



UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

Centro Interdipartimentale
Grandi Strumenti

CINQUANTA

HR-MAS NMR applicato a tessuti e cellule

Anna Gambini

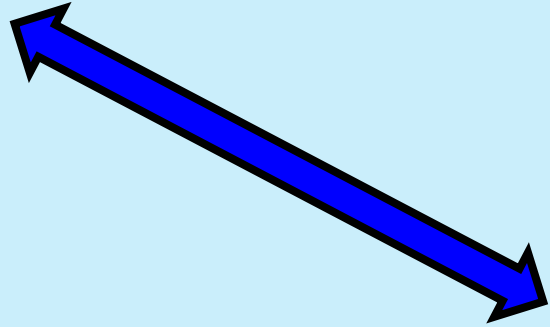
anna.gambini@unimore.it

SOMMARIO

- Cenni Teorici HR-MAS NMR
- Applicazioni:
 - Tessuti muscolari
 - Pellet cellulari

LIQUIDI

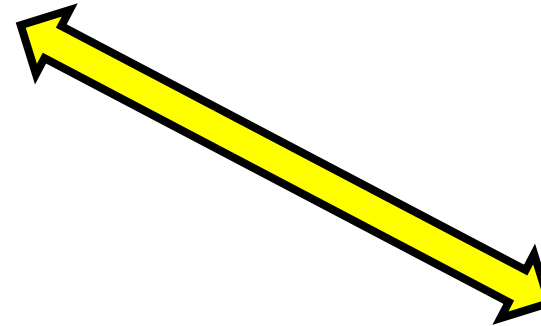
Stessa interpretazione



Stesse Sequenze

SEMISOLIDI

Rotazione in
acquisizione



Impaccamento del rotore

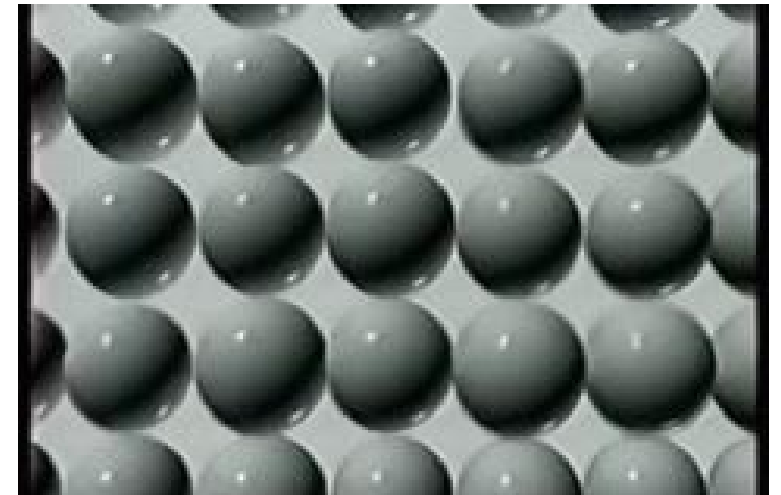
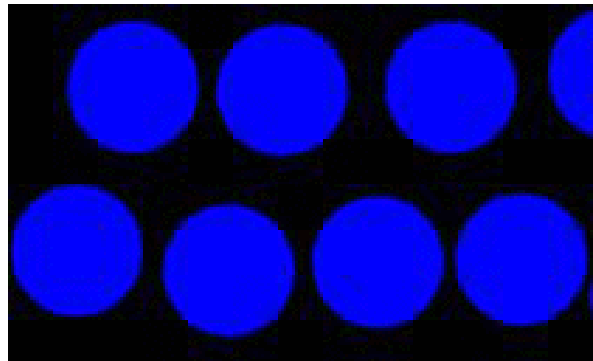
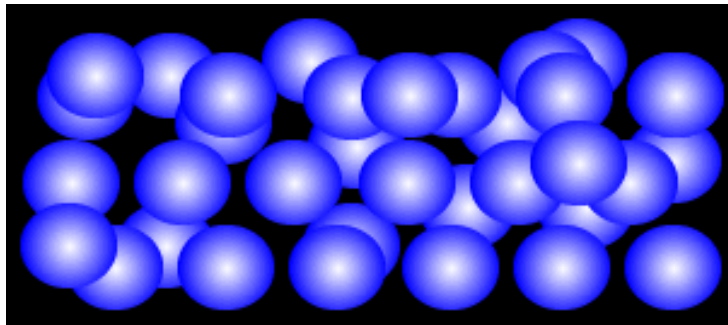
SOLIDI

