

Brevetti Vigenti a Titolarità IST

Dispositivo di rilevazione di sostanze volatili, apparato utilizzante tale dispositivo e relativo metodo di funzionamento.

Nickname: "Naso"

Data Deposito: 11/11/2009

Numero Domanda:

Data Registrazione:

Numero Brevetto:

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EXECUTIVE SUMMARY:

Applications

The device allows the evaporation and the measure of flying part in microliters of liquid samples by a set of smell sensors.

The device has been developed in order to detect the homovanillic acid (HVA) and vanillylmandelic acid (VMA) in the urines of children affected by neuroblastoma.

The device, thanks to its flexibility, could be used in all equipments that analyzes flying substances in liquid samples.

Application fields: biomedical, agroindustrial, chemical and environmental.

Short description of the invention (patent)

The device is made of a vaporisation chamber, within which it is introduced a sampler of inert and temperature resistant material previously soaked in the liquid sample to be analyzed.

In the vaporization chamber, the flying part of the sample, on account of the temperature, becomes gaseous and a carrier gas, made of chromatographic air, carries away the flying part towards the sensors.

The device is characterized by:

- stability of transport flow
- admission parcelling of the sample towards each single sensor
- peculiar geometry of vaporization and measurement chambers

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- peculiar injection methodology of sample
- accurate thermostating of vaporisation and measurement chambers

Short description of the existing market

The market concerning the employment of smell sensors based detecting systems is vast and increasingly rise in biomedical, agroindustrial, chemical and environmental area.

As regards applications in health area detecting systems are being studied in the following pathologies: pulmonary cancers, tuberculosis, bacterial infections of urinary tract, gastric and colon pathologies (helicobacter pylori and peptic ulcer), brain related pathologies, etc.

Short description of existing and competing products/technologies

Most used technologies for the detection of substances microquantities in liquid samples are presently: Gas-Chromatography, HPLC and HPLC-mass spectrometry.

Advantages with respect to the existing technologies

- Low cost of the device compared to the high cost of technologies already in use
- Low cost for reagents compared to high costs of reagents employed in traditional technologies
- Low cost of device maintenance
- Easy mode of operation even by not specialized staff
- Short execution time: 10 minutes against 2/3 day now necessary for other techniques
- As for several analyzes no specific preparation or samples treatment is demanded

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Chip nanoforato di nitruro di silicio per l'analisi di profili di espressione genica e relativi biosensori

Nickname: "ChipNanopori"

Data Deposito: 04/09/2009

Numero Domanda:

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Numero Brevetto:

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Titolari:

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Università degli Studi di Genova (azienda pubblica), GENOVA	50,00%

EXECUTIVE SUMMARY:

NANOMED labs, located at the Advanced Biotechnology Center of Genova (Italy), were funded in 2005 thanks to an Italian FIRB National Project, with the final aim to develop advanced nanotechnologies and promoting new knowledge in the fields of genomics, post-genomics and biomedicine in general. Our laboratories group multidisciplinary expertise in molecular biology, biochemistry, genetics and physics and include companies operating in the market of biotechnology and advanced electronics.

One of our main activities relates to the so called "Nanopore Array Technology for gene expression profiling", a promising and innovative technological platform with the potential to revolutionize the field of molecular diagnosis.

Based on the principle that single strand DNA (ssDNA) molecules attached to solid supports can hybridize to complementary sequences, microarray technology can be efficiently used to characterize gene expression profiles, to detect point mutations and Single Nucleotide Polymorphisms (SNPs), to identify gains or losses in chromosome regions. However, microarray technology suffers from various limitations. First of all the needs for fluorescent labels and optical detection methods, but also large amounts of target sample, Moreover, the complete process of sample preparation, measurement and data analysis is quite complex and lengthy.

