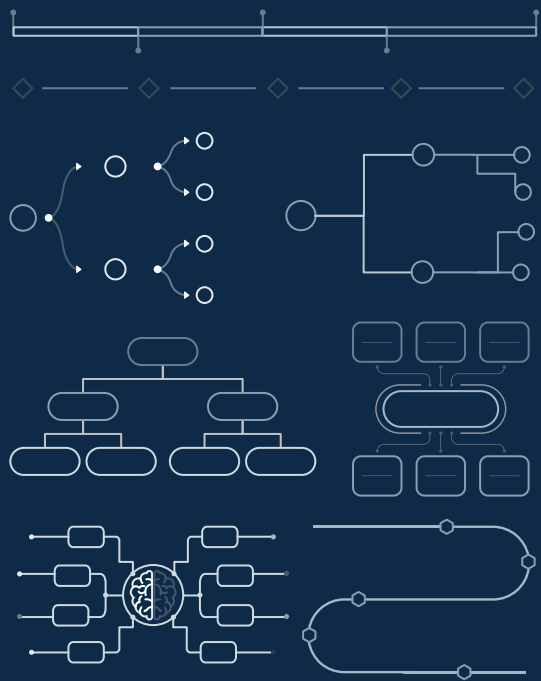


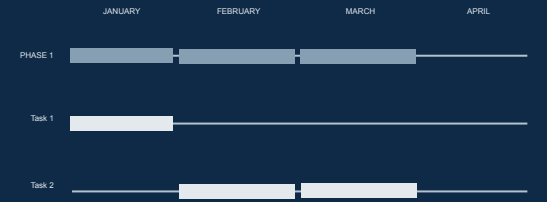
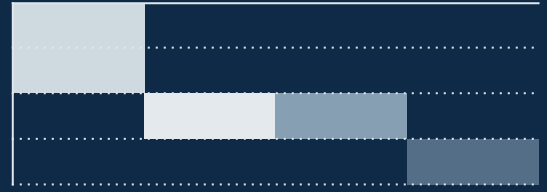
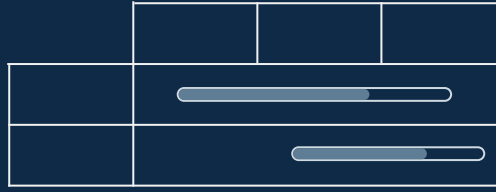
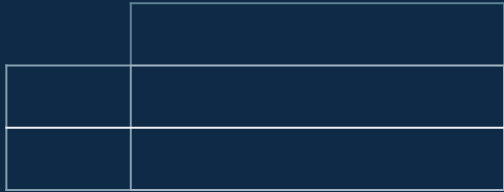
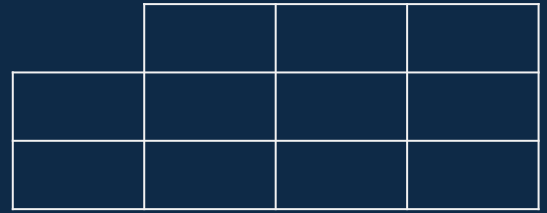
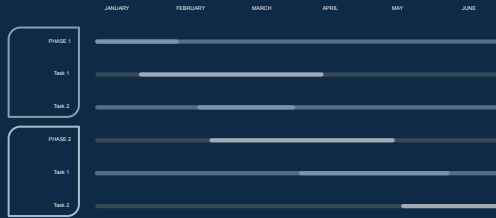
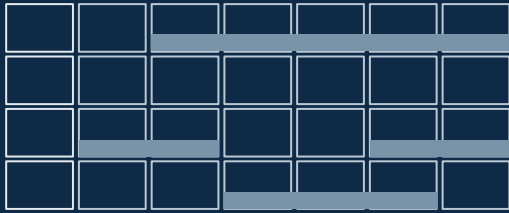
Rafiki