LIQUIDI

SEMISOLIDI

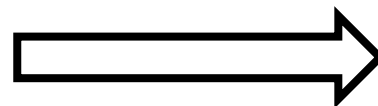
SOLIDI

Diminuzione del moto molecolare

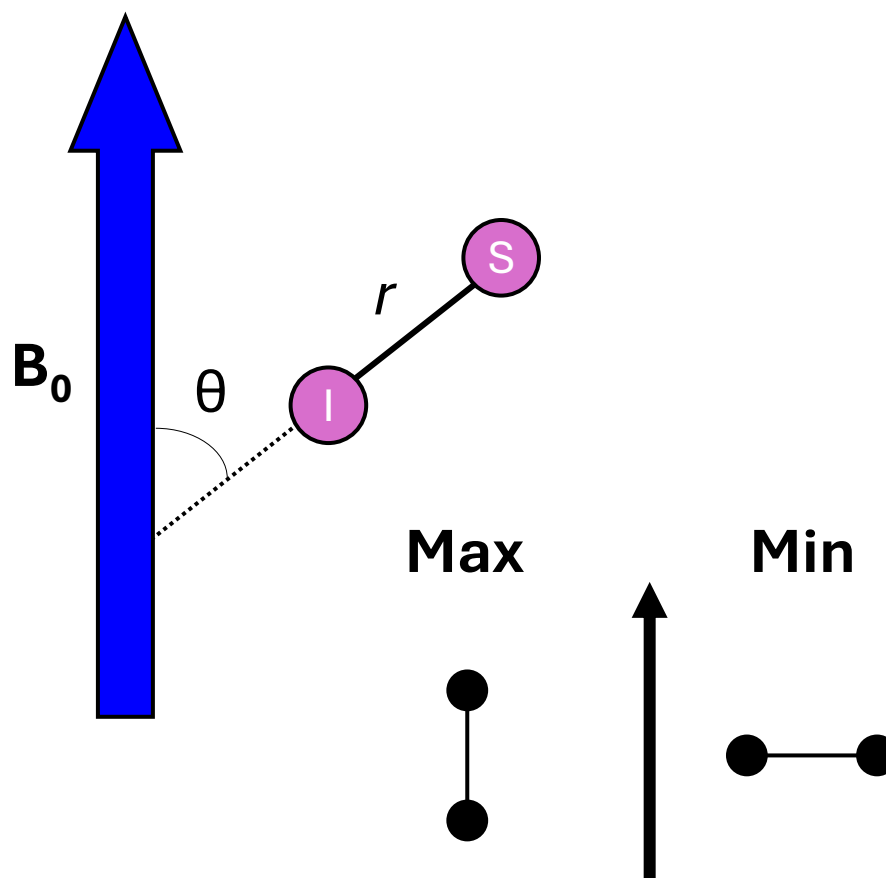


Allargamento segnali per Spin $\frac{1}{2}$:

- Accoppiamento Dipolare
- Anisotropia di Chemical Shift

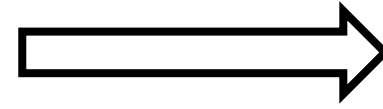


**Orientamento
delle Molecole**

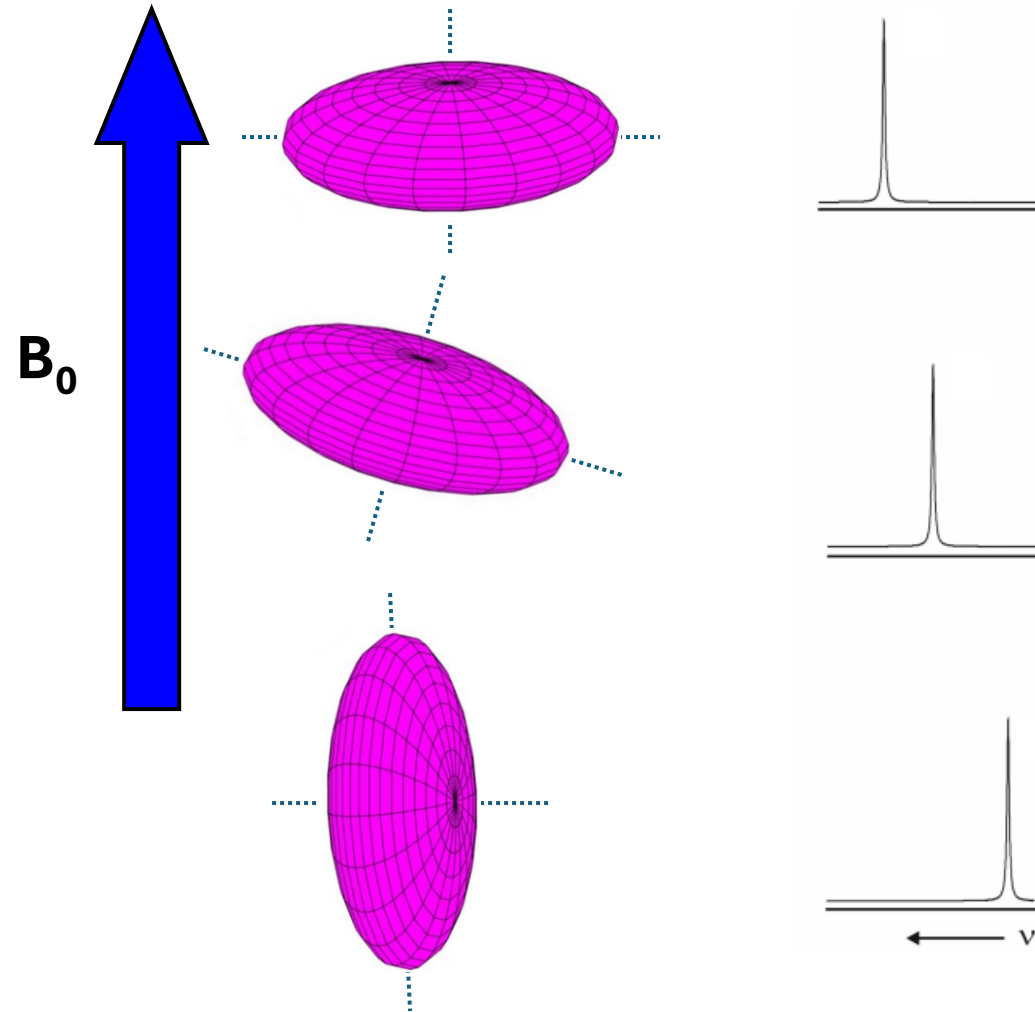


Allargamento segnali:

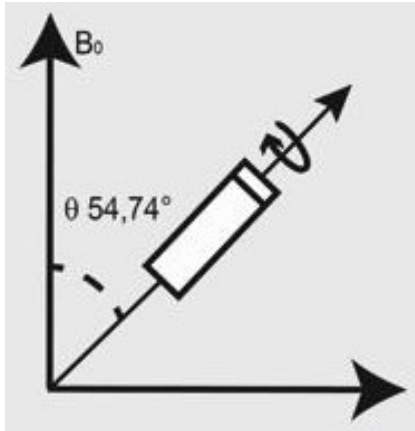
- Accoppiamento Dipolare
- Anisotropia di Chemical Shift



