Transferência de tecnologia universitária

Do laboratório ao mercado - II

Study cases

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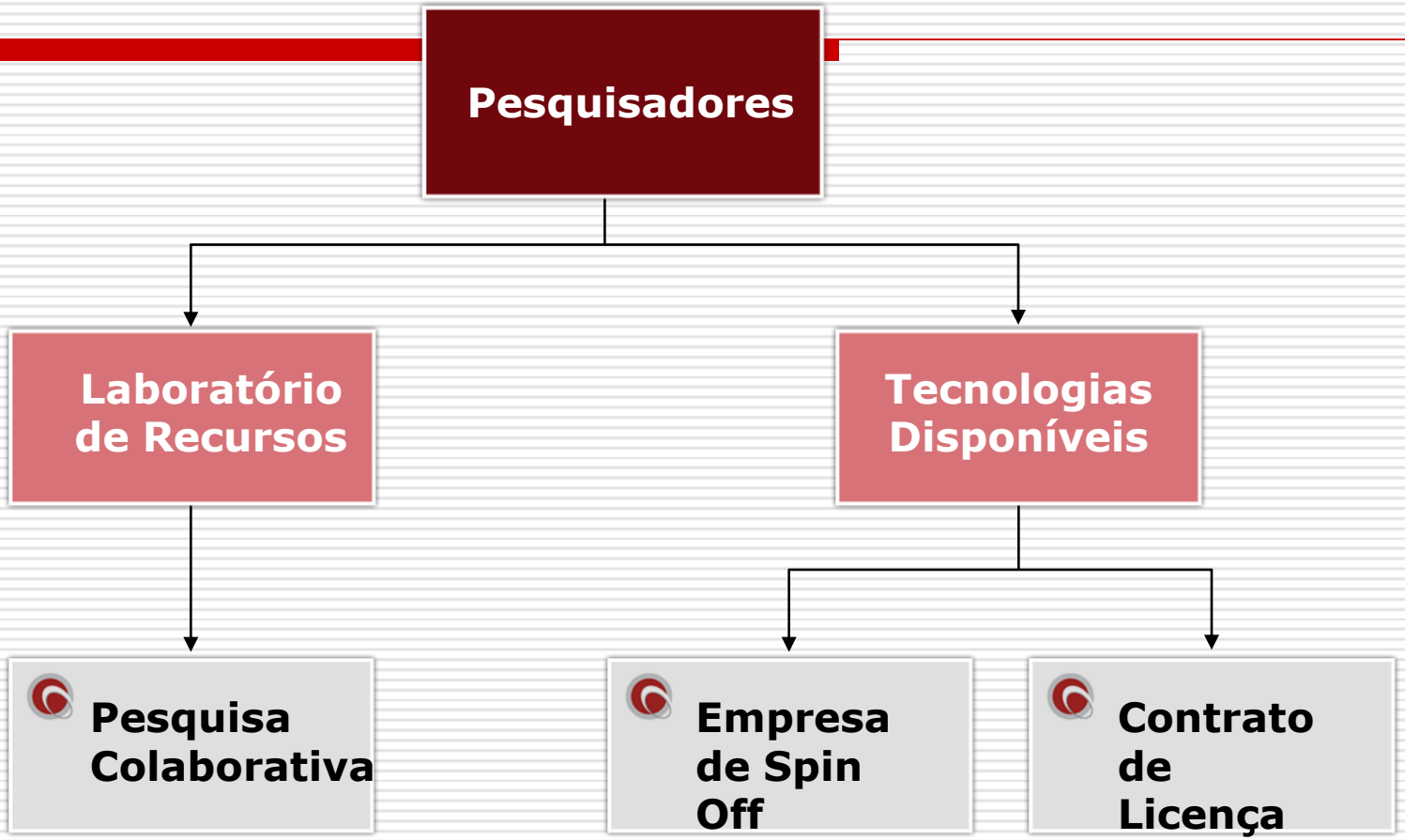
São Paulo - Abril 2013

