

NTHRYS

OPC PVT LTD

SECTION • XFR

Gene Transfer & Cellular Delivery

Hands-on wet-lab training in getting nucleic acids into cells — bacterial and yeast transformation, mammalian transfection, viral transduction, physical and direct delivery methods, and delivery optimisation and verification.

06

CATEGORIES

30

PROTOCOLS

XFR

SECTION ID

2026

EDITION

Categories & Protocols

Section **XFR** spans 6 category streams and 30 bench protocols. Every protocol carries a unique code for enrolment, tracking and certification.

XFR-BT	Bacterial Transformation Competent-cell prep, heat-shock & electroporation	05
XFR-YT	Yeast & Fungal Transformation Lithium-acetate, spheroplast & protoplast methods	05
XFR-MT	Mammalian Transfection Lipofection, electroporation & stable/transient	05
XFR-VT	Viral Transduction Lentiviral, AAV, adeno & retroviral delivery	05
XFR-PH	Physical & Direct Delivery Microinjection, biolistics & advanced physical methods	05
XFR-OP	Optimisation & Verification Efficiency, viability, selection & troubleshooting	05
TOTAL	All training protocols in section XFR	30

CODE FORMAT

XFR • **MT** • **01**

XFR section

MT category

01 protocol

01

■ CATEGORY · XFR-BT

Bacterial Transformation

Competent-cell prep, heat-shock & electroporation

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-BT-01

**Chemical Competent Cell
Prep**CaCl₂ competent-cell making.

XFR-BT-02

Heat-Shock Transformation

Standard plasmid uptake.

XFR-BT-03

Electrocompetent Cell Prep

Low-salt competent cells.

XFR-BT-04

**Electroporation
Transformation**

High-efficiency pulse uptake.

XFR-BT-05

**Transformation Efficiency
Assay**

CFU/μg determination.

02

CATEGORY · XFR-YT

Yeast & Fungal Transformation

Lithium-acetate, spheroplast & protoplast methods

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-YT-01

Lithium-Acetate Transformation

Standard yeast uptake.

XFR-YT-02

Spheroplast Transformation

Cell-wall-removed uptake.

XFR-YT-03

Electroporation of Yeast

Pulse-mediated uptake.

XFR-YT-04

Fungal Protoplast Transformation

Filamentous-fungus delivery.

XFR-YT-05

Selection & Screening of Transformants

Marker-based recovery.

03

■ CATEGORY · XFR-MT

Mammalian Transfection

Lipofection, electroporation & stable/transient

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-MT-01

Lipofection (Cationic Lipid)

Lipid-complex delivery.

XFR-MT-02

**Calcium-Phosphate
Transfection**

Co-precipitate uptake.

XFR-MT-03

**Electroporation /
Nucleofection**

Pulse-based nuclear delivery.

XFR-MT-04

PEI & Polymer Transfection

Polyplex delivery.

XFR-MT-05

**Stable vs Transient
Transfection**

Integration vs episomal.

04

■ CATEGORY · XFR-VT

Viral Transduction

Lentiviral, AAV, adeno & retroviral delivery

05

PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-VT-01

Lentiviral Production & Titration

Packaging & titre measurement.

XFR-VT-02

AAV Production & Transduction

Serotype-based delivery.

XFR-VT-03

Adenoviral Transduction

High-efficiency transient delivery.

XFR-VT-04

Retroviral Transduction

Dividing-cell integration.

XFR-VT-05

MOI Optimisation & Safety

Dose & biosafety control.



■ CATEGORY · XFR-PH

Physical & Direct Delivery

Microinjection, biolistics & advanced physical methods



PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-PH-01

Microinjection

Direct cell / embryo injection.

XFR-PH-02

Biolistic / Gene Gun

Particle-bombardment delivery.

XFR-PH-03

**In Vivo / Ex Vivo
Electroporation**

Tissue-level pulse delivery.

XFR-PH-04

**Sonoporation &
Magnetofection**

Ultrasound & magnetic delivery.

XFR-PH-05

Microfluidic Cell Squeezing

Membrane-deformation delivery.



■ CATEGORY · XFR-OP

Optimisation & Verification

Efficiency, viability, selection & troubleshooting



PROTOCOLS

CODE

TRAINING PROTOCOL

DESCRIPTION

XFR-OP-01

**Transfection Efficiency
Assessment**

Percent-positive measurement.

XFR-OP-02

**Reporter-Based
Optimisation**

Condition screening by reporter.

XFR-OP-03

**Cell Viability & Toxicity
Checks**

Delivery-stress assessment.

XFR-OP-04

**Selection Marker &
Antibiotic Titration**

Kill-curve determination.

XFR-OP-05

Delivery Troubleshooting

Diagnosing low-efficiency runs.

Get DNA into any cell

Every protocol in Section XFR is delivered as hands-on bench training — from competent-cell transformation through lipofection, viral transduction and physical delivery, with efficiency and viability verification. Reliable gene transfer is the gateway to expression, editing and selection.

30 protocols

6 categories

XFR section

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