**Orientazione delle
Molecole**

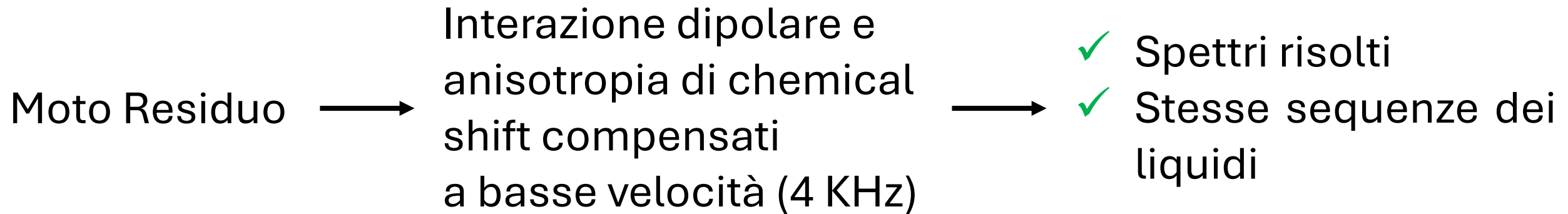


ANGOLO MAGICO

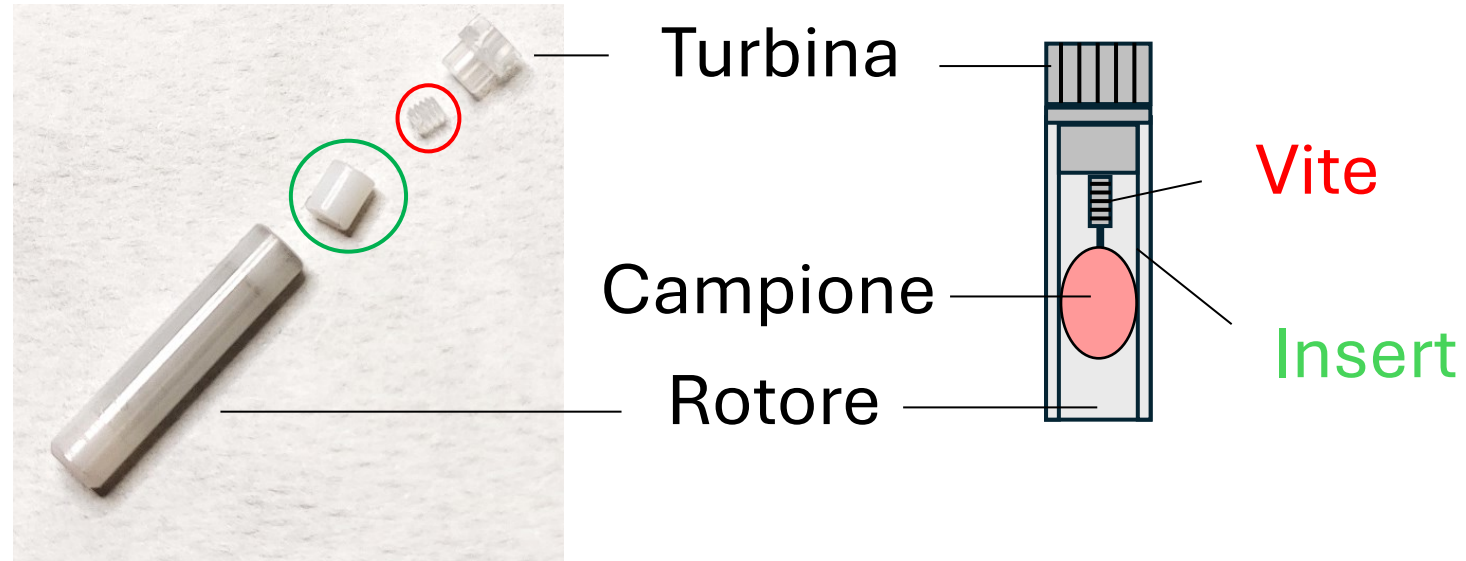


$$3(\cos\theta)^2 - 1 = 0 \quad \theta = 54.74^\circ$$

SEMISOLIDI



PREPARAZIONE DEL CAMPIONE

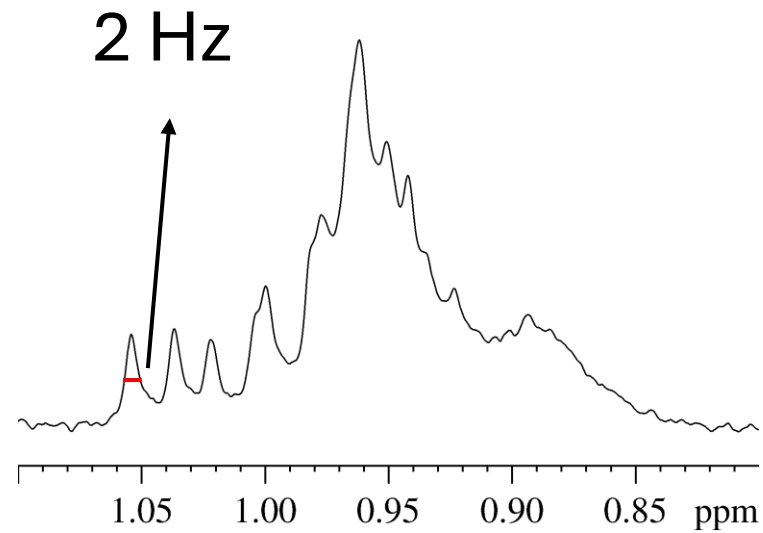
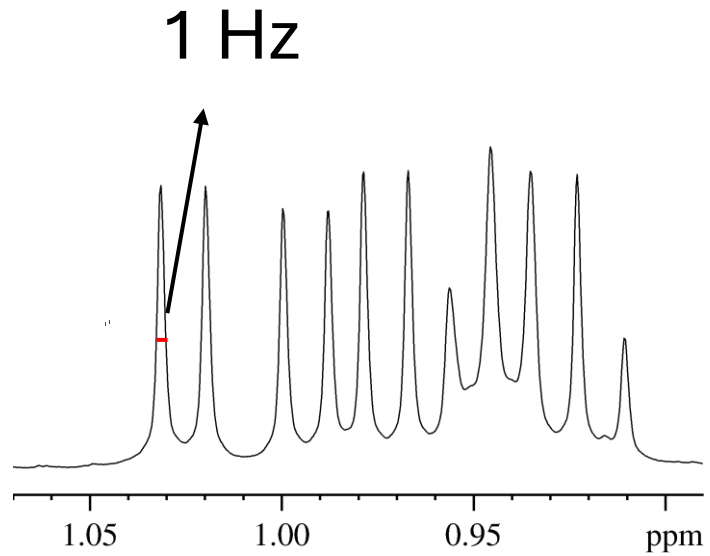