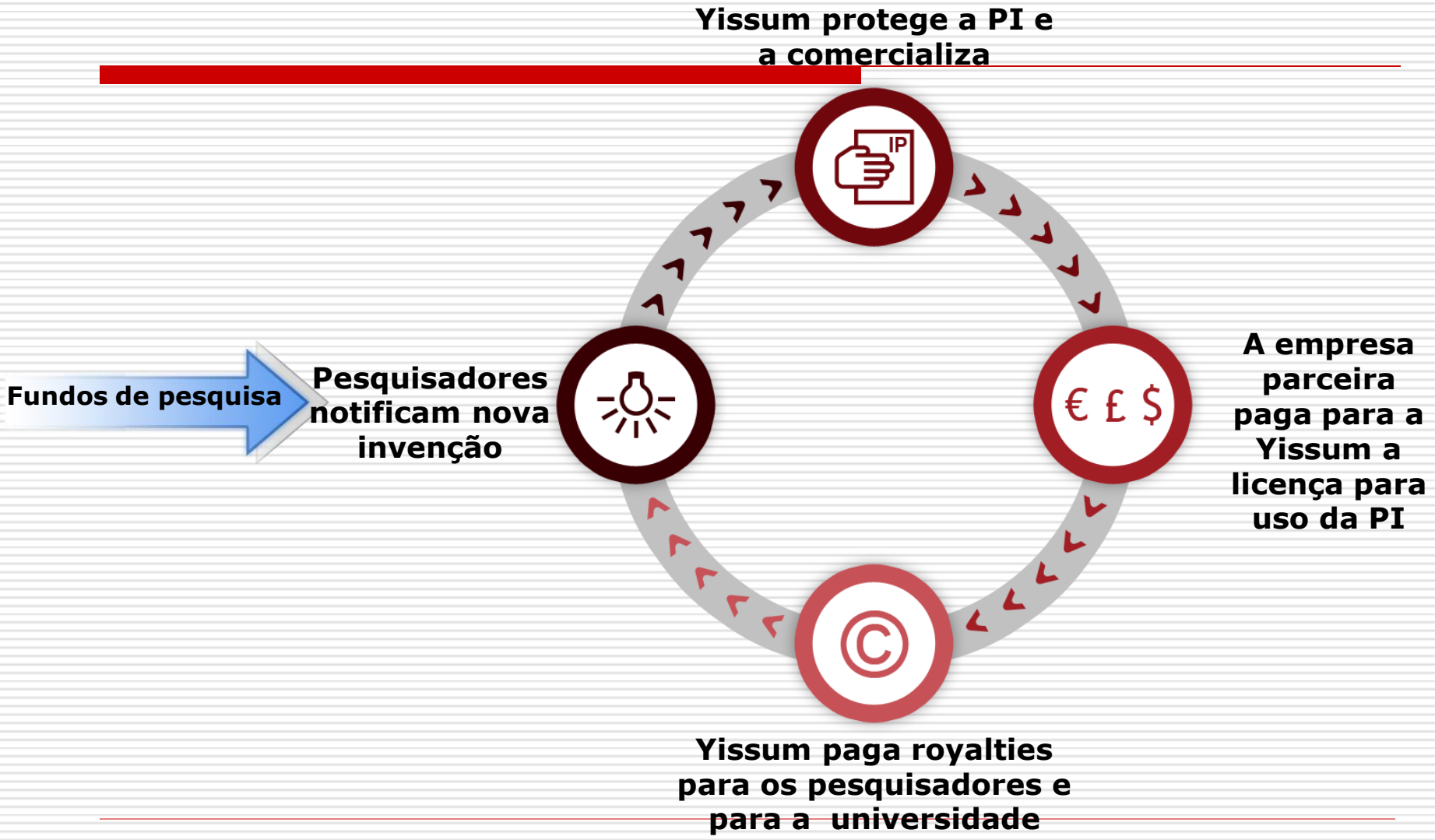
Roteiro

- Projetos na área de saúde
  - Study cases
    - Novas Moléculas
    - Vias de Administração
    - Novos materiais
    - Vacinas
    - Nutracêuticos

