Finanziato dall'Unione europea
NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

Development of innovative biologics for the treatment of unmet medical needs in rare metabolic disorders and oncology

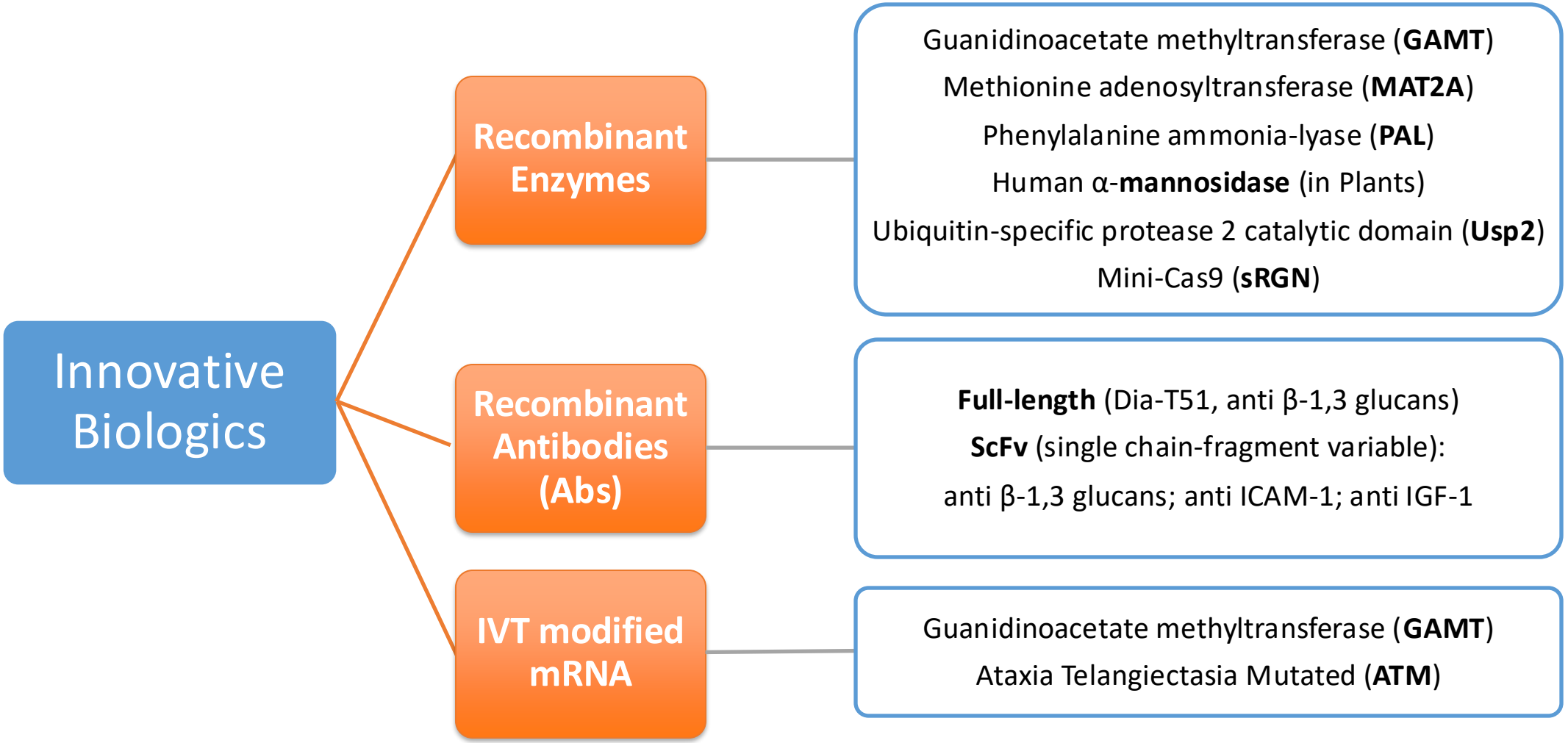
VITALITY

Marzia Bianchi
Vitality Uniurb Day 17/12/24

Task 2.1: Facility implementation for process development and the production of pre-clinical lots of biologics in class D

Task 2.2: Quality control laboratory for biologics and *in vitro* testing

Task 2.3: Animal facility of selected mouse models for *in vivo* efficacy studies