Analisi a 5 °C per tessuti e cellule

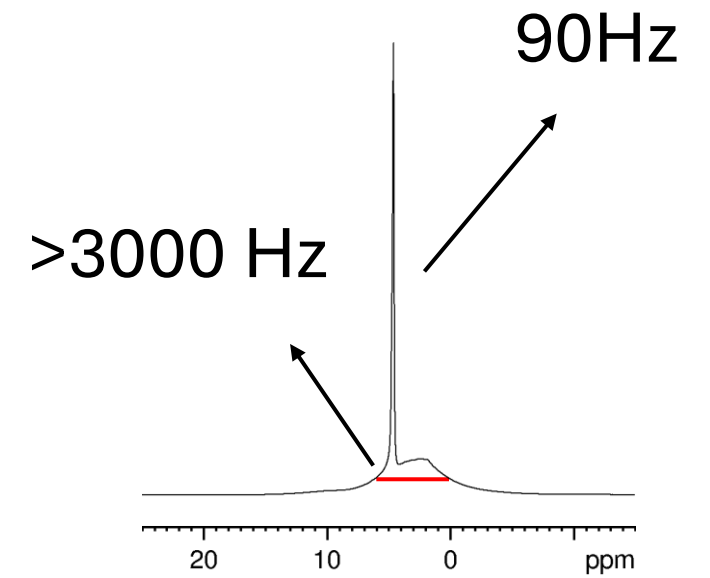
Spettri ^1H NMR

Semisolidi

Liquidi



Solidi



Metabolome in Tibialis and Soleus Muscles in Wild-Type and *Pin1* Knockout Mice through High-Resolution Magic Angle Spinning ^1H Nuclear Magnetic Resonance Spectroscopy

BIOMARKERS di METABOLISMO



OSSIDATIVO



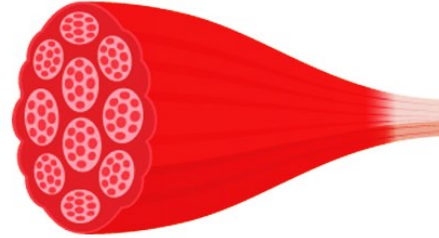
GLICOLITICO

FINGERPRINT METABOLICO



Soleo (SO)

Tipo I

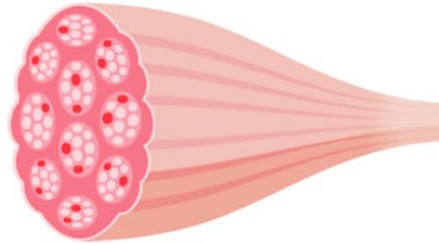


Ossidativo



Tibiale Anteriore (TA)

