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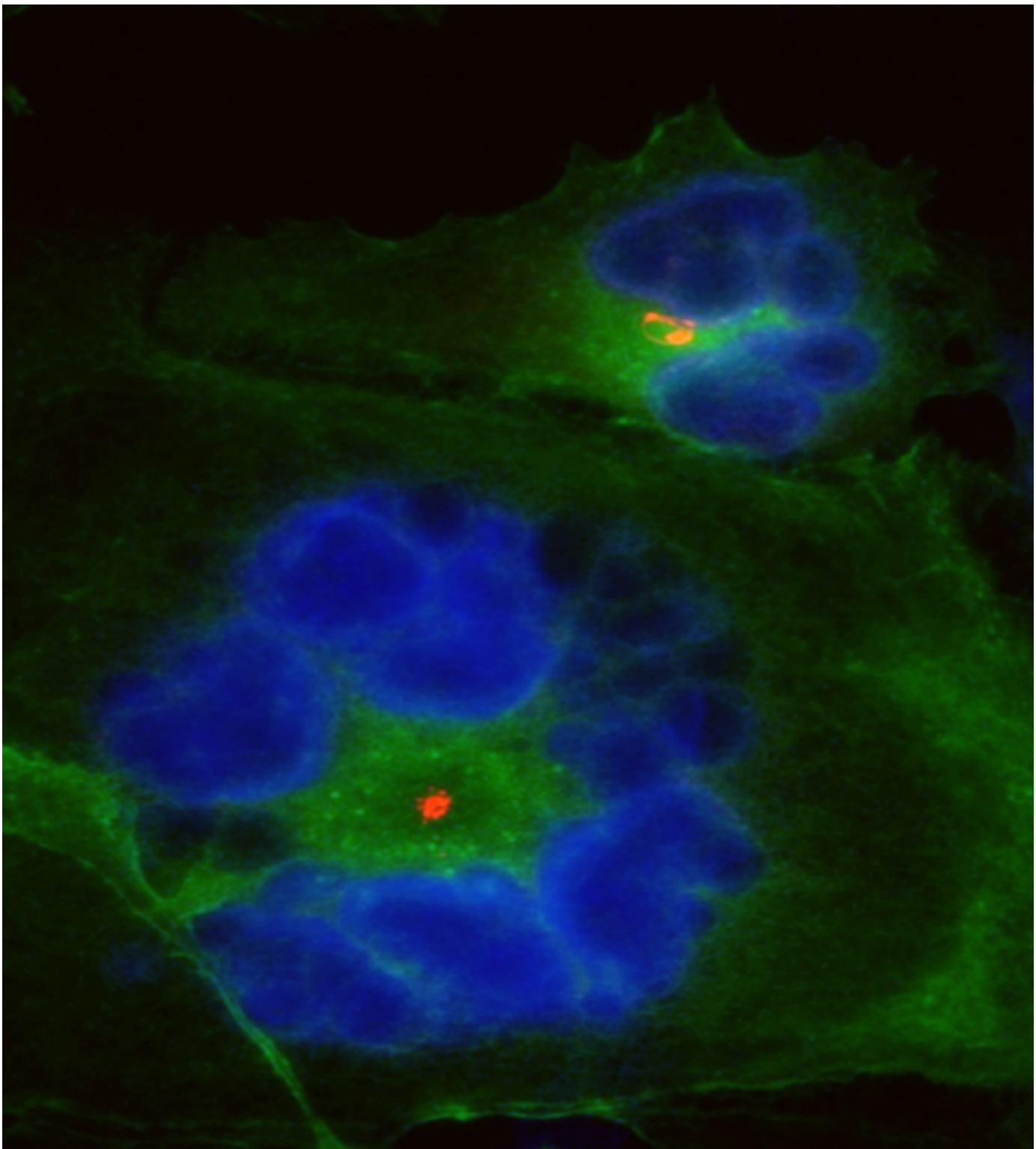

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Cover page: The Synthetic Lethal Rosette

Aberrant mitotic phenotype found in BRCA1-deficient cells treated with the PLK1 inhibitor Volasertib. Cells become giant and multinucleated and acquire a flower shape, with nuclei arranging in a circular disposition around a cluster of centrosomes. Blue (DAPI: nuclei), Green (FITC-phalloidin: actin cytoskeleton), Red (γ-Tubulin: centrosomes).

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BT-P08
IS IT POSSIBLE TO USE A CELL-PENETRATING PEPTIDE AS A VECTOR TO THE INTRACELLULAR DELIVERY OF MOLECULES INTO THE OOCYTE?