Innovative Biologics
Recombinant Enzymes
Guanidinoacetate methyltransferase (GAMT)
Methionine adenosyltransferase (MAT2A)
Phenylalanine ammonia-lyase (PAL)
Human α-mannosidase (in Plants)
Ubiquitin-specific protease 2 catalytic domain (Usp2)
Mini-Cas9 (sRGN)
Recombinant Antibodies (Abs)
Full-length (Dia-T51, anti β-1,3 glucans)
ScFv (single chain-fragment variable):
anti β-1,3 glucans; anti ICAM-1; anti IGF-1
IVT modified mRNA
Guanidinoacetate methyltransferase (GAMT)
Ataxia Telangiectasia Mutated (ATM)

Recombinant protein expression workflow

Select/Design the end product (amino acid sequence)

↓

Choose expression system

↓

Design expression clone (DNA construct)

↓

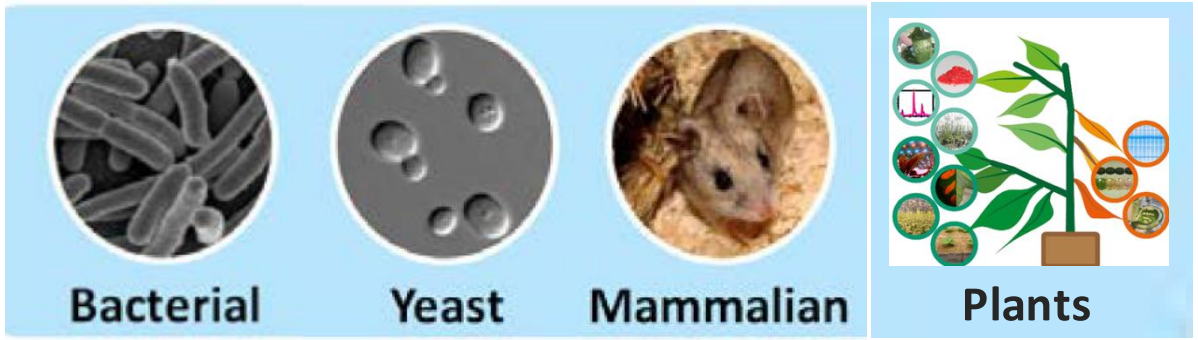
Express the protein

↓

Purify the protein

↓

Characterize the protein