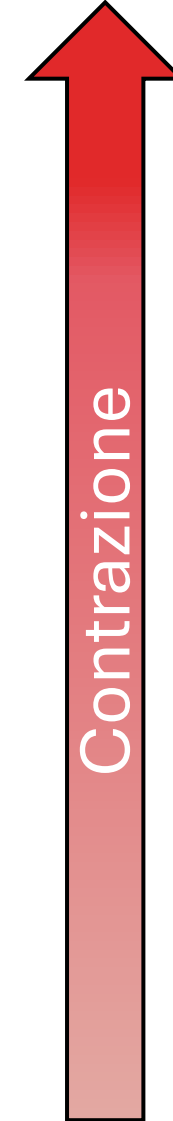
Tipo IIb



Glicolitico

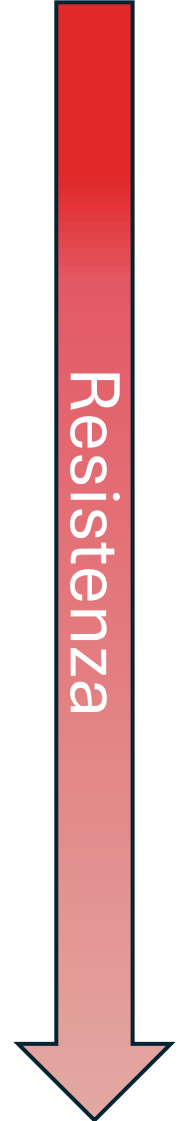
Lenta

Alta



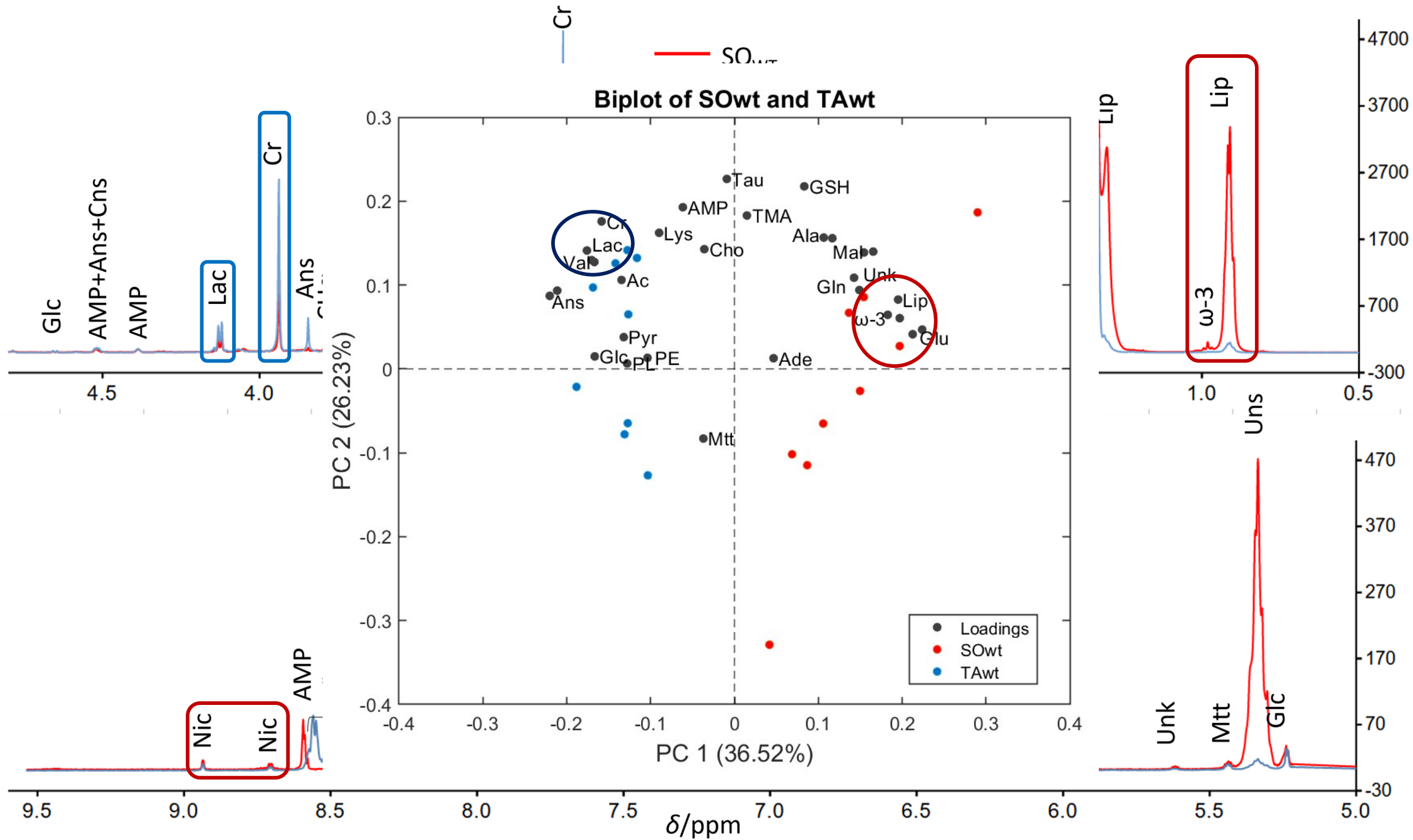
Contrazione

Veloce



Resistenza

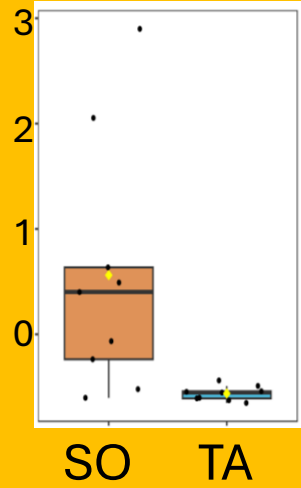
Bassa



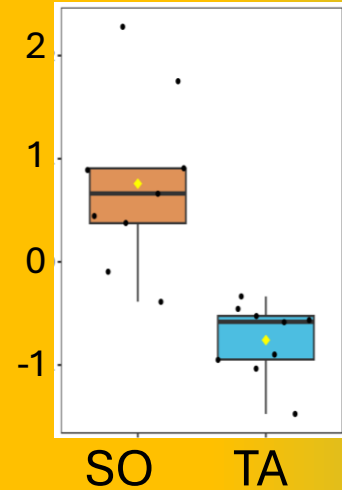
Biomarkers ossidativi di SO

Biomarkers glicolitici di TA

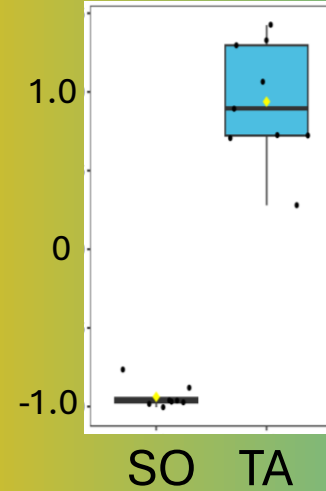
Lipidi



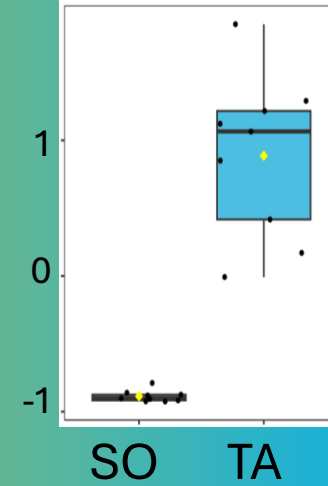
Fumarato



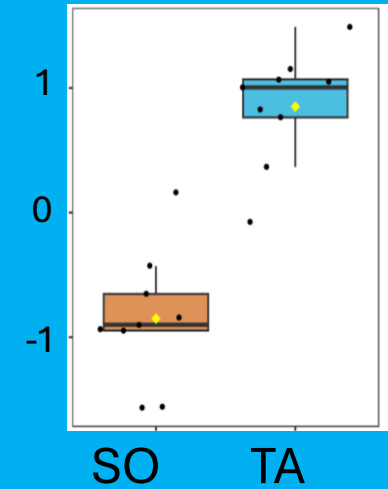
Anserina



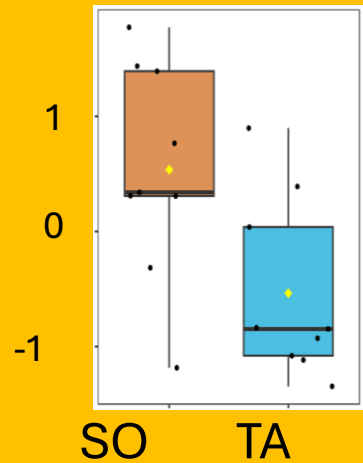