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The oocyte possesses a cell membrane named oolema that, in addition to the zona pellucida, protects the cytosol from the extracellular space and is essential in the sperm-egg interaction during fertilization. Nevertheless, it can be bypassed by intracytoplasmic microinjection, a physical technique used to introduce sperm or a number of different molecules into the oocyte cytosol. However, it is an invasive process because it implies the penetration of the plasma membrane and the zona pellucida. Cell-penetrating peptides (CPPs) have been introduced as novel biocarriers since they are able to translocate the cellular membranes without damaging it. These CPPs are small molecules composed of positive-charged amino acids that can be attached to fluorophores, proteins or nanoparticles. CPPs are used as carriers or vectors to introduce these molecules into the cell. The mechanisms by which these permeable peptides manage to enter the cell depend on the concentration of CPP and the incubated cellular type. However, the capacity of the oocyte to allow or deny the entrance of CPPs into the cytoplasm remains unknown. Therefore, the aim of this work was to study if a CPP is capable of penetrating the oocyte oolema, in order to determine if it constitutes an alternative of intracytoplasmic microinjection for the intracellular delivery of different molecules. Thus, CF-1 mouse oocytes of two maturation stages, immature (Germinal Vesicle, GV) and mature (Metaphase II; MII) oocytes were incubated in medium with increasing concentrations of an arginine-rich CPP attached to a fluorophore. The incubation was carried out at different times and different temperatures (4°C and 37°C). The cells were analyzed with confocal microscopy and the fluorescence intensity was used to graph concentration and time curves. Apparently, the MII oocytes incorporated CPP in a concentration and time-independent manner, at 4°C and 37°C. On the other hand, the penetration of peptide into GV oocytes was concentration and time-dependent, only at 37°C. The comparison of GV and MII oocyte showed that the first one incorporated more CPP than the second one, in all concentrations used during the incubation. These results show that CPP penetrates the oolema in both maturation stages and that the penetration was higher in GV oocytes.

BT-P09
TOPICAL SYSTEM OF CONTROLLED RELEASE OF NANOPARTICLES LOADED WITH ANTITUMORAL DRUGS

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Two of the main setbacks of many chemotherapeutical drugs are their widespread systemic distribution and limited permeability across the cell membrane. Indeed, to reach effective concentrations of the drugs at tumor sites, it is usually necessary to administer relatively high doses of drugs which ultimately lead to severe side effects. In this work, our goal was to develop a new system capable of stably encapsulate drugs that target tumor cells with controlled release of chemotherapeutic drugs. Moreover, we aimed to design a system that can be used on patients topically. Topical drug delivery eliminates the need for systemic drug administration and offers a less invasive alternative than conventional therapy. Nanocarriers could be used to improve solubility, cellular delivery, distribution *in vivo*, control release and decrease the toxicity of antitumoral drugs. In the present study, we used the biocompatible materials DOPC (D) and BHD-AOT (B) as nanocarriers capable of stably encapsulating antitumor drugs, such as Curcumin (C). C is a polyphenolic natural compound with well-known antitumoral, antioxidant and anti-inflammatory properties. However, the therapeutic efficacy of C is limited due to its poor aqueous solubility and its difficulty to cross the cell membrane. In this study, the *in vitro* biocompatibility of vesicles and the ability to encapsulate C of B (BC) and D (DC) was evaluated. The cellular interaction and antitumor activity of BC and DC were studied by nano-zetasizer and flow cytometry. Finally, to perform a local and controlled release of BC and DC we use a new type of hydrogel (oxidized alginate co-polymerized with gelatin) as a support matrix. This assay was carried out using rat skin by Franz diffusion cell and fluorescence spectroscopy. Our results showed that B and D are highly efficient to encapsulate C and interact with tumor cells. D was harmless in a wider range of concentrations compared to B (concentrations lower than 0.05 mg/mL). DC was more efficient than BC because it was able to deliver the high concentrations of C necessary to reach its antitumoral activity. Another important finding was that the incorporation of DC in tumor cells was greater ($\geq$ 70%) than in non-tumoral cell lines ($\leq$ 10%). The hydrogel incorporated and protected BC and DC efficiently, after lyophilization and in humid conditions both at low and physiological temperatures. Finally, after the controlled degradation of the hydrogel, both BC and DC vesicles crossed the stratum corneum without morphological alterations and without losing the encapsulated drug. Together, our results suggest that this type of vesicles can become ideal systems for the delivery of antitumor drugs in minimally invasive topical applications.

