SCHEDA 1

1 Quali sono i principali fattori che influenzano la sensibilità e l'accuratezza delle analisi LC/MS di campioni biologici?

2 Elencare quali sono gli organi dell'Ateneo

3 È possibile impedire a qualcuno di copiare la cella dal tuo foglio di lavoro?

4 Leggere e tradurre il seguente testo in inglese:

We illustrate the potential of liquid chromatography with (quadrupole) time-of-flight mass spectrometry [LC-(Q)TOF-MS] in investigating the presence of pesticide metabolites in food and water samples. The higher polarity of metabolites compared to their parent pesticides makes the combination of LC [both high-performance (HPLC) and ultra-performance (UPLC)] with TOF-MS one of the most appropriate techniques for their analysis, mainly from a qualitative point of view.

Both target analysis and non-target analysis have been explored making use of this technique. Target analysis is typically applied in the inspection of maximum residue limits in food, when a relevant metabolite is included in the residue definition for toxicological reasons or its presence in significant amounts. Within this field, LC-TOF-MS, thanks to its intrinsic characteristics of high sensitivity in full-scan acquisition mode and elevated mass accuracy, has great potential for qualitative purposes, and it allows detection and reliable identification of a large number of metabolites in only one chromatographic run without the need for re-analysis.

SCHEDA 2

1 Come si differenzia la cromatografia liquida ad alta prestazione (HPLC) dalla cromatografia liquida ultra-prestazionale (UHPLC)?

2 Il Rettore convoca e presiede:

3 Che cos'è una formula in Excel e come si crea?

4 Leggere e tradurre il seguente testo in inglese:

The method describes quantification and confirmation of flunixin in equine plasma by liquid chromatography–quadrupole time-of-flight mass spectrometry (LC/Q-TOF/MS/MS). Samples were screened by enzyme-linked immunosorbent assay (ELISA) and only those samples presumptively declared positive were subjected to quantification and confirmation for the presence of flunixin by this method. The method is also readily adaptable to instrumental screening for the analyte. Flunixin was recovered from plasma by liquid–liquid extraction (LLE). The sample was diluted with 2 ml saturated phosphate buffer (pH 3.10) prior to LLE. The dried extract was reconstituted in acetonitrile:water:formic acid (50:50:0.1, v/v/v) and subsequently analyzed on a Q-TOF tandem mass spectrometer (Micromass) operated under electrospray ionization positive ion mode. The concentration of flunixin was determined by the internal standard (IS) calibration method using the peak area ratio with clonixin as the IS. The measurement uncertainty about the result was 8.7%. The method is simple, sensitive, robust and reliably fast in the quantification and confirmation of flunixin in equine plasma. Application of this method will assist racing authorities in the enforcement of tolerance plasma concentration of flunixin in the racehorse on race day.

SCHEDA 3

1 Quali sono i principali vantaggi di un'analisi targeted rispetto a un'analisi untargeted?

2 Indicare da chi è composto il Consiglio di Amministrazione

3 Come si filtra un intervallo di dati in Excel?

4 Leggere e tradurre il seguente testo in inglese:

Efficient strategies are required to implement comprehensive suspect screening methods using high-resolution mass spectrometry within environmental monitoring campaigns. In this study, both liquid and gas chromatography time-of-flight mass spectrometry (LC-QTOF-MS and GC-QTOF-MS) were used to screen for >5000 target and suspect compounds in the Sacramento–San Joaquin River Delta in Northern California. LC-QTOF-MS data were acquired in *All-Ions* fragmentation mode in both positive and negative electrospray ionization (ESI). LC suspects were identified using two accurate mass LC-QTOF-MS/MS libraries containing pesticides, pharmaceuticals, and other environmental contaminants and a custom exact mass database with predicted transformation products (TPs). For suspect screening, extracts were rerun in electron ionization (EI) mode with a retention time locked method using a GC-QTOF-MS pesticide library (containing exact mass fragments and retention times). Sixteen targets and 42 suspects were detected, of which 12 and 17, respectively, were not identified by LC-ESI-QTOF-MS. The results highlight the importance of analyzing water samples using multiple separation techniques and in multiple ionization modes to obtain a comprehensive chemical contaminant profile. The investigated river delta experiences significant pesticide inputs, leading to environmentally critical concentrations during rain events.

