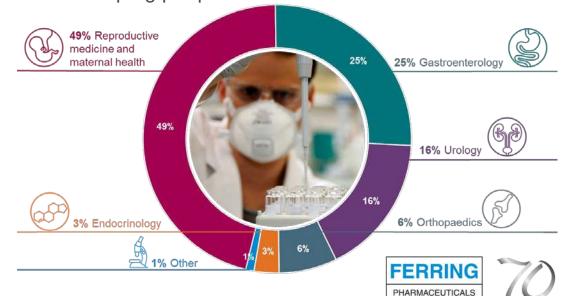


- Privately owned, research-driven specialty biopharmaceutical group headquartered in Switzerland
- Global company with over 6,000 employees in 56 countries and distribution in 110 countries
- Committed to building families worldwide and helping people live better lives
- 2019 revenue: EUR 2.0 billion*
- 2019 R&D investment: 18%
- Founded in Sweden in 1950.





Ferring Drug Modalities

Small mAbs Proteins Adenovirus / Microbiome **Peptides Molecules Human Gut** Microbiome -**Propess MRT**TM Firmagon® Dinoprostone Degarelix Mw 352 Mw 1632 Recombinant Rekovelle® adenovirus rhFSH **Pentasa** mAbs Mw ~40,000 Zomacton® Mesalazine Mw ~150,000 hGH Minirin® Mw 153 Mw x 10⁶ Mw 22,000 Desmopressin Mw 1069 Molecular Mass

Modality Neutral Drug Delivery Development



PHARMACEUTICALS

Oral dosage forms PR Hydrogel matrix Vaginal delivery system Transdermal Gel Tablets (PR, IR), Enema (suspension), Suppository Intravesicle Small Capsules (PR), Molecules Sachets – granules (PR) Oral solution etc Gene **Peptides** Delivery Parenterals - Room temp. stable solution - Powder for reconstitution Disease - PR forms in situ hydrogel Mechanism Oral dosage forms of action - Oral dispersible tablet - IR Tablet Nasal solution Micro-**Proteins** biome **Parenterals** - Solutions Enema (suspension) mAb - Powder for Reconstitution Oral dosage form Parenterals **FERRING** PR = Prolonged release 3 - Solutions

IR = Instant Release

Competence Agility and Collaborations - Therapeutic Area Focused Organization



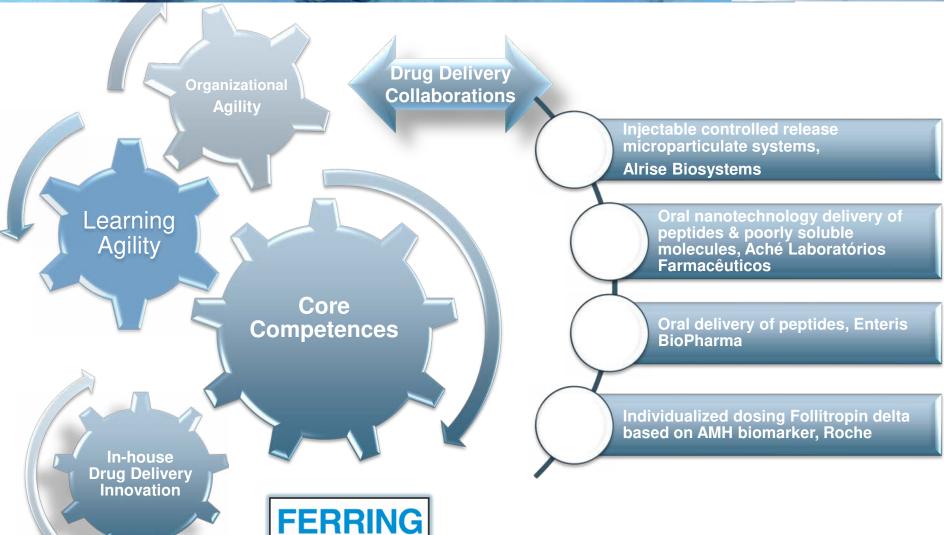




Competence Agility and Collaborations - Therapeutic Area Focused Organization

PHARMACEUTICALS







Ferring External Drug Delivery Technology Scouting Process



Scouting

Pre-Assessment

Technology Lead Evaluation

Feasibility

Recommendation for TA Approval

Technology Scouting Team Workflow

In-vitro studies Non-clinical studies

Technology Scouting/Screening Assessment

Spider Diagram summarises Technology Assessment

- Three criteria used for initial scouting:
 - Fit with strategy
 - GMP Potential
 - Scientific Rationale
- All criteria used thereafter





Modality Dependent Developability Assessment Process

Modality example: Peptides

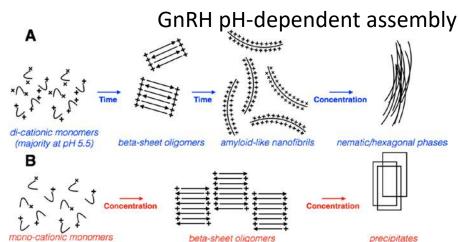
- Chemical stability?
- ❖ Solubility → Kinetic solubility ?

 aggregation propensity

- Aqueous solubility (t<2d and t>2d)
- Effect of pH
- Buffer
- Excipients

Hormone GnRH into Functional Amyloid Nanofibrils and Hexagonal Phases, Dharmadana, D et al, ACS Appl. Bio Mater. 2019, 2, 3601–3606, DOI: 10.1021/acsabm.9b00468

pH-Dependent Self-Assembly of Human Neuropeptide



Investigate aggregation propensity under stressed conditions

- Temperature
- Rotation stress
- Shaking stress
- Freeze-thaw stress

Concentration dependent

- o Ready-to-Use solution?
- Freeze dried powder for reconsitution?



7