BT-P10
HUMAN RECOMBINANT GALECTIN 1 PRODUCED BY TRANSPLASTOMIC TOBACCO PLANTS

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Transplastomic plants stand out from other molecular farming platforms because of the highly efficient production of recombinant proteins (>50% of the total soluble protein). In some cases, however, low and even undetectable levels of heterologous protein expression have been reported in this system. This fact makes it necessary to evaluate and study the expression system whenever a new protein emerges as a candidate to be produced using this platform. The aim of this work, therefore, was to assess the feasibility of producing transplastomic plants that express a human protein with immunomodulatory activity and potential therapeutic use. For this purpose, we expressed human Galectin 1 (hGal-1), a carbohydrate-binding protein with proven immunomodulatory and anti-inflammatory activities. This protein has broad therapeutic potential and the appropriate biochemical characteristics to be expressed in the plastid system. Initially, we cloned the *LGALS1* gene in a plastid transformation vector (pBSW5'UTR). This vector was used to transform *Nicotiana tabacum* leaves using biolistics. Transplastomic lines, obtained from three independent recombination events (verified by PCR), were characterized at the molecular level. In order to confirm the homoplasty of the lines, we performed a Southern blot. We corroborated the transgene transcriptional activity by Northern blot. The expression of hGal-1 in transplastomic plants was analyzed by Western blot and quantified by ELISA. In both cases, we used a specific anti-Gal1 polyclonal antibody for detection and recombinant hGal-1 expressed in *Escherichia coli* as the positive control. The standard protocol of protein extraction was adapted in order to increase the recovery of active Gal-1 by adding a reducing agent. This recombinant protein, accumulated in the soluble protein fraction of the transplastomic plants, was finally purified by affinity chromatography with a lactosyl-Sepharose column. In conclusion, homoplastic tobacco plants capable of producing hGal-1 were obtained. Human Galectin 1 produced by tobacco chloroplasts was electrophoretically indistinguishable from bacterial hGal-1. Purification by affinity chromatography demonstrated an intact carbohydrate recognition domain, suggesting preservation of the biochemical activity of the recombinant hGal-1. Further *in vitro* and *in vivo* experiments are currently in process in order to corroborate the biological activity of the recombinant protein. Given the therapeutic potential of this protein in the treatment of autoimmune and chronic inflammatory disorders, this new expression system may serve to produce endotoxin-free, hGal-1 for pre-clinical and clinical studies.

BT-P11
CONSTRUCTION OF A *SACCHAROMYCES CEREVISIAE* STRAIN FOR THE BIOREMEDIATION OF DAIRY INDUSTRY WASTE COUPLED WITH ETHANOL PRODUCTION

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The dairy industry is an integral part of the food industry, being one of the largest, most important and dynamic agro-food complexes within the national economy. This industrial segment produces considerable amounts of liquid waste with a high content of organic matter. Whey is the remaining liquid from the precipitation and removal of casein from milk during the cheese manufacturing process. It is made up of several components, with lactose being the most abundant (4.5–5 % w/v). This sugar contributes to the high chemical oxygen demand and the biochemical oxygen demand of whey. Bioethanol may be obtained from various compounds by microorganisms as yeasts, which have the ability to ferment a wide variety of sugars to alcohol. Yeasts are used in industrial plants because of their great fermentation yield, ethanol tolerance, productivity and their efficient growth in simple and economical media. Thus, the use of whey for the production of ethanol from the fermentation of lactose would be a beneficial process due to the reuse and bioremediation of this highly polluting by-product. By integrating the genes LAC4 and LAC12 from *Kluyveromyces marxinau*s to the genome of the *Saccharomyces cerevisiae* laboratory strain BY4742, we have developed several transgenic strains capable of using lactose as a sole carbon source. Using a spectroscopy technique, we determined the ability of these strains to produce bioethanol both from sucrose and lactose and compared it to a wild type *S. cerevisiae* strain. Our results show that while wild type *S. cerevisiae* strain is not capable of growing even in rich mediums if they contain lactose as the sole carbon source, the engineered strains are able to efficiently catabolize lactose into bioethanol in anaerobic conditions. Two of the strains obtained, BY4742-11F and BY4742-51, were able to produce a final concentration of 1.1% and 0.74% ethanol from a 2% lactose rich medium, values close to the maximum theoretical yield. These promising results justify further studies leading to an optimization in the production of bioethanol from this food processing waste using the strains obtained.

BT-P12
GLYPHOSATE REMOVAL BY RIPARIAN VEGETABLE SPECIES AND ISOLATION OF ASSOCIATED BACTERIA

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Glyphosate (Gly) is the most used herbicide in Argentina. Consequently, a higher occurrence of Gly and its major metabolite (AMPA) in different environmental compartments are currently found. Plants growing in such environments can reduce pollutant loads. Contaminated soils and vegetation represent a source of potentially beneficial plant associated-bacteria that could be used within microbial-assisted remediation strategies. The objectives of this study were (1) to isolate bacterial strains from Gly contaminated soil and rhizosphere of *Salix fragilis* (*Sf*) and *Festuca arundinacea* (*Fa*) spontaneously grown on soils contaminated, and (2) to evaluate Gly and AMPA content in soil and plant tissue of *Sf* and *Fa* grown in a greenhouse experiment. Samples of top soils contaminated with Gly and samples of *Sf* and *Fa* growing in the surroundings of the Claromecó stream (Tres Arroyos) were collected. For the bacterial isolation, one g of bulk soil (S) and rhizosphere soil (R) was suspended in a sterile solution. Soil suspensions were diluted and plated. After 7 days of incubation, distinct colony morphotypes isolated were screened according to use Gly (0.5 g L^{-1}) as only carbon source (minimal medium+Gly) and to use Gly as only P source (mineral salt medium+sodium glutamate+Gly).