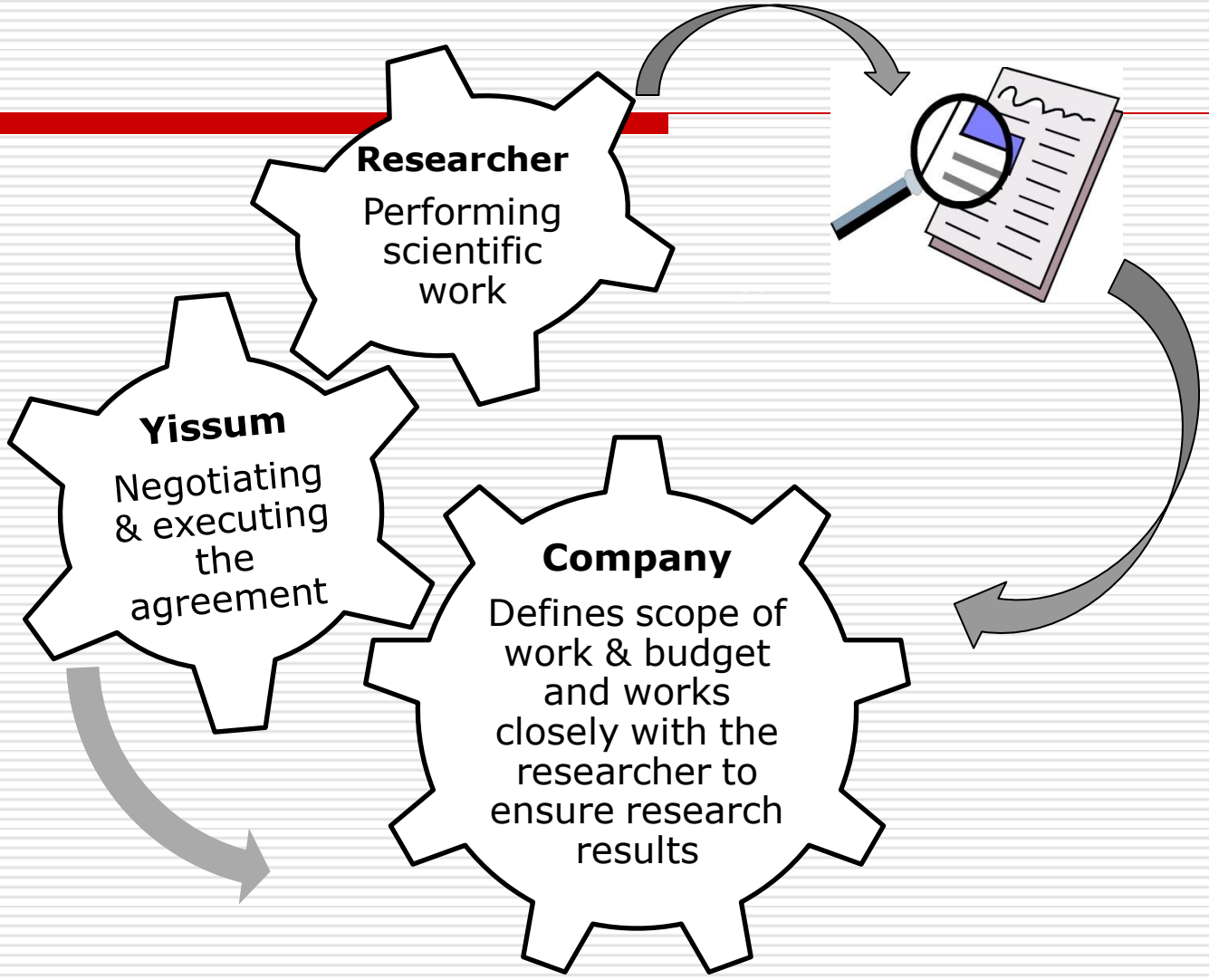
Yissum – modelos de negócios



Transferencia de Tecnologia – o processo (licenciamento)