Carnosina



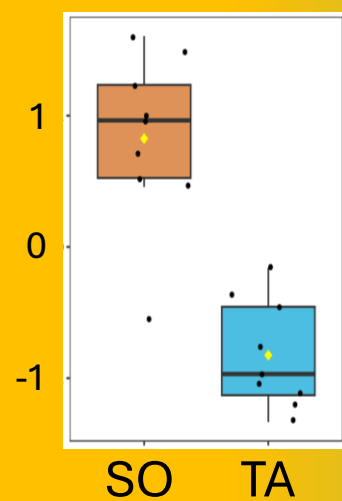
Lattato



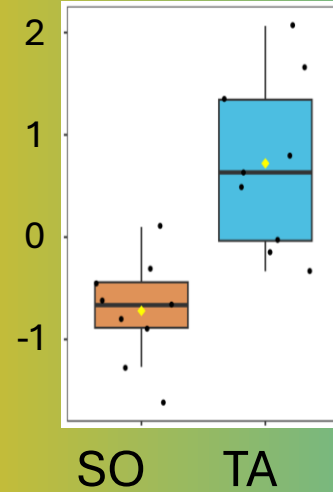
Nicotinammide



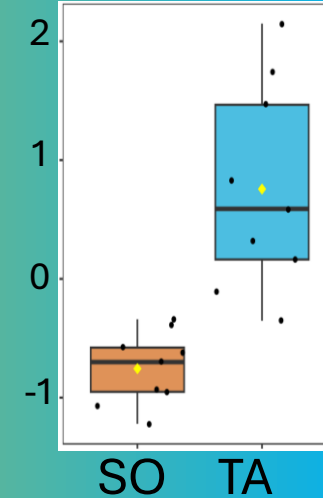
Glutammato



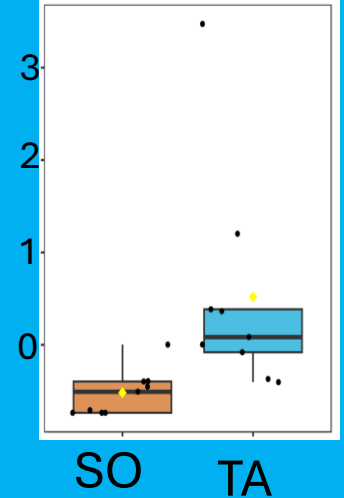
Glicina



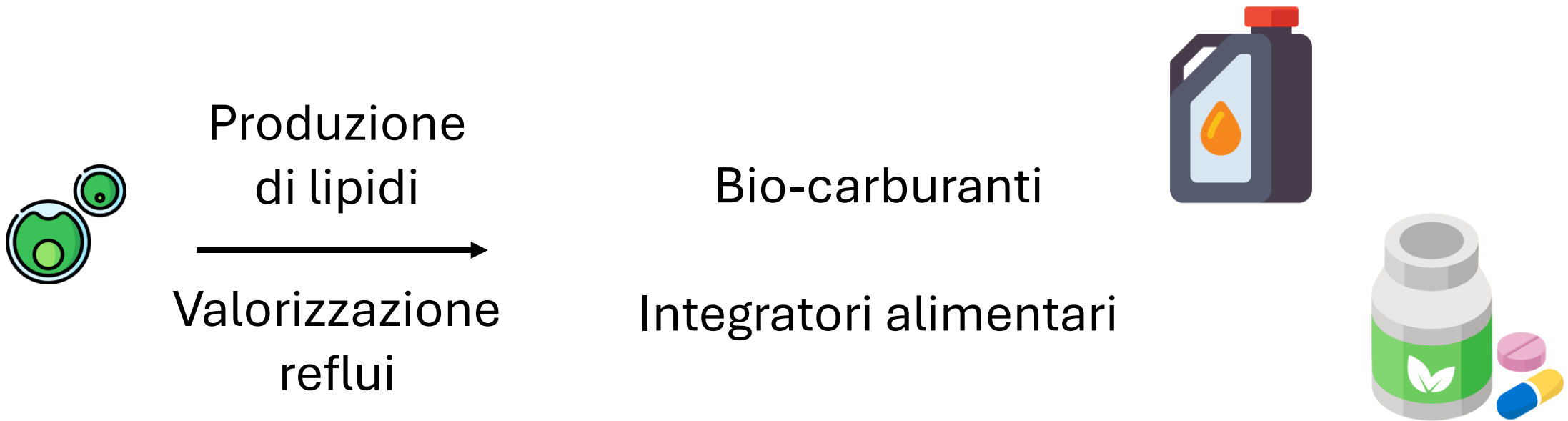
Glucosio



Piruvato

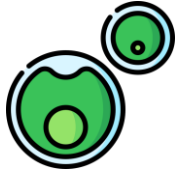


DETERMINAZIONE DEI LIPIDI IN MICROALGHE

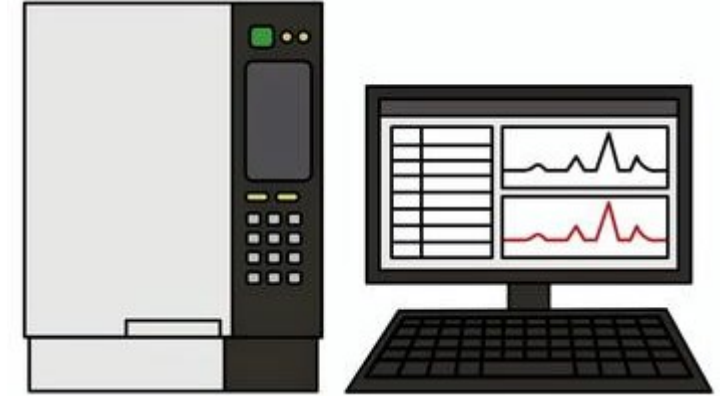


GC-MS

Estrazione lipidi

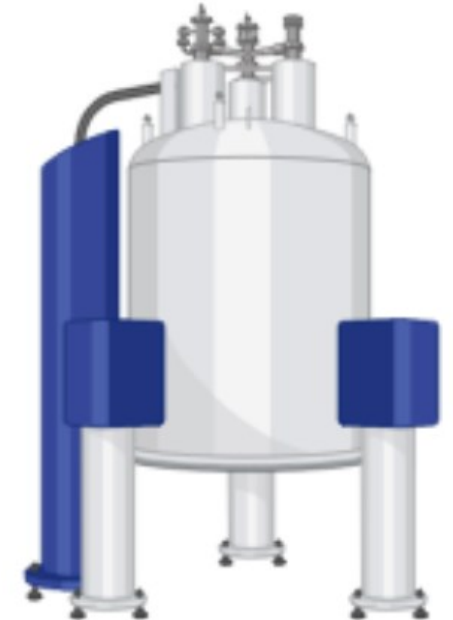
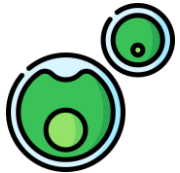