SCHEDA 5

1. Come vengono ionizzati i campioni in spettrometria di massa?

2. Quanto dura la carica del Direttore del Dipartimento:

3. Come si può condividere un file Excel con altri utenti?

4. Leggere e tradurre il seguente testo in inglese:

The present work proposes the use of a fast analytical platform for the mass spectrometric (MS) profiling of canine mammary tissues in their native form for the building of a predictive statistical model. The latter could be used as a novel diagnostic tool for the real-time identification of different cellular alterations in order to improve tissue resection during veterinary surgery, as previously validated in human oncology. Specifically, Rapid Evaporative Ionization Mass Spectrometry (REIMS) coupled with surgical electrocautery (intelligent knife—iKnife) was used to collect MS data from histologically processed mammary samples, classified into healthy, hyperplastic/dysplastic, mastitis and tumors. Differences in the lipid composition enabled tissue discrimination with an accuracy greater than 90%. The recognition capability of REIMS was tested on unknown mammary samples, and all of them were correctly identified with a correctness score of 98–100%. Triglyceride identification was increased in healthy mammary tissues, while the abundance of phospholipids was observed in altered tissues, reflecting morpho-functional changes in cell membranes, and oxidized species were also tentatively identified as discriminant features. The obtained lipidomic profiles represented unique fingerprints of the samples, suggesting that the iKnife technique is capable of differentiating mammary tissues following chemical changes in cellular metabolism.

SCHEDA 6

1. Quali tecniche di preparazione del campione sono necessarie per analisi accurate in cromatografia liquida e spettrometria di massa?
2. Quali sono gli organi del dipartimento
3. Qual è la differenza tra una formula e una funzione in Excel?
4. Leggere e tradurre il seguente testo in inglese:

In pesticide residue analysis (PRA), as well as traditional quantitative analysis of target compounds – mainly pesticides in their parent form – there is now remarkable interest in screening pesticides in a comprehensive way, including not only common pesticides but also less common or relatively new pesticides (non-target) or unknown transformation products (unknowns).
To address this interest, liquid chromatography coupled to mass spectrometry (LC-MS) with time-of-flight (TOF) analyzers (TOF-MS or QTOF-MS) is most suitable, taking into account accurate mass analysis, resolving power, enhanced selectivity and high sensitivity in full-scan acquisition mode.
In this article, we discuss the main features and the advantages of LC-TOF-MS instruments for PRA in food – advantages and pitfalls of the instruments. We make a critical comparison, including examples, of the application of LC-TOF-MS to screening, identification and confirmation of target, non-target and unknown pesticides in foodstuffs.

SCHEDA 7

1. Quali tipi di rilevatori di massa sono comunemente utilizzati in LC/MS e come si differenziano tra loro?
2. Il Senato accademico è l'organo:
3. Come si protegge una cella o un intervallo di celle da modifiche?

1. Leggere e tradurre il seguente testo in inglese:

Sample preparation is critical in relation to analysis time, sample throughput and therefore analysis costs. Due to recent advances in liquid chromatography-mass spectrometry (LC-MS) instrumentation, the detection of many compounds within one run became possible, and methods for the simultaneous analysis of different compound groups were developed. To be able to analyze compounds with different physical and chemical properties simultaneously, generic, non-selective sample-preparation procedures are applied.

The most frequently reported generic sample-preparation methods are a solvent extraction only, solid-phase extraction and a Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) approach. These multi-analyte methods – sometimes including more than 150 different compounds – are of much interest for analytical laboratories due to their reduction in costs. A clear drawback of generic sample-preparation procedures is the occurrence of abundant matrix effects, which compromise detection limits, quantitative aspects, method selectivity and maintenance frequency.