- Guanidinoacetate methyltransferase (**GAMT**)
- Methionine adenosyltransferase (**MAT2A**)
- Phenylalanine ammonia-lyase (**PAL**)
- Human α-**mannosidase** (in Plants)
- Ubiquitin-specific protease 2 catalytic domain (**Usp2**)
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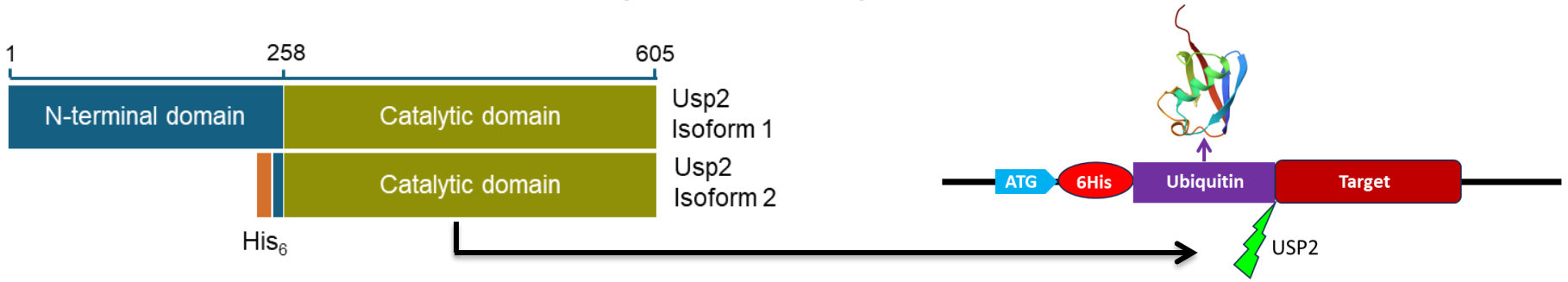
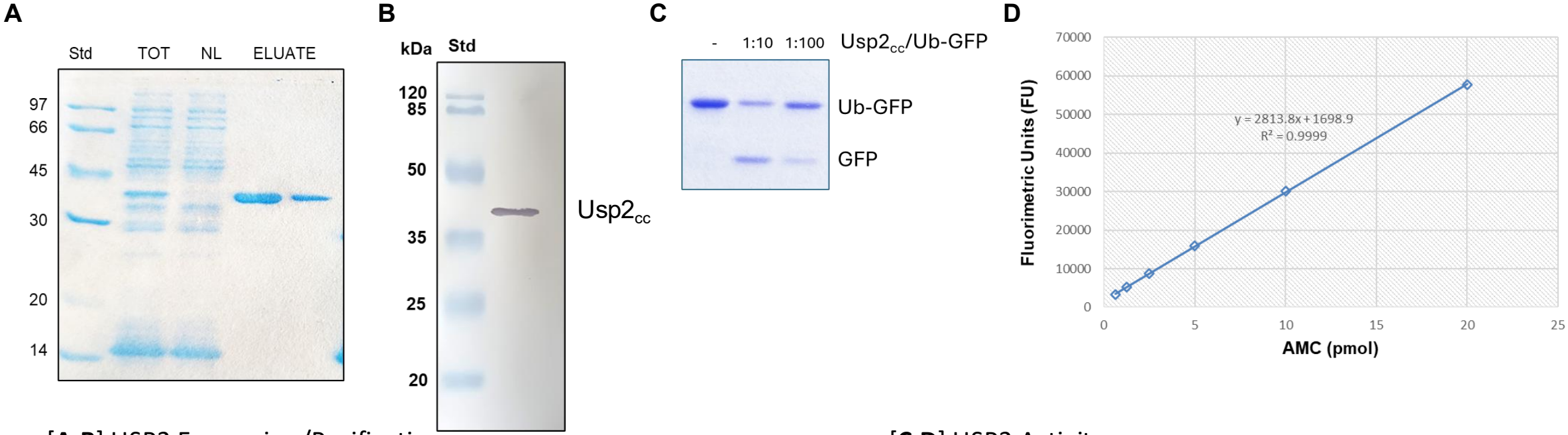
Recombinant protein expression in bacteria: USP2





[**A,B**] USP2 Expression/Purification

[**C,D**] USP2 Activity

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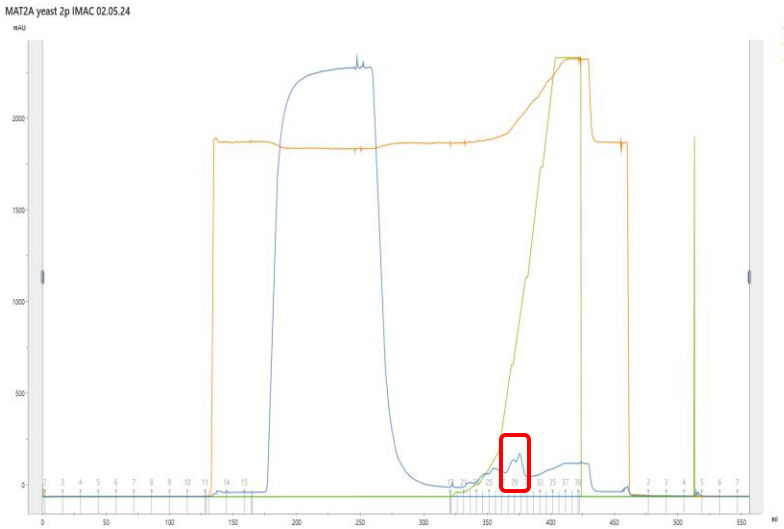
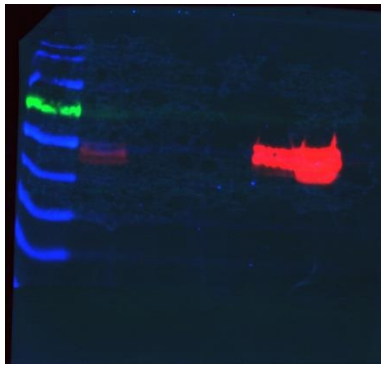
Recombinant protein expression in yeast: MAT2A

A



B



C

[**A,B**] MAT2A Expression/Purification from yeast strain INVsc1 transformed with p426HXT7-6His MAT2A plasmid