Nanopore technology has been recently proposed for biosensing and genome analysis as a low cost, fast processing and high throughput alternative to microarrays: a 1.4 nm self-assembled protein channel connects two electrolyte-filled reservoirs in which target ss-DNA

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molecules are dispersed. By applying a voltage across the biological pore, an ionic current is established. The negatively charged target molecules are electroforetically drawn through it, and their passage is detected as an ion current drop. In principle, the specific signal due to single bases can be identified by analyzing the current drop amplitude and duration, so that low-cost fast DNA sequencing could be possible. But although biological pores demonstrated to be useful for a range of applications, the present interest and attention are undoubtedly attracted to the possibility of fabricating solid-state nanopores with many obvious advantages, such as very high stability, better control of diameter and channel length and adjustable surface properties.

NANOMED Labs have made a step forward in this direction in order to identify individual DNA strands by means of “engineered nanopores”. Our results demonstrate that solid state nanopores can be efficiently and stably functionalized by oligonucleotide molecules, to conceive and develop a selective biosensor which can be integrated into more complex microfluidic devices and Lab-On-Chips (LOCs), obtaining an high throughput platform for DNA analysis. In particular, our approach has the advantage of avoiding both post-fabrication treatments generally used to reduce the solid state nanopore diameter to molecular level dimensions, and labelling procedures for the target molecules. Instead, it is based on a simple functionalization procedure not even involving localized surface modification or further material deposition, and extendible to arrays of nanopores each one selective and specific for a different DNA sequence, thus allowing parallel fast analysis.

This innovative approach and the great application opportunities have led our Labs to submit a patent request (# RM2009A000450, 4th September 2009, “DNA-functionalized silicon nitride nanopores for gene expression profiling and related biosensors”). The patent relates to many possible applications of our finding, from personalized medicine and diagnostic, to infectious disease testing, applications in defence, food safety, forensic medicine analysis and, generally speaking, biomolecular interactions.

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Inibitori di ADAM17 atti a modulare il rilascio di AL-CAM (CD166) solubile in cellule tumorali e loro uso nel trattamento terapeutico del carcinoma ovarico epiteliale (EOC)

Nickname: "ALCAM"

Data Deposito: 19/08/2009

Numero Domanda:

Data Registrazione:

Numero Brevetto:

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Titolari:

Università degli Studi di Pisa (azienda pubblica), PISA	60,00%
IST (azienda pubblica), GENOVA	40,00%

EXECUTIVE SUMMARY:
NEW INHIBITORS OF ADAM17/TACE

Brief description of the invention

Matrix Metalloproteinases (MMP) and a Disintegrin and Metalloproteinases (ADAM) are involved in tissue remodeling and in tumor neo-angiogenesis and invasion. MMPs degrade not only structural components of the tissue extracellular matrix and base membranes, but are also involved in the cleavage of certain cell adhesion molecules, surface receptors, cytokines and growth factors. MMP have been associated with tumor progression and invasiveness in several types of cancer, and have been regarded as attractive target molecules for at least 20 years. In addition, MMPs and ADAMS are also involved in inflammation and tissue remodeling. The present invention refers to new compounds, which act as inhibitors of ADAM17 (a disintegrin and metalloprotease 17, also known as TACE, TNF alpha converting enzyme) and are able to block the proteolytic release by tumor cells of the membrane ALCAM (Activated Leukocyte Cell Adhesion Molecule) as a soluble form (sALCAM). Cell adhesion molecules (CAMs) are essential for homeostasis and cellular architecture in multicellular organisms, being involved in cell-cell and cell-matrix interactions. In neoplastic development, multiple adhesive interactions, in concert with the activation of proteolytic cascades, play critical roles in determining cell release from the primary tumor and invasiveness.

The invention concerns the potential diagnostic and therapeutic use of such compounds in epithelial ovarian cancer (EOC) and possibly in other diseases.

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Brief description of the possible applications

The possible applications of the new inhibitors of ADAM17/TACE are broad, as this enzyme has been involved in several pathological processes. In particular their application as therapeutic agents can be foreseen in two frequent and life-threatening categories of disease: i) several type of cancers, such as breast and ovarian cancer, where ADAM17/TACE activates growth factors (i.e. EGF-like ligands) and promotes chronic inflammation, tumor progression and metastases through the release of intercellular adhesive bonds; ii) inflammatory diseases where activation of TNF-alpha plays a crucial role, such as reumathoid arthritis.