Processo de pesquisa colaborativa



Lista de Projetos (Yissum) – um pequeno exemplo

- Non-Toxic, Skin-Permeable, Low- Molecular Weight Antioxidants: A unique approach addressing aging and senescence-associated alterations
  Abdullah Haj-Yehia
- Superantigen toxin antagonist and vaccine
  Raymond Kaempfer
- A Peptide Preventing Highly Invasive Group A Streptococcal Infections
  Emanuel Hanski, Carlos Hidalgo-Grass, Allon E. Moses
- Carbamoylphosphonates as Matrix Metalloproteinase (Mmp) Inhibitors with Anti-Metastasis and Anti-Restenosis Activity
  Eli Breuer, Reuven Reich
- Development of Novel Anti-Hyperglycemic Drugs
  Shlomo Sasson, Erol Cerasi, YehoshuaKatzhendler, Arie Gruzman
- A new efficient cannabinoid antiemetic in pediatric oncology
  Raphael Mechoulam
- Anandamide - fatty acid cannabinoid from brain
  Raphael Mechoulam
- Analgesic for neuropathic pain based on peripherally acting anti-convulsant, local anaesthetic and antiarrhythmic agents
  Marshall Devor
- Oral delivery of peptide drug by hydrogels designed for synchronized release of probes with different physicochemical characteristics
  Avraham Rubinstein, Michael Friedman, R. Radai
- Prodrugs of bisphosphonates for oral administration in calcium-related disorders
  Eli Breuer, Gershon Golomb
- Ocular polymeric drug delivery system
  Avi Domb
- CNS-active tetramethylcyclopropane analogues of valpromide: Antiepileptic and CNS activity
  Meir Bialer, Boris Yagen
- Liposomal local anesthetics: A means to improve topical anesthesia
  Yechezkel Barenholz, Gilbert Grant (NYU)
- Sunscreen Skin photoprotectors
  Touitou Elka, Bergelson Lev

Projetos na Área de Saúde

- “Provedores diretos”
  - Faculdade de Medicina
  - Odontologia
  - Farmácia
  - Biologias

Projetos na Área de Saúde – Outras fontes

- Projetos provenientes de outras faculdades (química, biologia, informatica, agricultura, psicologia)
- Projetos multidisciplinares
- Projetos de "suporte" (novos materiais, *software*, física)
- Projetos conjuntos (outras universidades, hospitais, companhias)

Tecnologia de saúde – áreas (Exemplo)

- Tecnologias Inovadoras
  - Novas Vacinas
  - In-Situ Biomateriais
  - Tissue Engineering
  - Terapia Genetica
  - Terapia Regenerativa

Tecnologia de saúde Características

- Novas Moléculas & Novos Usos
- Sistemas de vias de administração *(drug delivery)*
- Diagnósticos (conceitos, métodos, equipamento)
- Ferramentas de pesquisa
- Equipamentos médicos

Tecnologia de saúde – projetos/produtos

- Novas Moléculas: Novos medicamentos & Novos usos para medicamentos conhecidos
- Vias de Administração *(drug delivery):* Targeted Cancer therapy, Anestésicos, Transdermal, Intra-Ocular
- Diagnósticos Médicos: DNA, computerized
- Ferramentas de pesquisa (*Research Tools*): *Drug design, computer imaging*
- Equipamento Médico: *computer aided*, novos materiais
- Nutracêuticos: alimentos, melhor solubilidade, melhor absorção, etc

Exemplos

Novas Moléculas & Novos Usos

- ***Ladostigil, a novel cholinesterase and brain selective monoamine oxidase inhibitor for the treatment of dementia co-morbid with depression***

- Marta Weinstock-Rosin - Pharmacology Department, School of Pharmacy, HUJI
- Moussa Youdim, Rappaport Research Institute, The Technion Istitute