[**C**] MAT2A Activity: substrates conversion in SAM (S-adenosyl methionine) detected by MS

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Recombinant Antibodies expression

Select the format

↓

Select/Design the end product (amino acid sequence)

↓

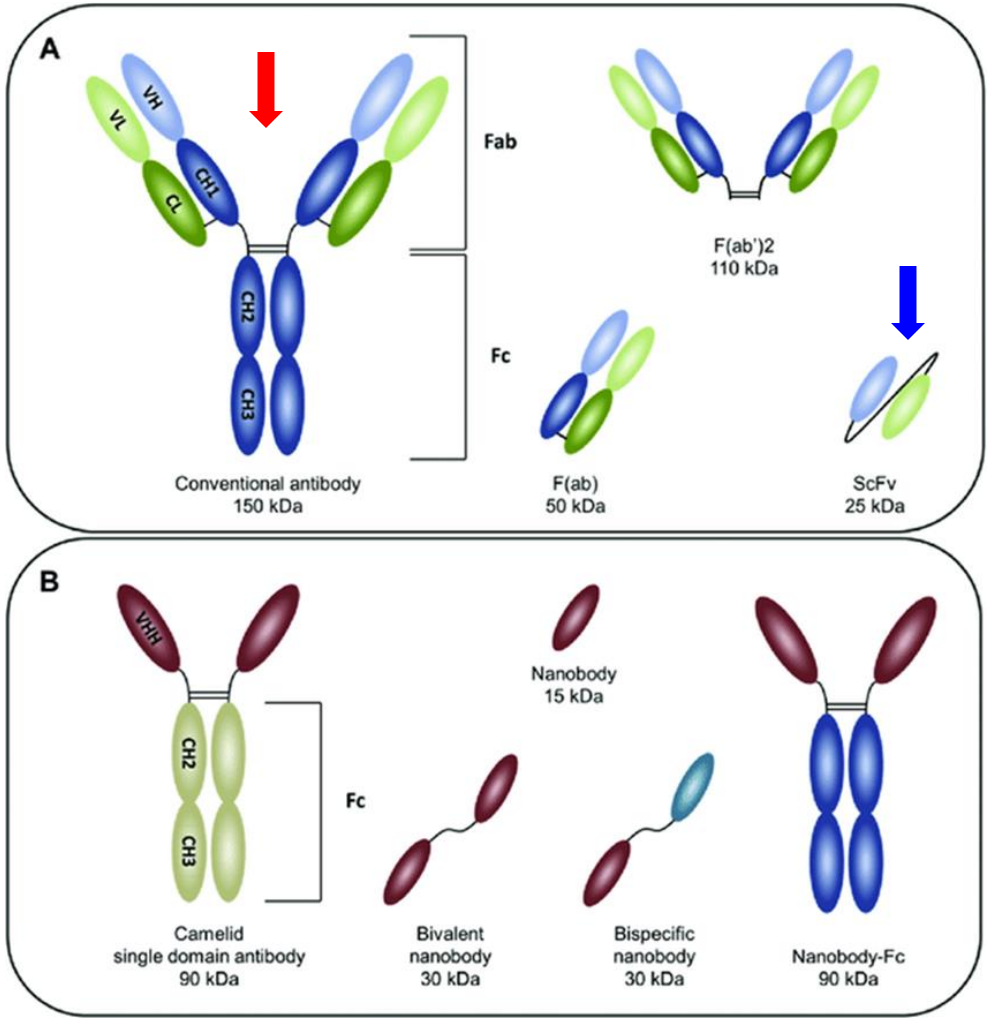
Choose expression system

↓

Design expression clone (DNA construct)

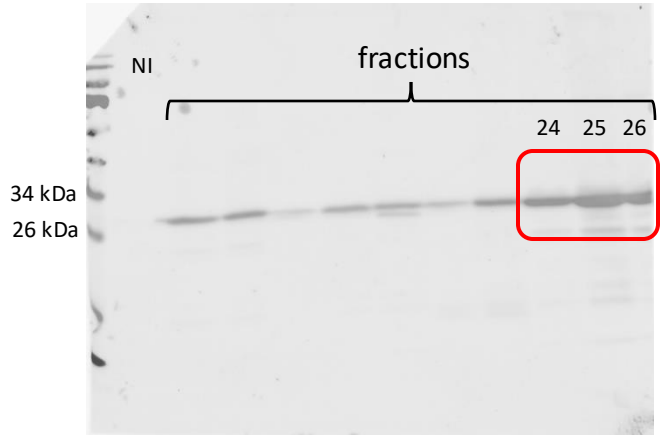
↓

Express/Purify/Characterize the protein



Full-length: Dia-T51, anti β-1,3 glucans)

