



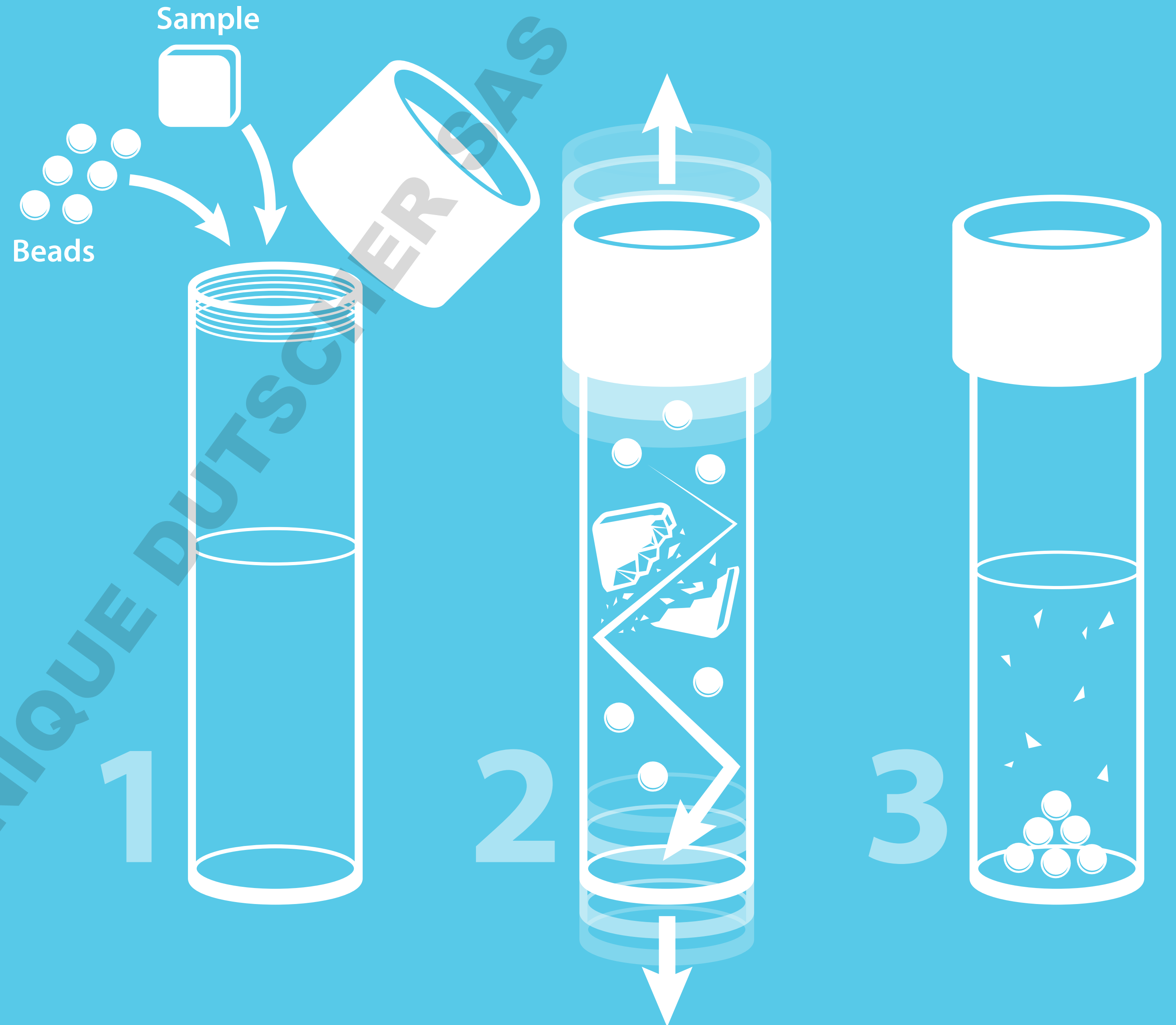
Bead Mill Homogenizers



How To Design Your Experiment

Bead mills function by rapidly accelerating **beads** within a vessel.

