



GENE TRANSFER: BIOLISTIC PARTICLE DELIVERY

Helios[®] Gene Gun System

- Biolistic gene transfer over a 2 cm² area using a 100–600 psi helium pulse
- No carrier DNA required; no extraneous genes or proteins delivered
- Transient and stable gene expression in prokaryotic and eukaryotic cells

Rapid-Fire Nucleic Acid Delivery

Biolistic DNA Delivery

The Helios gene gun system is a handheld biolistic device that fires nucleic acid directly into eukaryotic and prokaryotic cells. An adjustable helium pulse of 100–600 psi propels gold microparticles that can be coated with DNA, RNA, and other biomaterials. Cartridge “bullets” act as carriers for ~0.5 mg of microparticles and are easily prepared using the tubing prep station. The target area is 2 cm².

Outline of Helios Gene Gun Operation

- DNA (or other biomaterial) of interest is coated onto gold microparticles
- Coated microparticles are loaded into the cartridge holder (loading differently coated microparticles permits codelivery)
- The operator pulls the trigger; the helium pulse propels the microparticles into target cells
- Nucleic acid coated onto the microparticles is taken up by the genome of target cells

Helios Gene Gun System Components

The Helios gene gun system includes:

- Helios gene gun
- Hose assembly
- Special helium regulator
- Tubing prep station
- Tubing cutter
- Optimization kit
- Enough materials (excluding compressed gases, low-pressure nitrogen regulators, and nucleic acids) to prepare nearly 1,000 samples

Target Applications

Transformation Factors	Helios Gene Gun System
Experimental conditions	In situ, in vitro, in vivo, ex vivo
Target area	Small (2 cm ²)
Pressure range	100–600 psi
Target types	Animals: Any tissue exposed to barrel (skin, organs); cell, explant, and organ culture Plants: Field and greenhouse use, plant cell culture, explants Yeast, bacteria, other microbes



Helios Gene Gun System



A bombardment of an A6 potato clone with viral cDNA at 80 (left upper part of leaves), 100 (right upper part of leaves), 150 (left lower part of leaves), and 200 psi (right lower part of leaves) at 0 cm.

Accessories for the Helios Gene Gun

GeneShot™ Control Cartridges

GeneShot control cartridges are premade projectiles for the Helios gene gun. Each cartridge contains two widely used reporter genes, *lacZ* (encoding β -galactosidase) and *luc* (encoding firefly luciferase), on 1.6 μ m gold. Driven by a strong mammalian promoter, the human cytomegalovirus (CMV) immediate early promoter, these positive control bullets yield reporter gene activity useful for optimizing the Helios gene gun in numerous applications.

Specifications

Helios Gene Gun System

Functional

Maximum current	10 mA peak
Voltage input	9 V alkaline battery, replaceable
Battery life	1,000 discharges in continuous use
Gas pressure	600 psi maximum helium
Safety relief pressure	700 \pm 35 psi at regulator assembly
Regulator adjustment	800 psi limit maximum
Discharges	12 per cylinder, mechanical indexing

Environmental

Operating conditions	10–32°C (50–90°F); 30–80% humidity
Storage conditions	0–60°C (32–110°F); 10–90% humidity

Physical

Dimensions	20 x 25 cm (8 x 10"; approximate)
Weight	1.42 kg (3.15 lb)

Tubing Prep Station

Electrical

Maximum current	62 mA/125 mA peak
Voltage input	100/120 V or 220/240 V

Functional

Input frequency	50/60 Hz
Relief pressure	30 \pm 1.5 psi at regulator assembly
Speed	30 rpm nominal
Tubing fill	Manual

Physical

Construction	Aluminum and acrylic
Dimensions	85 x 10 cm (33.5 x 4"; approximate)
Weight	5.08 kg (11.2 lb)

Sample Preparation Accessories

Microcarriers, Tefzel tubing, cartridge collection/storage vials, and desiccant pellets are needed for sample preparation. DNA is precipitated onto gold microcarriers using calcium phosphate and spermidine. The gold microcarriers are available in 0.6, 1.0, and 1.6 μ m diameters. Lengths of Tefzel tubing (up to 76 cm, or 30") are loaded with DNA- or RNA-gold microcarrier complexes using the tubing prep station. Coated sample tubing is cut into 1.25 cm (0.5") cartridges using the tubing cutter. Sample cartridges can be stored at 4°C in cartridge collection/storage vials with a desiccant pellet for later use. Additional barrel liners and cartridge holders are available.

Ordering Information

Catalog #	Description
165-2431	Helios Gene Gun System , 100/120 V, includes Helios gene gun kit, helium hose assembly, helium regulator, tubing prep station, syringe kit, tubing cutter, Helios gene gun optimization kit, instructions
165-2432	Helios Gene Gun System , 220/240 V
165-2412	Helium Hose Assembly , with Swagelok quick-connect fittings
165-2413	Helium Regulator , CGA 580 female fitting (US standard), with pressure relief valve; maximum pressure 2,600 psi
165-2418	Tubing Prep Station , 100/120 V, includes tubing support cylinder, power cord, O-rings, tubing prep unit, 12" Nalgene nitrogen regulator hose, two 3/16" barb-to-male Luer-Lok fittings, nitrogen flowmeter fitting, two 1/8" barb-to-male Luer-Lok fittings, 5/64" Allen wrench, 10 ml syringe holder
165-2420	Tubing Prep Station , 220/240 V
165-2421	Syringe Kit , includes syringe adaptor tubing, silicone, 5", 0.104" ID x 0.192" OD, five 10 ml syringes, syringe adaptor fitting, five 1/8" barb-to-female Luer-Lok fittings
165-2422	Tubing Cutter , includes tubing cutter unit and 10 razor blades
165-2424	Helios Gene Gun Optimization Kit , includes 0.25 g 0.6 μ m gold microcarriers, 0.25 g 1.0 μ m gold microcarriers, 0.25 g 1.6 μ m gold microcarriers, cartridge kit

For more information, visit us on the Web at www.bio-rad.com/genetransfer/ or www.bio-rad.com/RNAi/

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