ScFv: anti β-1,3 glucans; anti ICAM-1; anti IGF-1R



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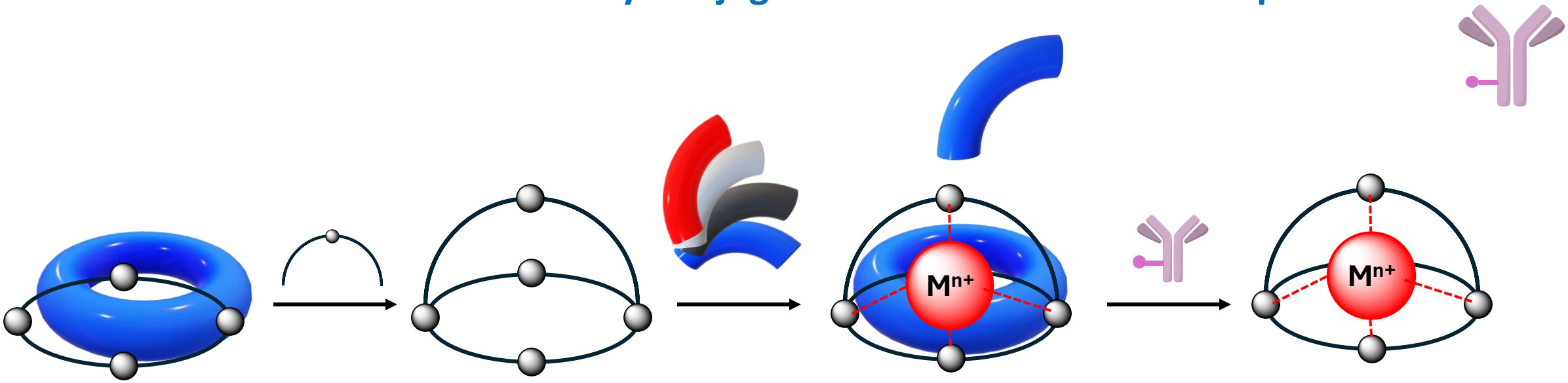
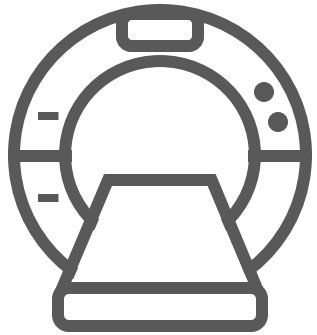
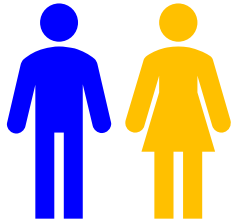
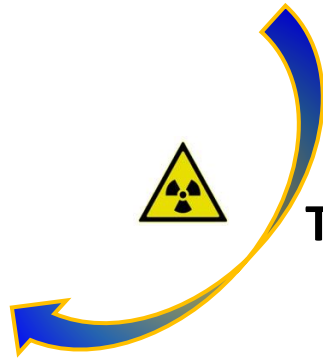
Monoclonal Antibody Conjugation with stable metal complex



green chemistry







Target Therapy

Diagnostics

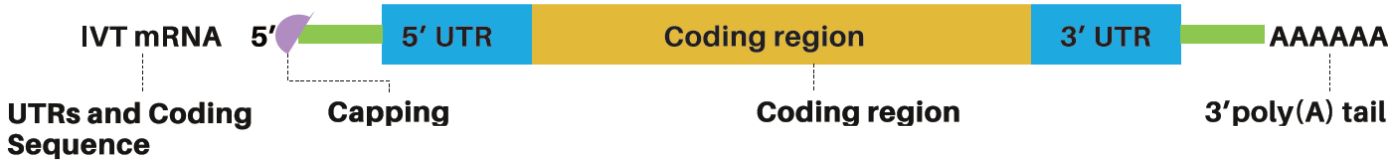
Establishing a versatile platform for evaluating B and T cell responses to SARS-CoV-2 or other infectious diseases