Considerations on the potential existing market

Regarding the potential use of ADAM17/TACE inhibitors in reumathoid arthritis, it must be considered that about 1% of the world's population is affected by this chronic inflammatory disease. Reumathoid arthritis is a highly disabling condition, which leads to loss of joint mobility. The onset is frequent in the fourth or fifth decade, but people of any age can be affected.

Breast cancer comprises about 10% of all cancer incidence among women, making it a common cause of cancer death in women. EOC has a lower incidence but a high mortality rate, representing the fourth leading cause of cancer-related death in women in western countries and the leading cause of gynaecologic cancer death. The high mortality of EOC is mainly related to its frequent diagnosis at advanced stages, due to the lack of reliable screening tools. The potential use of labelled ADAM17/TACE inhibitors as therapeutics or as diagnostic tools is therefore extremely attractive.

Possible advantages over previous inhibitors of ADAM17/TACE

Several small molecule and peptidomimetic-based second generation inhibitors of MMPs entered in phase III clinical trials of advanced cancer but they failed to increase survival. This failure may relate to several factors, particularly to the poor specificity of such broad inhibitors for those MMPs really involved in tumor progression. Therefore the study of new more potent and target-specific inhibitors of MMPs is a relevant goal.

Considering the data coming from literature and our previous studies in this field, a novel series of (R)-4-amidosubstituted-2-(arylsulfonylamino)butanoic hydroxamates, were designed and synthesized exploiting the differences between MMP and ADAM17 catalytic site. These compounds were evaluated as ADAM17/TACE inhibitors on isolated enzyme and were tested in living cancer cells for their capacity to block sALCAM release. Among the novel analogues, two very promising compounds were discovered, which showed nanomolar activity for ADAM17/TACE and a good selectivity over MMP-1 and MMP-14. When assayed in several cancer cell lines, the same compounds resulted the most potent of the series, inhibiting sALCAM release better than the reference compounds. In particular, the inhibitory effects were evident on different type of cancer cells, where the new compounds were able to reduce ALCAM shedding in the low nM range (IC₅₀ between 3.2-97 nM). These preliminary results allowed us to validate ADAM17/ALCAM pathway as new target in anticancer therapy.

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PNA conjugates targeted to the E[μ] enhancer of the Ig locus as therapeutic agent for BCL2 translocation-driven Follicular Cell Lymphoma clonal expansion

Nickname: "PNA"

Data Deposito: 24/09/2007

Numero Domanda: 07018695.2

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Numero Brevetto: EP2039767

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Titolari:

IST (azienda pubblica), GENOVA	100,00%
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EXECUTIVE SUMMARY:

DISEASE

Follicular (center cell) non-Hodgkin's Lymphoma (FCL) is a B-cell cancer. This disease is characterized by a t(14;18) chromosomal translocation of the oncogene bcl2 that becomes juxtaposed to the E μ enhancer of the Ig locus in chromosome 14. Consequently bcl-2 becomes up regulated hyper, expressing the anti-apoptotic BCL2 protein, and FL cells become immortalized and can uncontrollably expand

PATENT

Our invention refers to the use of a Peptide Nucleic Acids, a synthetic molecule complementary to the E μ enhancer (PNAE μ wt), that can specifically block bcl-2 hyperexpression in Follicular Lymphoma providing a specific treatment of the disease.

FL THERAPY GENERATED REVENUES

Follicular lymphoma (FL) is a non-Hodgkin lymphoma (NHL) that exhibits marked differences in the incidence rates across geographic regions: extremely low incidence rates are reported among most Asian countries, and comparatively high rates are reported in North America and Western Europe. Non-Hodgkin's lymphoma is the most common hematological cancer and the fifth leading cause of cancer death in the U.S. There are approximately 56,400 new cases diagnosed per year, responsible for 19,200 deaths annually (the second fastest growing form of cancer in the U.S) more than doubled since the 1970s. The prevalence of NHL is approximately 400,000, including 77,000 patients with Follicular Lymphoma According to the American Cancer Society, the incidence is doubled since 2007.

