

Nourseothricin (NTC) – gold standard lab antibiotic

(1) NTC for pro- and eukaryotes

Nourseothricin (NTC, sometimes also termed clonNAT) is a superior selection antibiotic for genetic modification of unicellular and complex organisms including bacteria, yeast, filamentous fungi, protozoa, microalgae as well as for manipulating plant and mammalian cells (ask for info) .

NTC selection pressure is used for gene disruption, knock-out, complementation, replacement and overexpression, and the number of NTC engineered organisms (ask for info) is growing steadily.

For example, recently the

- human pathogenic fungus *Coccidioides posadasii*,
- wood-decay fungus *Physisporinus vitreus*,
- red yeasts *Rhodosporidium kratochvilovae* and *Rhodotorula graminis*,
- plant root colonizing biocontrol fungus *Trichoderma atroviride*,
- plant pathogenic fungus *Verticillium dahlia*,
- carotenoid producer *Xanthophyllomyces dendrorhous*,
- osmotolerant yeast *Zygosaccharomyces rouxii*,
- protozoon *Trypanosoma vivax*.

were reported to be NTC susceptible (Wise *et al.* 2013; Schubert *et al.* 2013, Abbott *et al.* 2013, Dubey *et al.* 2013, Santhanam *et al.* 2013, Gassel *et al.* 2014; Watanabe *et al.* 2013, Govard *et al.* 2014)

(2) NTC mechanism

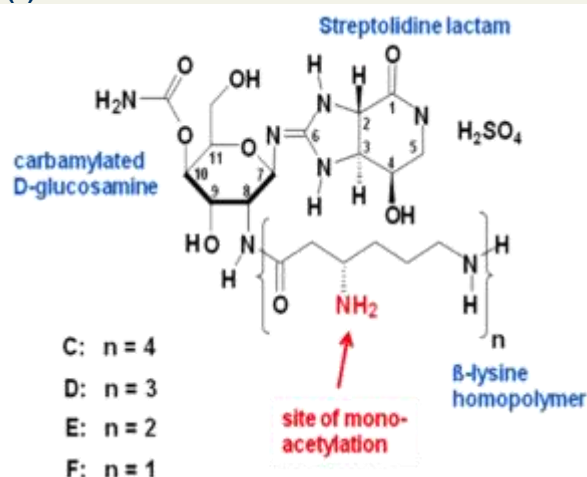


Figure 1: Chemical structure of Nourseothricin. The antibiotic consists of 4 components (C, D, E and F) differing in the number of β -lysine units ($n = 1$ to 4). The contents of most active D + F > 85 %.

NTC is an antibiotic of the streptothricin group produced by *Streptomyces noursei*. The antibiotic effect is based on inhibition of protein biosynthesis and induction of miscoding.

The NTC resistance is encoded by the bacterial *sat1* or *Streptomyces nat1* marker genes. Its codon usages and expression signals were adapted to various recipient hosts. The product of the resistance genes – Nourseothricin N-acetyltransferase – inactivates NTC

by monoacetylation of the β -amino group of its β -lysine residue (Figure 1).

NTC is highly soluble in water and long-term stable as powder or in solution. It shows no or very low background, no cross-reactivity with other aminoglycoside antibiotics such as Hygromycin or Geneticin and no cross-resistance with therapeutic antibiotics.

Further, NTC is used for our eukaryotic expression system **LEXSY**.

References:

- Abbott *et al.* (2013) Overcoming recalcitrant transformation and gene manipulation in *Pucciniomycotina* yeasts. *Applied Microbiology and Biotechnology* **97**:283-295.
- Dubey *et al.* (2013) Role of the methylcitrate cycle in growth, antagonism and induction of systemic defence responses in the fungal biocontrol agent *Trichoderma atroviride*. *Microbiology* **159**:2492-2500.
- Gassel *et al.* (2014) Genetic engineering of the complete carotenoid pathway towards enhanced astaxanthin formation in *Xanthophyllomyces dendrorhous* starting from a high-yield mutant. *Applied Microbiology and Biotechnology* **98**:345-350.
- Goyard *et al.* (2014) *In vivo* imaging of trypanosomes for a better assessment of host-parasite relationships and drug efficacy. *Parasitology International* **63**:260-268.
- Santhanam *et al.* (2013) *Verticillium dahliae* Sge1 Differentially Regulates Expression of Candidate Effector Genes. *Mol. Plant Microbe Interact.* **26**:249-256.
- Schubert *et al.* (2013) *Agrobacterium*-mediated transformation of the white-rot fungus *Physisporinus vitreus* *Journal of Microbiological Methods* **95**:251-252.
- Watanabe *et al.* (2013) Adaptation of the Osmotolerant Yeast *Zygosaccharomyces rouxii* to an Osmotic Environment Through Copy Number Amplification of FLO11D. *Genetics* **195**:393-405.
- Wise *et al.* (2013) Extracellular ammonia at sites of pulmonary infection with *Coccidioides posadasii* contributes to severity of the respiratory disease. *Microbial Pathogenesis* **59-60**:19-22.

NTC products

LEXSY NTC (Nourseothricin) is the **prime selection antibiotic** for recombinant LEXSY strains. It can efficiently be used also for **other host systems** as **Gram-positive** and **Gram-negative bacteria**, **Streptomyces**, **yeast**, **filamentous fungi**, **protozoa**, **plants** etc.

Product	Cat. No.	Amount	Cat. No.	Amount	Technical sheet
LEXSY NTC (Nourseothricin), sterile ready-to-go stock solution, 100 mg/ml	AB-101S	1 ml	AB-101L	5 ml	OnLine
	AB-101-10ML	10 ml	AB-101-50ML	50 ml	
LEXSY NTC (Nourseothricin), powder (non-sterile)	AB-102L	1 g	AB-102XL	5 g	OnLine
	AB-102-25G	25 g	AB-102-100G	100 g	
LEXSY Bleo , sterile ready-to-go stock solution, 100 mg/ml	AB-103S	1 ml	AB-103L	5 ml	OnLine
LEXSY Neo , sterile ready-to-go stock solution, 50 mg/ml	AB-105S	1 ml	AB-105L	5 ml	OnLine
LEXSY Tet , sterile ready-to-go stock solution, 10 mg/ml (for inducible protein expression in LEXSY host T7-TR)	AB-106S	1 ml	AB-106L	5 ml	OnLine
	AB-106XL	10 ml	AB-106XXL	50 ml	

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