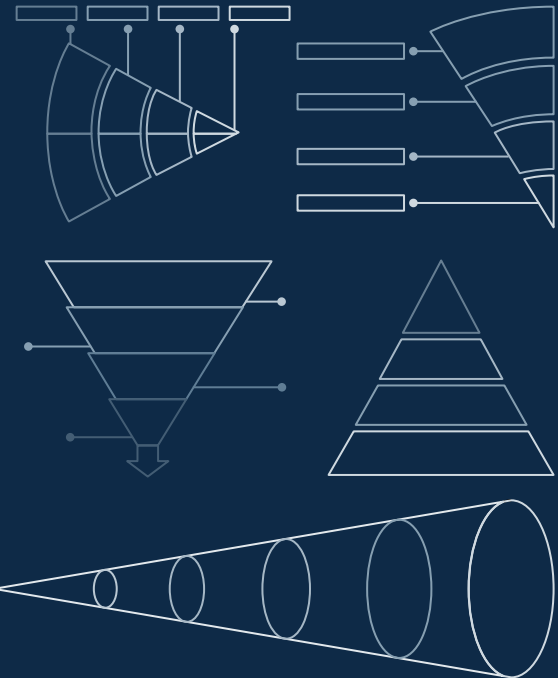
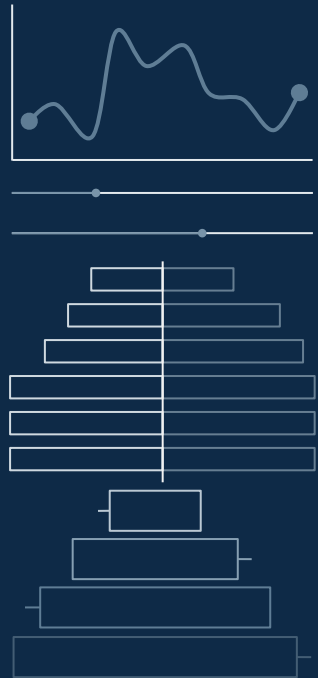
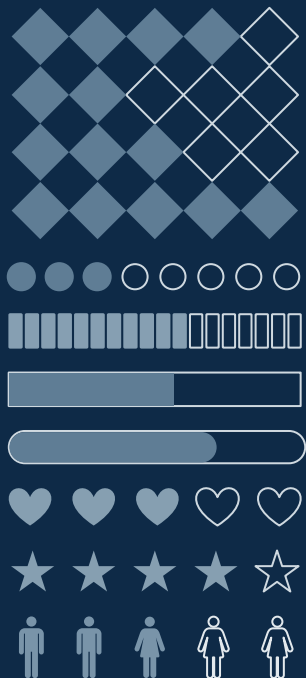
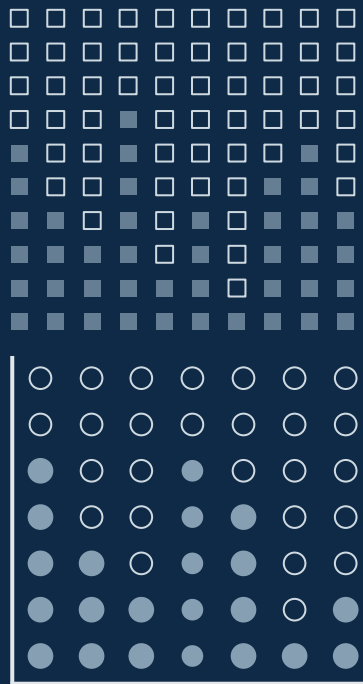
Cuate











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Contents of this template

This is a slide structure based on a disease presentation

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Fonts

To view this template correctly in PowerPoint, download and install the fonts we used

Used and alternative resources

An assortment of graphic resources that are suitable for use in this presentation

Thanks slide

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Colors

All the colors used in this presentation

Icons and infographic resources

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