O Projeto: definição do problema e objetivos

- Atualmente ainda não existem terapias específicas para a prevenção do processo degenerativo nos primeiros estágios.
- O objetivo: Desenvolver um novo medicamento bi-funcional que consiga:
  1. Melhorar as funções cognitivas, com dispersão mais lenta e de duração mais prolongada do que a Rivastigmina (Exelon)
  2. Reduzir o stress oxidativo e consequentemente diminuir a neurodegeneração
- O projeto foi licenciado à TEVA e alcançou a fase II – atualmente a procura de um novo licenciado

Projeto Ladostigil (histórico)

- Iniciado na Universidade Hebraica, Fac de Farmacologia (primeiros estágios quimicos, farmacológicos)
- Parceria com cientista de outra universidade (Prof M Youdim,Technion)
- Licenciado a TEVA (Phase I, II), desenvolvimento de novas formas de solubilidade, novos processos (TEVA continua investindo em desenvolvimento paralelo)
- TEVA opta por outro produto (Risagiline- Azilect™, aprovado pelo FDA)
- Licença retorna a Yissum/Technion
- Yissum/Technion em busca de novo licenciado para o Ladostigil

Projeto Ladostigil - comercialização

- Cientista decide investir no desenvolvimento do Ladostigil
- Nova start-up com outros investidores, continua desenvolvimento
- Arrecadação de US$ 9M em 2010

GLOBES [online]
Israel's Business Arena

Alzheimer drug co Avraham Pharmaceuticals raises $9m
Investors include Prof. Marta Weinstock-Rosin of Hebrew University.
Published by Globes [online], Israel business news – www.globes-online.com - on April 14, 2010

Liposomal Bupivacaine

Yehezkel Barenholz, PhD
Professor of Medicinal Biochemistry
The Hebrew University/Hadassah Medical School

in association with

Gilbert J. Grant, MD
Associate Professor of Anesthesiology
NYU School of Medicine

O Projeto: definição do problema

- Dor Aguda: o escopo do problema
  - Milhões são afetados anualmente
  - Nos E.U.:
  - 26,264,953 procedimentos cirúrgicos em 1999
  - 3,965,000 partos em 1998
  - 37,000,000 entradas em unidades de emergência pós acidentes em 1998

Anestesia Local

- Vantagens
  - Evita efeitos colaterais dos analgésicos sistemicos
  - Seguro e simples
  - Dosagens menores
- Limitações:
  - Curta duração do efeito analgésico
  - Anestésicos locais são menores (MW ~ 300)
  - Rapidamente redistribuidos a partir do local da administração

Liposomas: O agente ideal para infiltração local

- Longa duração – uma administração é suficiente
- Baixa (zero) toxicidade

- Encapsulação de anestésico local num veículo de *slow-release*:

- Proporciona analgesia prolongada - resultado de *drug release* gradativa
- Possibilita a administração de doses maiores

Bupivacaina Liposomal
Usos Potenciais

- Dor Aguda
  - Pos-cirúrgica
  - Pos-trauma
  - Outros:

    Bursitis, herpes zoster, trigger point, sympathetic blocks
- Dor Crônica
  - Cancerosa, condições gerais de dor *não-maligna*