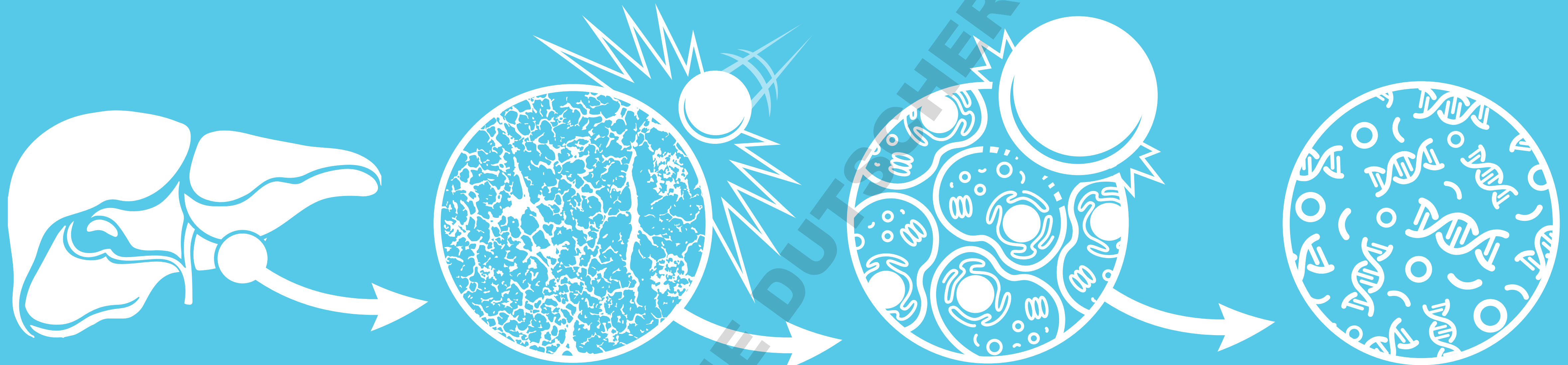
The projectiles dissociate the **sample** upon impact.



Things to consider when performing a Bead Mill Sample Extraction:

- 1 Target Sample**
cells, tissues, and environmental samples are standard
- 2 Sample Size**
lab grade bead mills typically accommodate 2 mg – 5 g samples
- 3 Bead Material**
glass, ceramic, garnet, and stainless steel beads are available
- 4 Bead Density**
- 5 Bead Diameter**
beads ranging from 0.1 mm to 6.5 mm are available for various applications
- 6 Tube Velocity**

Biological Sample Dissociation occurs in multiple phases...



1 **Organs** are composed of multiple cell types, connective tissues, and vasculature.

2 **Bead impacts** disrupt cellular adhesion and connective tissue.

