Examples of Electro-transfected Eukaryotic and Prokaryotic Cells

Mammalian

†Hamster fibroblast (CHO)
†Human B
†Human, B lymphomas: BJAB,P3HR-1, B95-8, UC729-6
†Human, B-cell, JY, Epstein-Barr virus transformed
†Human, C-4I, cervical carcinoma
†Human epithelial cells
†Human erythroleukemia (K-562)
†Human, epithelial, cervix (HeLa)
†Human fibroblast
†Human, GCT, fibrous histocytoma
Human glioblastoma
†Human, HEL cells, eythroleukemia
†Human, Hep3b2, hepatocytes
†Human, HepG2, hepatoma
†Human, HL 60, eythroleukemia
†Human hybridoma
†Human, JEG-3, choriocarcinoma
†Human, K562, chronic myeloid leukemia
†Human, kidney, 293
†Human, lymphocytes, primary
†Human lymphoma EB4, Ly67, HUT-78
†Human, MCF-7, breast
†Human, MRC-5, lung
Human medullary thyroid (MTC)
Human melanoma (SKMEL 25, SKMEL 28)
†Human, pancreatic
Human primary monocytes
†Human, Raji, Burkitt lymphoma
†Human, red blood cells
†Human, skin carcinoma
†Human, squamous cell carcinoma, oral and cervical lines
†Human, T lymphoma (Jurkat)
†Human, T lymphoblastoid, CEMx174
†Human, TCCSUP (epithelial-like) bladder carcinoma
†Human, U373, glioblastoma
†Human, U937, hystiocytic lymphoma
†Human, V79, skin cells, fibroblasts

†Hybrid, mouse/human, A9 fibroblast
†Hybrid, rat/mouse, MEL cells

†Monkey, kidney (COS-1, COS-7, CV-1, Vero)

†Mouse, 3T3, embryo
†Mouse, 32d, myeloma
Mouse, B
†Mouse, BALB/c 3T3, clone A31, fibroblast, embryo
†Mouse, BbSutA, hematopoietic
†Mouse, C127, fibroblast, mammary tumor
†Mouse, C2, muscle myoblast
†Mouse, C2C12, muscle
†Mouse, D10.G4.1, T-cell, helper

Mammalian (continued)

†Mouse, embryonic stem cells (ES-D3, E14)
†Mouse, erythroleukemia cells
†Mouse, FDC-PI, Il-3-dependent cell line
Mouse fibroblast
Mouse, hepatoma (Hepa 1–6)
†Mouse, J558-L, myeloma.
†Mouse, L-cells
†Mouse, L cell derivative, A-9
†Mouse, L929, connective tissue
†Mouse, LM(TK-), connective tissue
†Mouse, mammary epithelial cells
†Mouse, myeloma, 32d, p3x63AG8 (X-63)
Mouse macrophage (RAW 264)
Mouse mammary tumor (C127)
†Mouse, NIH/3T3; embryo
†Mouse, NSO, myeloma cells
†Mouse, p3x63AG8; myeloma
†Mouse, SP2/0, [Sp-2], myeloma
Mouse T
†Mouse, WEHI-3B, myelomonocytic leukemia
†Mouse, X-63, myeloma [p3 X63 - Ag8.653]
†Ovine (sheep), CSL503, fetal lung
†Ovine (sheep), R.E., rumen
†Rat-1
†Rat brain
†Rat, CA77, medullary thyroid carcinoma cell line
†Rat, D202CC, hepatoma
†Rat, fibroblasts
†Rat, H4-11-E-C3, hepatoma
†Rat, L-6, myoblast
Rat lymphoma (BW5147)
Rat macrophage
Rat myeloma (4B 2/0)
†Rat, N62 T cells
†Rat, PC12, adrenal pheochromocytoma
†Rat, submandibular acini (secretory cells)

Plant Protoplasts

Rice	Sugar beet	Lettuce
Maize	Pine	Potato
Alder tree	Sugar cane	Soybean
Tobacco	Carrot	Tomato