The overall mean treatment cost per patient (in euro, year 2007) taking into account the cost of rescue therapy, was 22,113 euro with the R-CHOP regimen and with 22,831 euro with the CHOP regimen. Sensitivity analyses showed an incremental cost-effectiveness with Rituximab addition to the therapy.(details below)

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PRESENT STANDARD THERAPIES

As today the standard FL treatment consist in:

- high dose conventional chemotherapy (CHOP: cyclophosphamide, doxorubicin, vincristine, and prednisone or FCM: fludarabine, cyclophosphamide, and mitoxantrone) in combination with the monoclonal anti-CD20 antibody rituximab

Several rescue therapies exist for cases of FL who relapse or fail first line therapies. Despite the wide array of therapeutical strategies now available, patients with FL stage III/IV tend to relapse repeatedly. Therefore the disease can not be considered as “cured” in any of these patients. In fact most of them succumb to FL.

INNOVATIVE THERAPEUTIC ADVANTAGES

PNA E μ -NLS provides an alternative to the available (rather ineffective and toxic) pharmacologic treatments of FCL.

PNA E μ -NLS therapeutic use provides the following potential advantages

long persistence of the intact active molecule, even if administered at pharmacological concentration over a prolonged period of time; low or no toxicity; low or no immunogenicity; low or no mutagenicity.

Since presently the standard FCL treatment consists in high dose conventional chemotherapy, in combination with specific monoclonal antibodies and, in case of failure, autologous stem cell transplantation (ASCT) or radio immuno therapy (RIT), the invention has tremendous innovative potential.

UPDATE ON THERAPEUTIC IMPROVEMENTS (September 2009).

We have already proven that PNA E μ -NLS per se provides an efficient innovative pharmacological treatment of FCL inducing: -in cultured cells 80% of apoptotic cell death and - in a animal model system causing an 84% decrease in tumor volume.

Since our aim is a total eradication of FCL we recently tried a combinatorial approach. PNA E μ -NLS (an anti apoptotic) was coupled with a drug (already established in the therapy of human FCL as well as of other B cell malignancies) targeted to the inhibition of the cell cycle.

The combination of these two drug proved to be synergistic behind our most optimistic hopes: cultured FL cells even at relatively short treatment times went completely into apoptosis. The effectiveness of this combinatorial treatment was so dramatic that we proceeded to test the two drugs at decreasingly lower concentrations. It was shown that PNA E μ -NLS combined with the cell cycle inhibitory drug, both at 1/5 the standard pharmacologically active concentration, were still sorting a “curative” effect.

Preliminary experiments on the already described animal model system gave the similar positive indications.

This improvement in the strategy, maximizing PNA E μ -NLS therapeutic efficacy, brings this drug one step closer to human phase I test.

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Metodo per la prognosi del carcinoma mammario

Nickname: "Signa"

Data Deposito: 01/06/2007

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Data Registrazione:

Numero Brevetto:

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Titolari:

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ABSTRACT: La presente invenzione riguarda Metodo in vitro per la determinazione della prognosi del carcinoma mammario che comprende l'analisi differenziale dell'espressione dei geni coinvolti nell'insulino resistenza.

L'invenzione, in un altro aspetto, riguarda un microarray per la determinazione del livello di espressione dei geni coinvolti nell'insulino resistenza .

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Bio-membrana ingegnerizzata osteo angiogenica e suoi usi per la rigenerazione di tessuto osseo

Nickname: "Biorigen"

Data Deposito: 31/05/2006

Numero Domanda: RM2006A000289

Data Registrazione:

Numero Brevetto:

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Biorigen s.r.l., GENOVA

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ABSTRACT: A bio-membrane with angiogenic activity for implant in tissue regeneration and repair, including bone reconstruction and the repair of skin and soft tissue lesions is described, essentially constituted by a gel able to provide support and growth and/or differentiation and/or angiogenic factors for the full in vivo functionality of the cell, containing also mesenchymal stem/ precursor cells, an implant device for reconstructive surgery of bone tissue, of skin and soft tissue lesions which comprises the bio-membrane, and a method for its obtainment. Use of the gel alone for tissue regeneration and of adhesive plasters that comprise it is also described.