Derivatizzazione

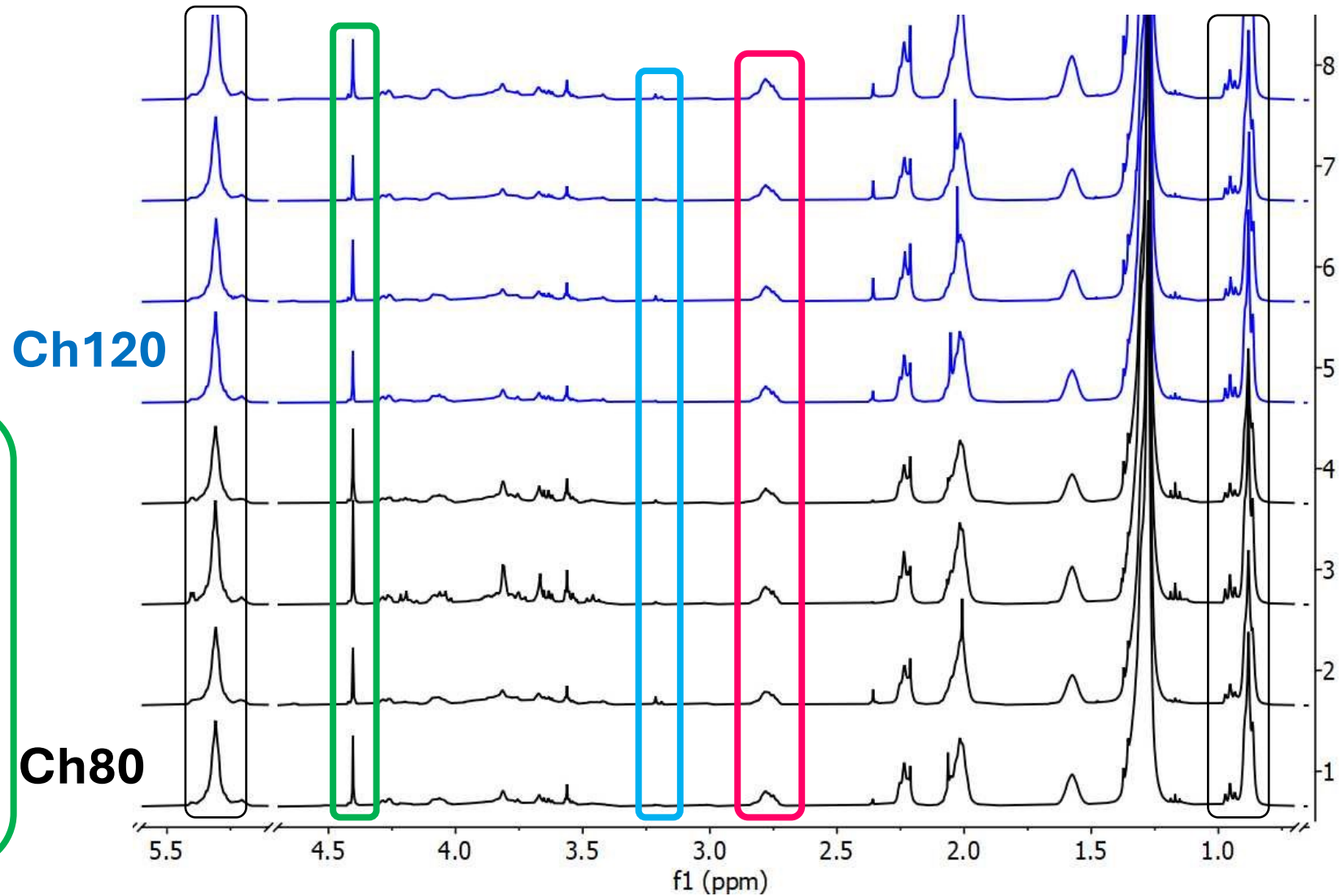
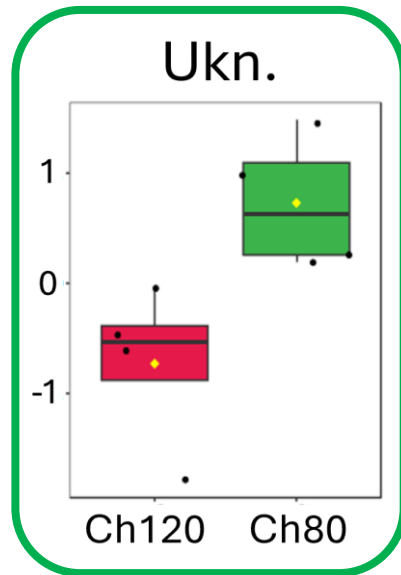
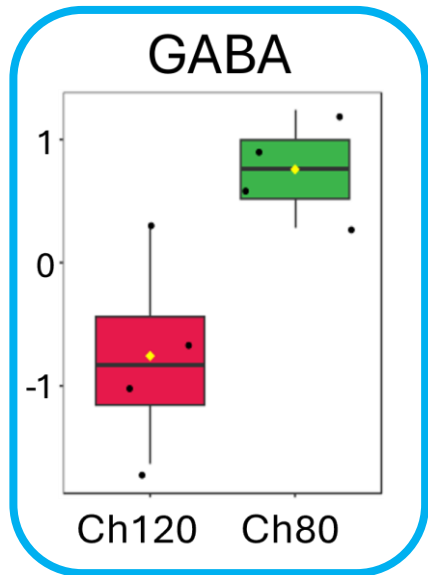
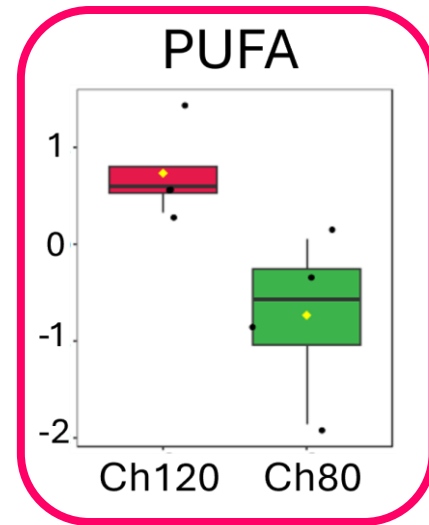