Intact Plant Cells

Carrot
Chenopodium rubrum
†*Hedyotis corymbosa*
†*Lactuca sativa* (aka chirimen chisha)
†Maize
†*Nicotiana plumbaginofolia*; protoplasts from leaf
†*Oryza sativa,* cv. Yamahouci or cv. Nihonbare
Thalictrum rugosum

Fungal Cells

†*Aspergillus* (4 species)
†*Candida* (2 species)
†*Colletotrichum gloeosporioides* (a fungal phytopathogen)
†*Cryptococcus neoformans,* ma5 mutants
†*Dictyostelium discoideum*
Fusarium solani
Leptosphaeria maculans
Neurospora crassa
†*Pichia pastoris*
Penicillium urticae
†*Saccharomyces cerevisiae* (6 strains)
†*Schizosaccharomyces pombe*
Trichoderma harzianum

Bacteria, gram negative

†*Acetobacter xylinium,* ATCC 23769
Actinobacillus (2 species)
†*Agrobacterium* (3 species)
Azospirillum brasilense
†*Bacteroides* (3 species)
Bradyrhizobium (2 species)
Brucella abortus
Butyrivibrio fibrisolvens
Campylobacter (2 species)
Caulobacter (3 species)
Citrobacter freundii
†Cyanobacteria, primarily filamentous, *Anabaena* species
Enterobacter aerogenes
†*Escherichia coli* (62 strains)
Erwinia (2 species)
Francisella (2 species)
Haemophilus influenzae
Klebsiella (3 species)
†*Legionella* (3 species)
Pasteurella ''aemolytica
Proteus (2 species)
Pseudomonas (8 species)
Rhizobium (unspeciated)
Rhodopseudomonas viridis
Rhodospirillum molischianum
Rochalimaea quintana
†*Salmonella* (4 species)
Serratia (2 species)
†*Vibrio* (2 species)
Xanthomonas campestris
Yersinia (3 species)

Bacteria, gram positive

Amycolatopsis mediterranei
Amycolatopsis orientalis
†*Bacillus* (7 species)
†*Brevibacterium* (3 species)
Clavibacter (4 species)
Clostridium (2 species)
†*Corynebacterium* (3 species)
Cytophaga johnsonae
†*Enterococcus* (4 species)
Fremyella diplosiphon
†*Lactobacillus* (21 species)

Bacteria, gram positive (continued)

Leuconostoc (3 species)
Listeria (5 species)
†*Mycobacterium* (3 species)
Pediococcus acidilactici
Propionibacterium jensenii
Rhodococcus fascians
†*Staphylococcus* (7 species)
†*Streptococcus* (11 species)

Cyanobacteria

Anabaena
Fremyella diplosiphon
Nostoc
Synechococcus

Other Bacteria

Acholeplasma laidlawii
Methylophillus (3 species)
Mycobacterium (4 species)
Serpula hyodysenteriae
Spiroplasma citri
Treponema hyodysenteriae

Other Cell Types

Anaerobic bacteria
†Chicken, HD11, macrophage
†Chicken, primary hepatocytes
†Chicken, TS34 a6 L1, [LSCC HD2], erythroblast
Chloroplast, spinach
Encapsulated bacteria
Frog, retina
Giardia lamblia
†Hydra cells, *Cnidaria.*
†*Leishmania*, all species within the genus
Marine organisms
Photosynthetic bacteria
Primary chicken oviduct
Sea urchin egg
Tetrahymena
Thermotolerant bacteria
†*Trypanosoma brucei* (blood stream and procyclic forms)

Other Applications

Cotransformation
Cosmids
Carbohydrates
Direct transfer (donor to recipient)
Fluorescent molecules
Influence of DNA size on efficiency
Influence of DNA conformation on efficiency
Large DNA fragments
Ligation mixtures
Library construction
M13 DNA
Plasmid incompatibility
RNA
Release of cell components
Use of more than one electroporation unit

†Experimental conditions available as an Electroprotocol

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