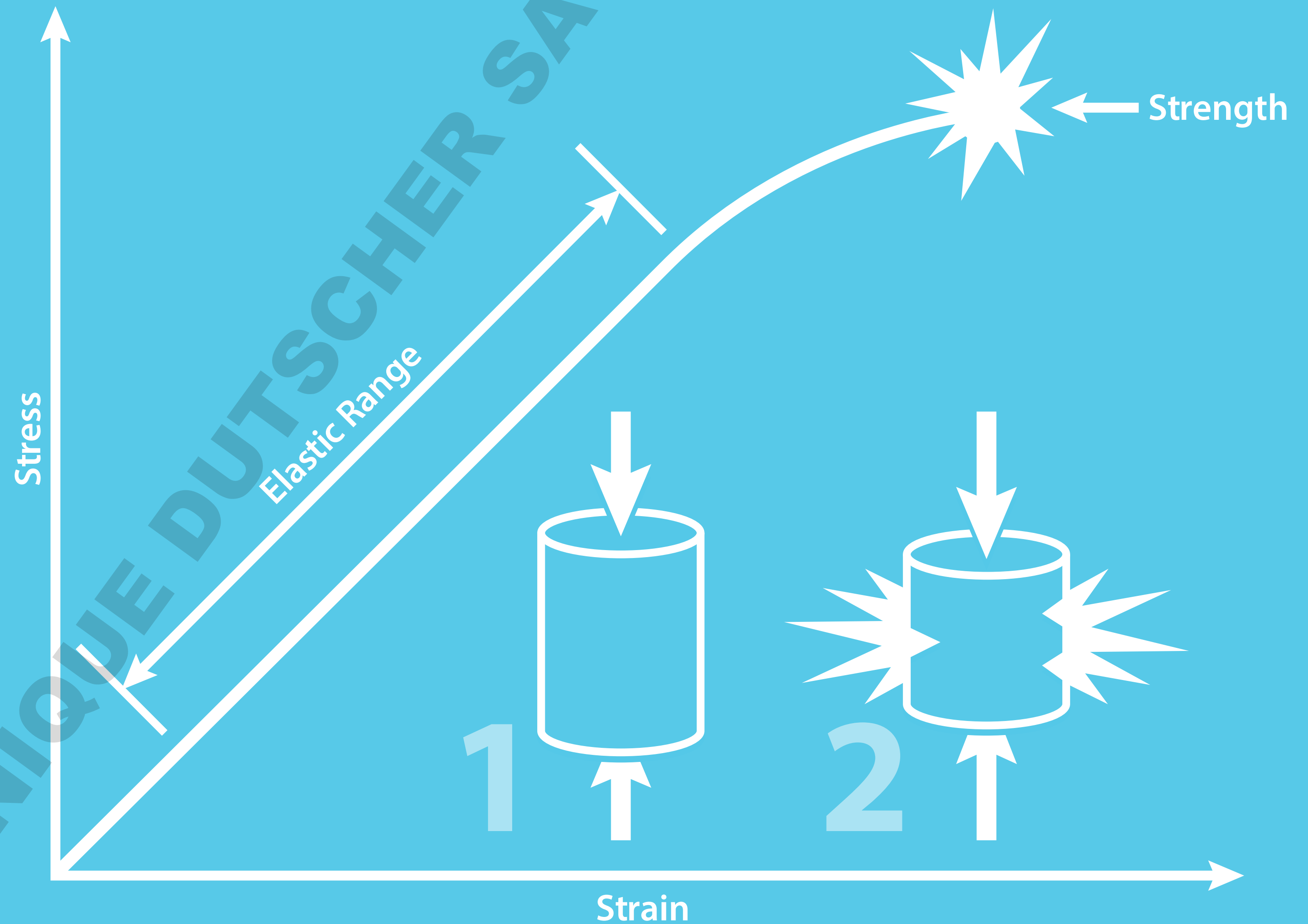
3 Bead impacts and cellular projection through tube disrupts cell membranes to release **non-organelle based compounds and organelles**.

4 **Organelles** are lysed through bead impacts to release **organelle bound analytes**.

$$E = \frac{\text{Stress}}{\text{Strain}} = \frac{F/A}{\Delta L/L_0}$$

Young's Modulus is a measure of the ability of a material to **withstand changes in length** when under lengthwise **tension or compression**.

Understanding a sample's **elasticity** is essential when designing a bead mill experiment.