- Yissum (conjunt/ com NYU) licenciaram a tecnologia a uma start-up nos EU

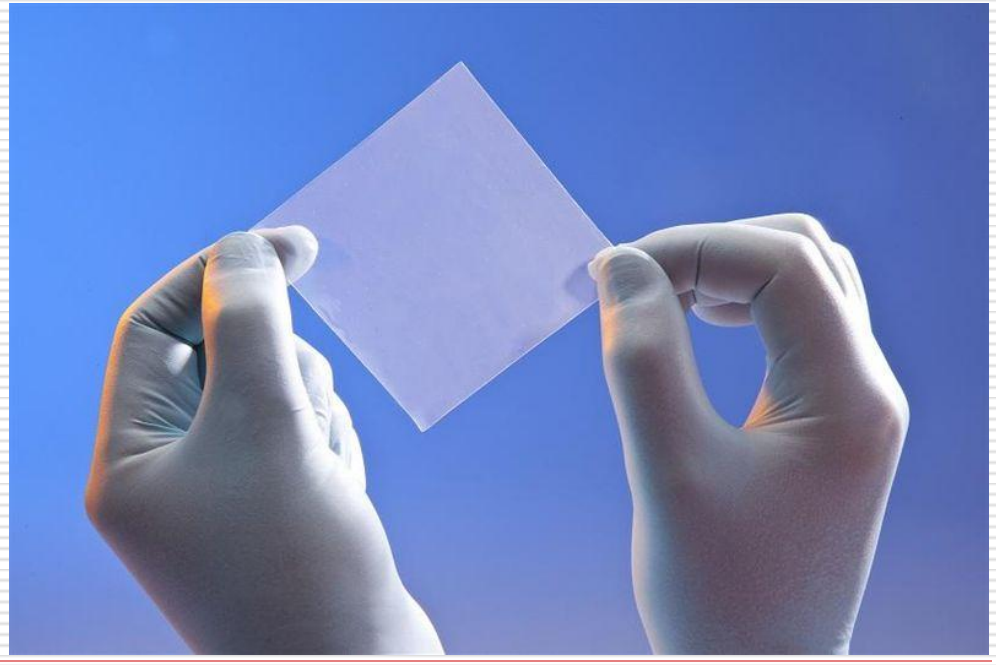
Case Study: Regenecure

REGENECURE
Regrows Naturally

http://regenecure.co.il/

A new family of regenerative, biocompatible, thin, strong, and flexible membrane implants.

These implants stimulate bone growth and guided bone regeneration — and accelerate the healing process in fracture management.



Case Study: Regenecure- O Processo

REGENECURE
Regrows Naturally

Researcher's Discovery	Funding	Results	Investor Interest	Creating a start up	License Agreement
• 4 Years of research •Collaboration with Hadassah Hospital	Yissum grants Baby Seed fund for 1 year.	Successful Animal Trials	Entrepreneur Moshe Tzabari	Yissum, Hadasit, the researchers and Investors form NewCo: Regenecure	Project licensed to Regenecure

… And now R&D and commercial work begins!

Case Study: Regenecure Status Today

REGENECURE
Regrows Naturally

- Company already selling veterinary product
- Expected CE approval by the end of 2012.
- FDA clearance for Humans expected by mid 2013
- Entering clinical trial in dental application in Dec. 2012
- By Q1 2013 clinical trial in 20 trauma patients with severe fractures.
- Entering second investment round of $3 Million.

Start up - NasVax:

(Initiated at Meytav Incubator)

- **NasVax** technology is based on a single proprietary molecule, allowing intranasal instead of intramuscular vaccination
- **NasVax** utilizes a proprietary technology originally developed at the Hebrew university by Prof. Yechezkel Barenholz and Prof. Eli Kedar, in collaboration with Bio-Lab Ltd., Israel
- First product to be developed - Intranasal flu vaccine
- Pipeline – additional intranasal vaccines

Definição do problema/vantagens
WHY MUCOSAL VACCINES?

- Most pathogenic microorganisms enter the body via the mucosal routes (nasal, oral, genital, rectal)
- Inefficiency of the available intramuscular influenza vaccine in the elderly and immunocompromised
- The mucosal immune system is less affected by aging
- Can be self-administered; no need for trained personnel; the use of syringes is avoided
- Nasal vaccination triggers both the local and systemic immune response

The Technology

- The technology is based on a formulation of the commercial vaccine with a proprietary polycationic lipid, CCS
- The new formulation enables the efficient and sustained delivery of the vaccine onto the mucosa of the nasal cavity, due to improved adhesion.