HR-MAS NMR

Analisi diretta

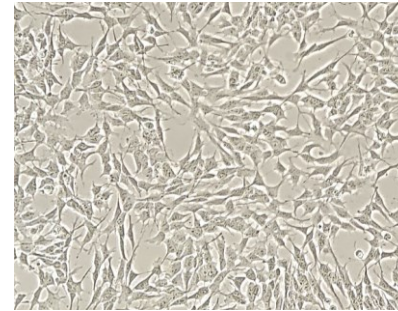
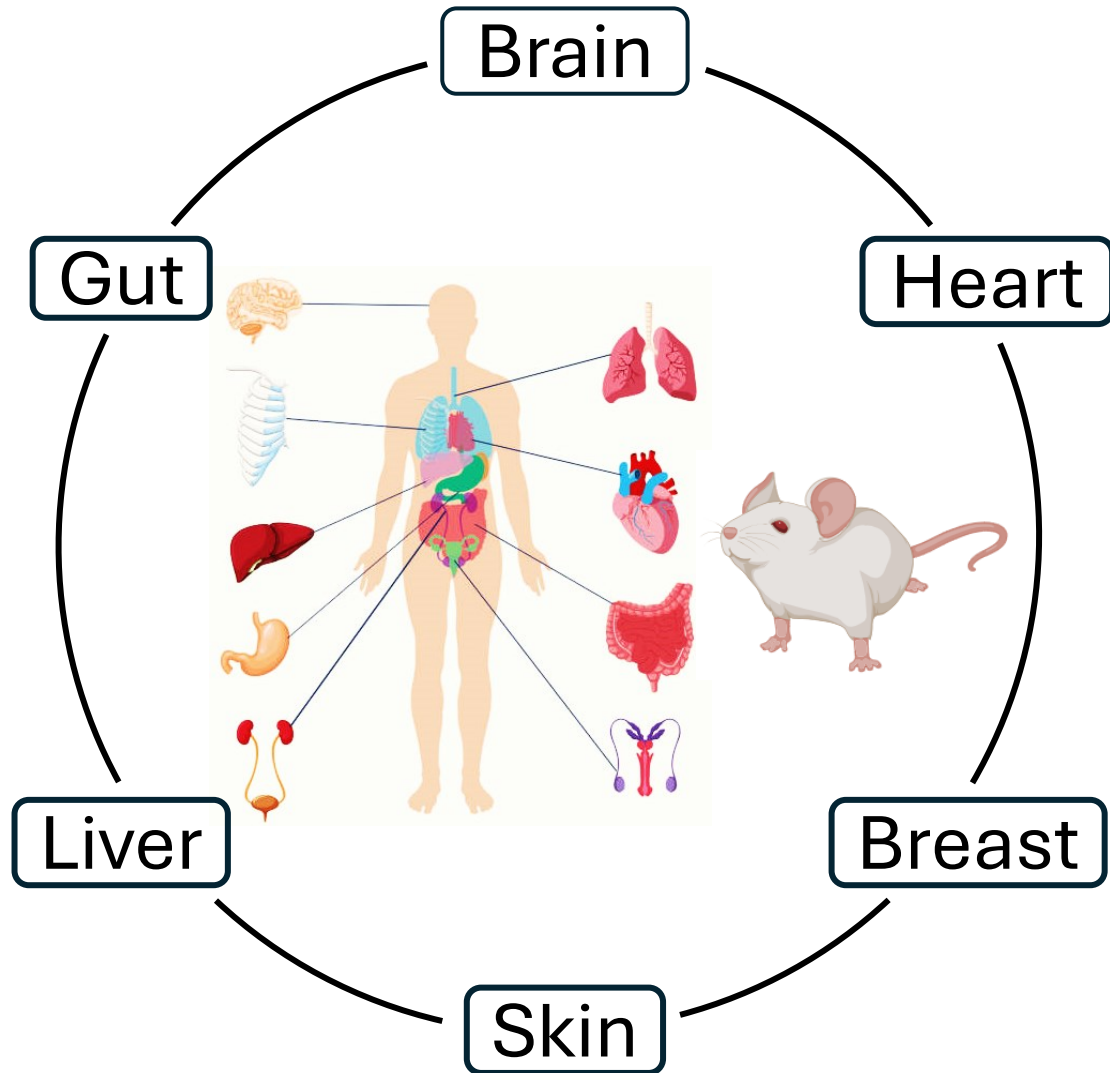


Clorella vulgaris irradiata con luce rossa a 80 e 120 μE



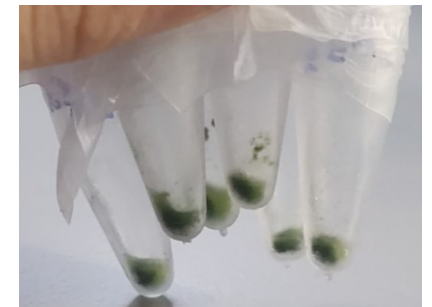
RIASSUMENDO...

- HR-MAS NMR → minimo pretrattamento
- Fingerprint Metabolico



Cellule
animali

Cellule
vegetali



GRAZIE DELL'ATTENZIONE