

# RedOxMics

## Investigation of abiotic stress

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# RedOxMics

## 1 – Introduction

Up to now, most common skin stress such as UV, polluted air, screen blue light, dust, smoke... are evaluated through testing models based on some basic biomarkers such as squalene, carbonylated proteins, or targeted RT-qPCR gene follow-up.



## 2-RedOxMics

PHYLOGENE defined a complete investigation approach of stress based on high resolution comparative proteomics and CORAVALID™ effects analysis implemented with a new extensive protein oxidation ratio named OxDeep

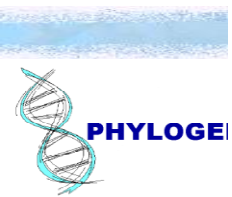
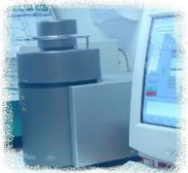


### 2-1High resolution proteomics

PHYLOGENE nanoLC-MS/MS proteomics already showed the potential of **describing and understanding the effects of such stress on skin in an untargeted way.**

<https://www.ncbi.nlm.nih.gov/pubmed/28865110>

PHYLOGENE's CORAVALID™ bioinformatics/biostatistics data processing allows understanding the effects.



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## 2-2-Proteins oxidation

By a new dedicated data processing workflow, PHYLOGENE can further provide an iterative approach of the most common **18 RedOx reaction modifications of 10 amino acids**, i.e. the formation of:

- 3 -hydroxyaspartic acid from **Aspartic acid**
- 2-oxohistidine and 4-hydroxynonenal from **Histidine**,
- 3-hydroxyleucine from **Leucine**
- Methionine sulfoxide and Methionine sulfone from **Methionine**
- Hydroxyphenylalanine, from **Phenylalanine**
- Pyrrolidinone , Pyroglutamic acid or Hydroxyproline from **Proline**
- 2-amino-3-ketobutyric acid from **Threonine**
- Kynurenine, Hydroxytryptophan, Hydroxykynurenine, N-formylkynurenine or 6-Nitrotryptophan from **Tryptophan**
- 2- nitrophenylalanine from **Phenylalanine**.
- semi-semialdehyde glutamate from **Arginine**



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Based on this, a new extensive oxidation ratios is defined :

- **OxDeep** : Indicates the stress deepness: The higher the ratio, more proteins are victim of oxidation

***OxDeep: Number of oxidized peptides species/ Total number of peptides species***



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## 3- Example :

- Comparison of two treatments: Active Ingredient (T) vs Placebo (NT), both exposed to cooled motor exhaust.
- Our CORAVALID pathway analysis allowed to observe:
  - A decrease of proteins involved in inflammation pathway and also a global decrease of proteins involved in ROS responses (especially SOD proteins and Peroxiredoxin proteins family).
  - A decrease of pro-apoptotic pathways induced by lipid peroxidation
  - That some proteins who take a major role in positive regulation of desquamation are also down regulated (especially major protease involved in desquamation).

Our RedOxMics ratio is :

OxDeep NT = 35%

OxDeep T = 12 %



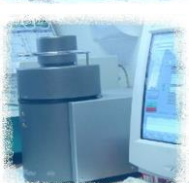
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## 3- Example :

### *Claiming potential:*

The active ingredient shows the following benefits:

- Protection against ROS
- Protection of the cohesion and protection against cellular death induced by lipid peroxidation
- Protection against proteins oxidation



## 4-Conclusion

Our untargeted methodology, which is by nature free of hypothesis, allows to finely dissecting:

- The functional aspects (impact of the abiotic stress on metabolism) by high resolution LC-MS/MS proteomics and CORAVALID™ data processing.
- The structural aspect (physical modifications of the proteins by OxDeep ratio)