Novel method for isolating and expanding **B cells** for the production of libraries of monoclonal antibodies (Spike- and Nucleocapsid-specific)

Characterization of both CD4+ and CD8+ Spike- and Nucleocapsid-specific **T cell** responses from individuals who had recovered from SARS-CoV-2 infection or received vaccination

Comprehensive biological **library**, which will serve as a valuable resource for the development of more effective diagnostics, vaccines, and immune therapies

Modified mRNA to treat monogenic diseases

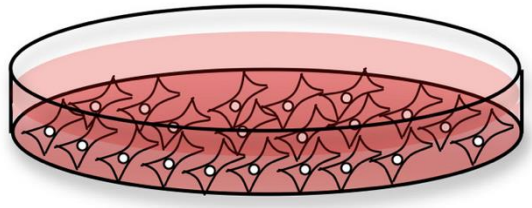


GAMT mRNA

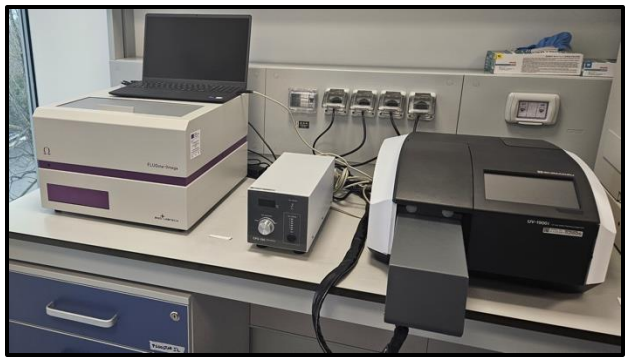
- IVT-modified mRNA
- Mouse model of GAMT deficiency for *in vivo* studies

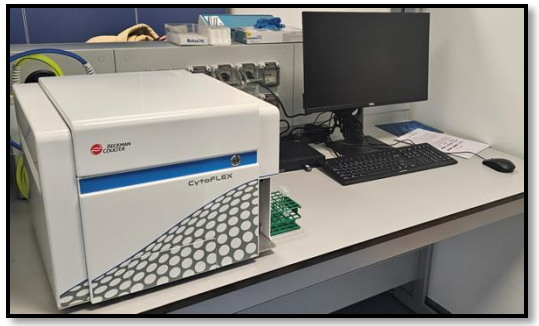
ATM mRNA

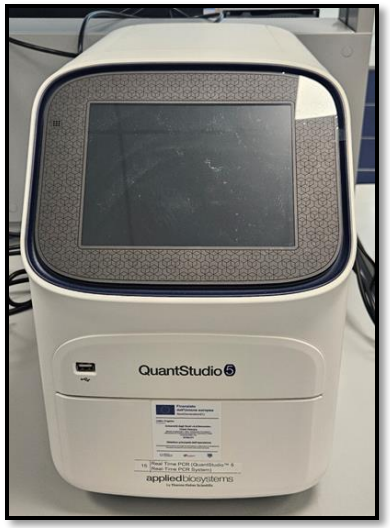
- CDS for ATM variants cloned in pMRNAxp vector
- ATM-deficient cell lines for *in vitro* studies



QC Lab

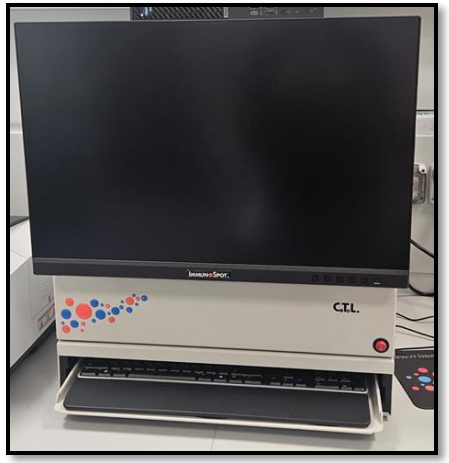



CytoFLEX


QuantStudio 6
appliedbiosystems


Qubit™ Assays
thermo scientific


cytiva
Biacore 1K


C.T.L.


Monolith
NANOTEMPER

Thank you for your attention!