SCHEDA 8

1. Quali sono le differenze tra un'analisi quantitativa e qualitativa di campioni biologici con LC/MS?
2. Chi fa parte del consiglio di dipartimento?
3. Come si crea un grafico a torta e quando è appropriato usarlo?
4. Leggere e tradurre il seguente testo in inglese:

Concentration measurements are one of the most important and fundamental approaches in preclinical and clinical studies of small-molecule drugs, metabolites and biomarkers, since information about the absorption (drug), synthesis (biomarker), distribution, metabolism and elimination can be obtained by determining the concentrations of target analytes in biological fluids or tissue samples. Among all the bioanalytical techniques, liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) has been widely used, due to its high sensitivity, selectivity and reproducibility. Attention has been paid to the quantitation of small-molecule analytes in brain tissue samples by LC-MS/MS, because the important information about brain concentrations obtained *via* such studies can be used to interpret the distribution and function of target chemicals in the central nervous system (CNS). In order to be analyzed by LC-MS/MS, brain tissue samples need to be properly obtained and carefully prepared into an LC-MS/MS compatible form. The choice made here will which greatly influence the sensitivity and robustness of the method. As a result of the vital function and complex composition of brain tissue, sample collection and preparation can be very challenging.

SCHEDA 9

1. Come si valutano l'accuratezza e la precisione di un metodo analitico
2. Il Direttore generale è
3. Cos'è un foglio di calcolo in Excel e quali sono i suoi componenti principali?
4. Leggere e tradurre il seguente testo in inglese:

Moxifloxacin (MFX) is a potential oral agent use in the treatment of multidrug-resistance tuberculosis (MDR-TB). Due to variability in pharmacokinetics and *in vitro*susceptibility of causative bacteria, therapeutic drug monitoring (TDM) of MFX is recommended. Conventional plasma sampling for TDM is facing logistical challenges, especially in limited resource areas, and dried blood spots (DBS) sampling may offer a chance to overcome this problem. The objective of this study was to develop a LC–MS/MS method for determination of MFX in dried blood spots (DBS) that is applicable for TDM. The influence of paper type, the hematocrit (Hct) and the blood volume per spot (V_b) on the estimated blood volume in a disc (V_{est}) was investigated. The extracts of 8 mm diameter discs punched out from DBS were analyzed using liquid chromatography tandem mass spectrometry (LC–MS/MS) with cyanoimipramin as internal standard. The method was validated with respect to selectivity, linearity, accuracy, precision, sensitivity, recovery and stability. The effect of Hct and V_b on LC–MS/MS analytical result was also investigated.

SCHEDA 10

1. Quali sono i vantaggi dell'utilizzo di LC/MS rispetto ad altre tecniche analitiche?
2. Quanto dura la carica del Rettore
3. Cos'è una funzione in Excel e come si utilizza?
4. Leggere e tradurre il seguente testo in inglese:

Dried blood spot (DBS) sampling methods are desirable for population-wide biomarker screening programs because of their ease of collection, transportation, and storage. Immunoassays are traditionally used to quantify endogenous proteins in these samples but require a separate assay for each protein. Recently, targeted mass spectrometry (MS) has been proposed for generating highly-multiplexed assays for biomarker proteins in DBS samples. In this work, we report the first comparison of proteins in whole blood and DBS samples using an untargeted MS approach. The average number of proteins identified in undepleted whole blood and DBS samples by liquid chromatography (LC)/MS/MS was 223 and 253, respectively. Protein identification repeatability was between 77 %–92 % within replicates and the majority of these repeated proteins (70 %) were observed in both sample formats. Proteins exclusively identified in the liquid or dried fluid spot format were unbiased based on their molecular weight, isoelectric point, aliphatic index, and grand average hydrophobicity.