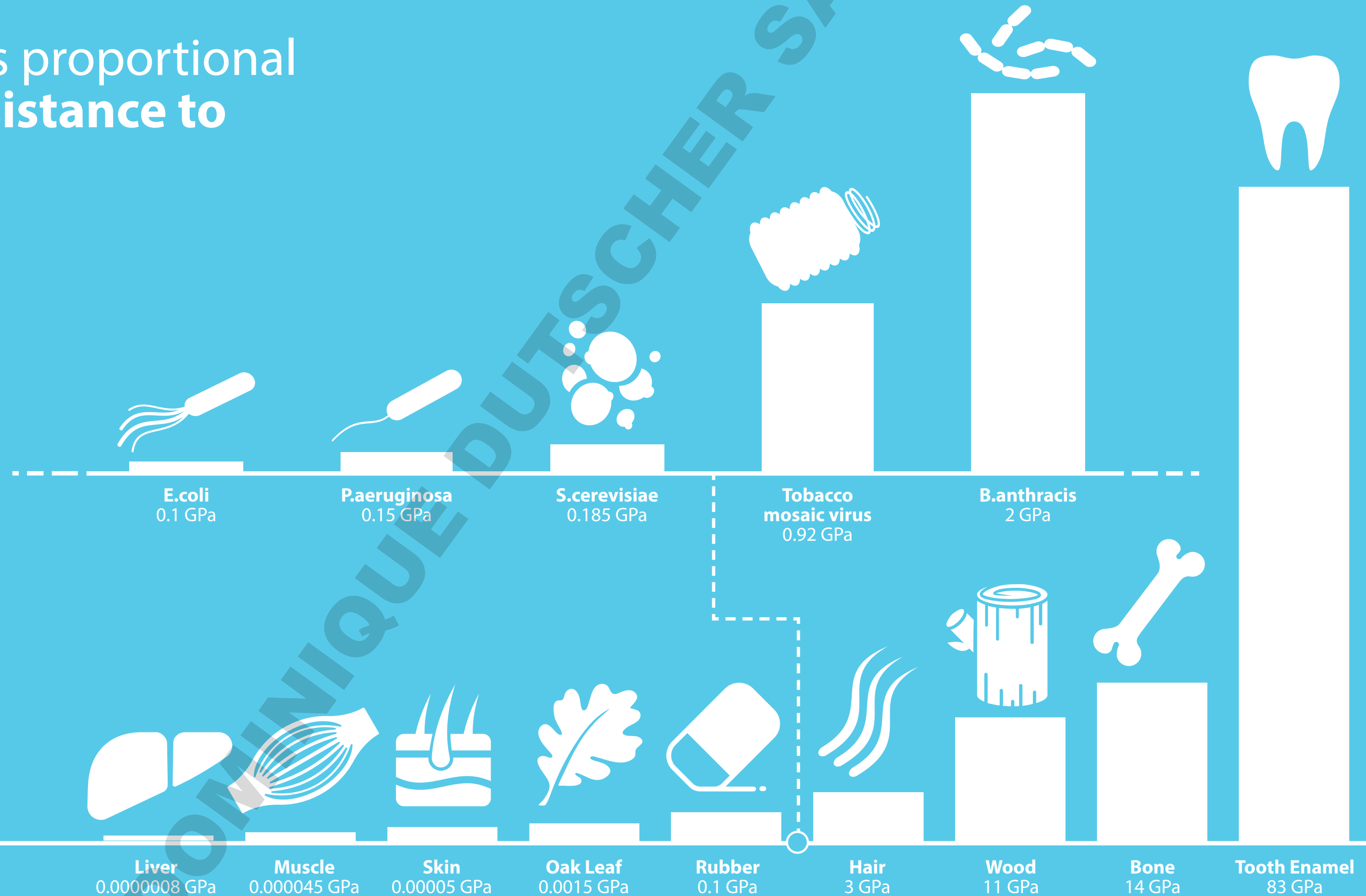


Biological samples with increasing Young's Modulus.

Young's Modulus is proportional to the sample's **resistance to dissociation**.

Cells exhibit significant differences in elasticity.

A cell's Young's Modulus must be considered when designing a bead mill experiment.