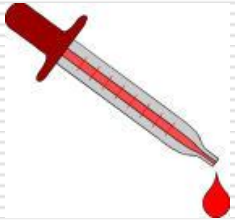
Advantages of the new intranasal vaccines

- Easy to self-administer by the "patient"; no medical staff needed, reduced costs
- Painless and needle-free, hence higher compliance of the public
- Large populations can be vaccinated within a short period of time: critical in cases of global pandemics or bioterror attack
- Expected to boost stronger immune responses at the site of pathogen entry, compared with injectable vaccines, without compromising the systemic immune responses
- Expected to cause less local and systemic adverse reactions, compared with injectable vaccines

The Product

Lyophilized polycationic lipid (D-Erythro-N-palmitoyl sphingosyl-1-0 Carbamoyl Spermine, CCS), ready for reconstitution, administrated via:

- a dropper
- a sprayer



- Production process is relatively simple
- Establishment of production facilities in Israel is feasible
- Relatively low investments are required

Current Status

- In the short time since its inception, based on the results of intensive studies conducted by the Barenholz/Kedar research teams, the Company advanced its intranasal delivery system for influenza vaccine from bench to clinical trials, in less than 18 months. Within one year of operations, the Company completed two private investment rounds; the second round was made by Pontifax venture capital fund, founded in 2004 by Eli Hurvitz, Chairman and former CEO of Teva Pharmaceutical Industries. Following a successful IPO on December 2005, it turned into a public company traded on the Tel Aviv Stock Exchange (TASE).

Current status

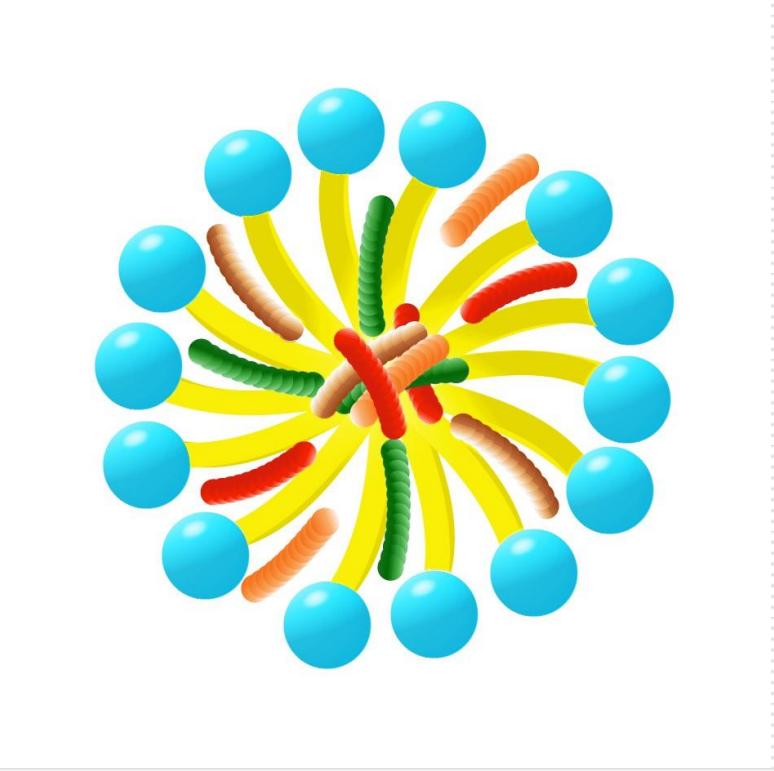
NasVax extends Novartis vaccine research collaboration

NasVax also granted Novartis an option to buy a non-exclusive license to use the VaxiSome technology for some of its own vaccines.

20 April 11 11:26, Globes' correspondent

NutraLease Ltd.

Nano Encapsulation Technologies



NutraLease

O Projeto: definição do problema

- Solubilidade de materiais em fluídos (água, óleos)