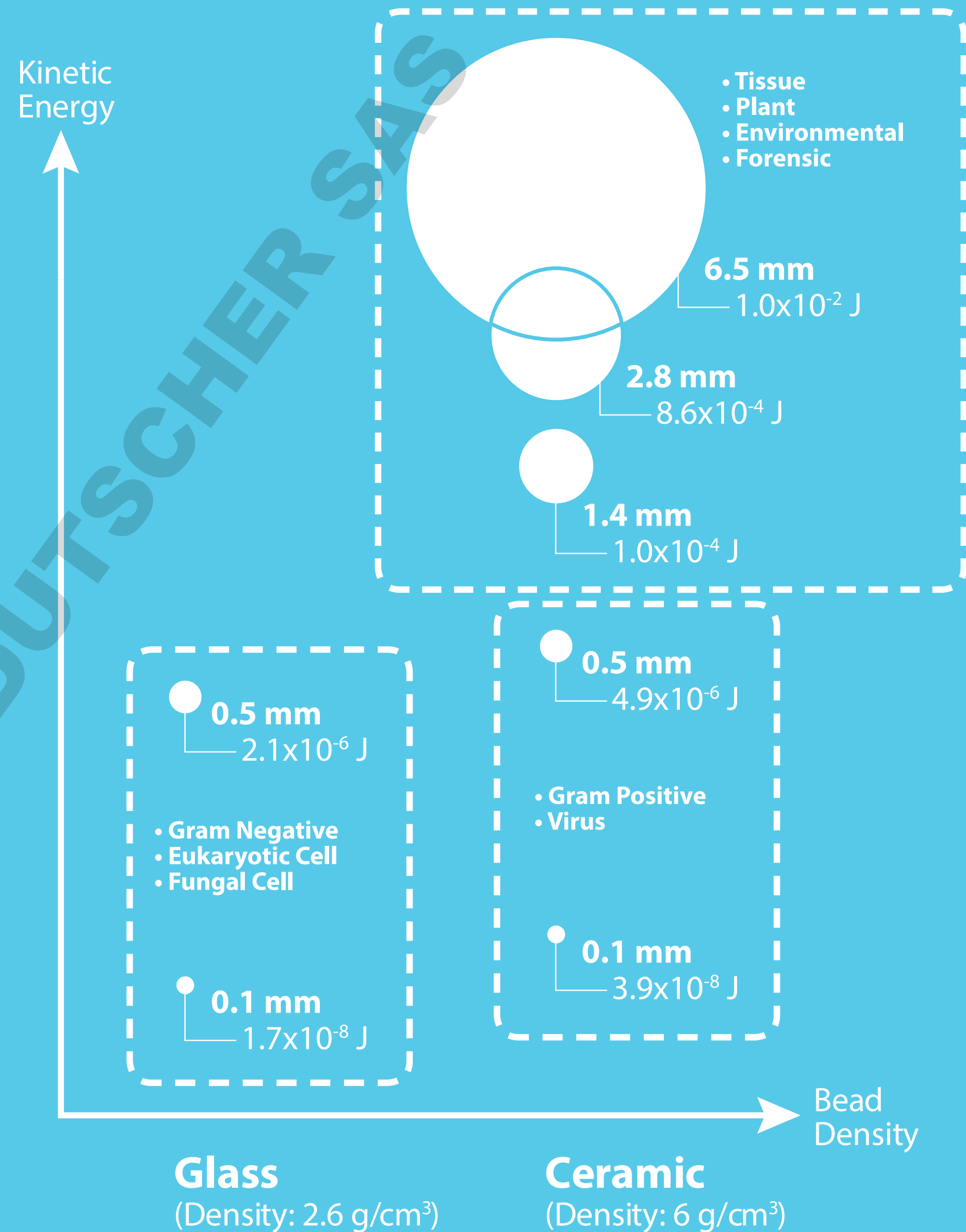


Bead Material, Density, and Diameter determine the **Kinetic Energy** imparted to the sample during impact, and ultimately establishes the **dissociation efficiency**.

As material density and diameter increases, the kinetic energy of the projectile increases.

Increased Kinetic Energy = Increased Lysis Efficiency.

(Kinetic Energy presented at Tube Velocity of 5 m/s.)



Choosing the correct bead(s) for your sample:

TIP: *Bead Diameter should be proportional to Sample Diameter.*



**0.1 / 0.5 mm
Glass**

- Gram Negative
- Eukaryotic Cell
- Fungal Cell



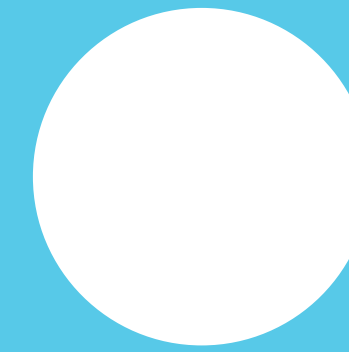
**0.1 / 0.5 mm
Ceramic**

- Gram Positive
- Virus



**0.15 / 0.7 mm
Garnet**

- Soil
- Clay
- Sediment
- Waste Water
- Feces



**2.4 mm
Metal**

- Hard Tissue
- Dry Grinding
- Roots / Seed
- Skin
- Muscle
- Bone
- Hair



**1.4/2.8/6.5 mm
Ceramic**

- Tissue
- Plant
- Environmental
- Forensic

Pre-filled Bead Kits

Pre-filled Bead Kits are available in 0.5 mL, 1.5 mL, 2 mL, 7 mL, 30 mL and 50 mL.

Tubes and Beads available in bulk.



0.5 mL



1.5 mL



2 mL



7 mL



15 mL



30 mL



50 mL



Bead Ruptor 4

Bead Ruptor 12

Bead Ruptor Elite

0.5 mL	0.5 mL	0.5 mL
1.5 mL	1.5 mL	1.5 mL
2 mL	2 mL	2 mL
7 mL	7 mL	7 mL
		15 mL
		30 mL
		50 mL

Tube Capacity