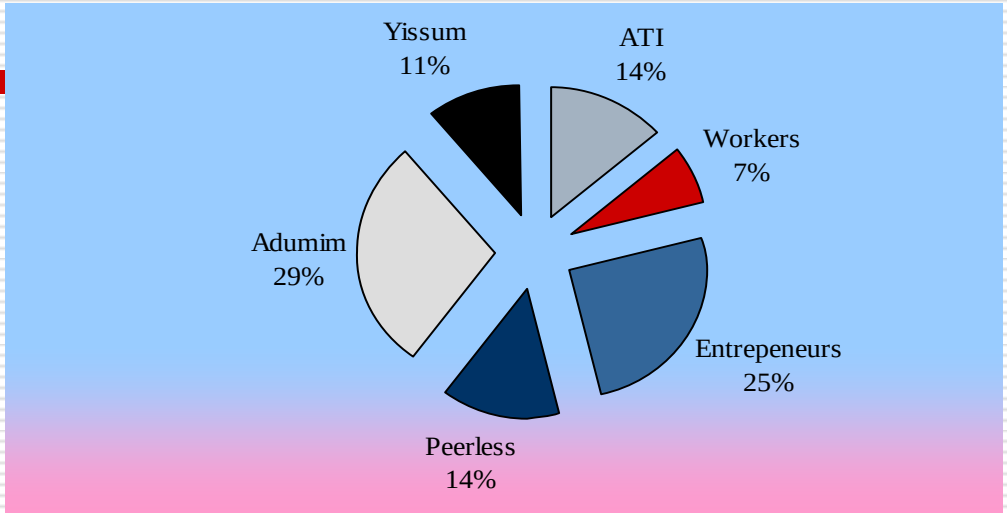
- A solução:

NSSL

(Nano Sized Self Assembled) como veículo portador

Ownership Profile

NutraLease



A joint effort of:

- **ATI** - Ashkelon Technological Industries (Incubators)
- **Yissum** - Tech Transfer Co. of the Hebrew University (HU)
- **Entrepreneurs** - Prof. N. Garti and Dr. A. Aserin of the HU

Investors:

- **Peerless** - Leading edible-oil company from Australia
- **Adumim Food Additives** - Israel

NutraLease

The Technology

NSSL (Nano Sized Self Assembled) as a vehicle for adding non soluble substances into water based or oil based products to:

- Enhances solubility/solubilization
- Improves functionality
- Enhances bio-availability.

Potential fields of application:

- **Functional Food (adding health related ingredients)**
- **Cosmetics**
- **Improved drug delivery**

NutraLease

The main focus: Nutraceuticals

"Let thy food be thy medicine"
Hippocrates (460-377 B.C.)

FOOD USA navigator.com

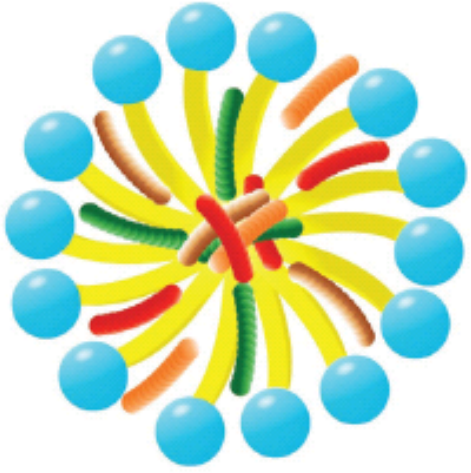
- NutraLease™ - Award winning, patent pending Nanoemulsion technology
- (NutraLease - Nano-encapsulation Technology
- Winner of Forbes Top 10 Nano Technologies for 2005

  Now you can solubilize insolubles!

BY BOB SWIENTEK

IFT HONORS
Innovations on Expo Floor

• **Adumin/P.L. Thomas** (www.plthomas.com) garnered the 2007 IFT Food Expo Innovation Award for their *NutraLease* nano-encapsulation technology, which is a patented ingredient/nutraceutical delivery system for food and beverage applications. The technology—based on nano-sized, self-assembled structured liquids—enhances the solubilization capacity of different compounds in either



Nutralease *nano-encapsulation technology*

Concluindo

- Há diversas possibilidades de comercialização de uma invenção universitária
- Dependem das características da tecnologia, do estágio de desenvolvimento da mesma, da maturidade do projeto e do proprio mercado

Concluindo II

- O segredo está na identificação correta:
  - Do potencial da invenção
  - Dos elementos chaves de cada caso
  - Das correntes atuais do mercado
  - Das possibilidades de alianças, cooperações
- E na articulação entre as partes

- Obrigada pela atenção!