Perspectives on the Need for Improved (Pediatric) Formulations
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Meropenem 500 mg Vial
Dose for premature neonate:
10 mg/kg x 0.5 kg = 5 mg
Hydroxyurea 500 mg capsule
Dose for 9-month old with Sickle Cell Anemia: 20 mg/kg QD x 8 kg = 160 mg
Isotretinoin 10 mg capsule
Dose for 2-year old with neuroblastoma:
80 mg/m^2 PO BID x 0.5 m^2 = 40 mg PO BID
Pediatric formulations 2019
Some Drugs in Need of Reformulation

- Baclofen
- Hydroxyurea
- Prednisone (taste)
- 6-mercaptopurine, methotrexate
- Liquid-stable L-thyroxine
- Albendazole
- Isotretinoin
- Isoniazid
DOSAGE AND ADMINISTRATION
Patients weighing 60 kg or greater, 400 mg twice daily; less than 60 kg, 15 mg/kg/day in divided doses twice daily (maximum total daily dose 800 mg). ALBENZA tablets should be taken with food.
Current Methods of Making Pediatric Formulations

• Tablet splitting
• Tablet crushing, adding to liquids/soft foods
Tablet Splitting of a Narrow Therapeutic Index Drug: A case with levothyroxine sodium


DOI: 10.1208/s12249-010-9515-8
Ideal Oral Pediatric Dosage Form

• Tasteless/taste-masked
• With minimal excipients
• In flexible dosage increments
• Orally dissolvable, or easy to swallow or dissolve in small amount of liquid
• Heat, humidity and light stable
Improving the Palatability of Minitablets for Feline Medication

by

Jasna Hautala

ACADEMIC DISSERTATION

To be presented, with the permission of the Faculty of Pharmacy of the University of Helsinki, for public examination in Auditorium 2041 at Biocenter 2 (Vilkinkatu 5E, Helsinki) on March 31st 2017, at 12.00 noon.

Helsinki 2017
• Perform an assessment of all commercially available products to determine which have pediatric formulations.

• Determine what technologies are publicly available, how these technologies have been used, and for what types of products.

• Use prototypical drug products and computational methods to distinguish their molecular structure through characteristics such as solubility, permeability, light sensitivity, pH instability, heat instability, hygroscopic properties, and bitterness.

• Determine the best formulations technology for specific drug categories based on information from tasks 1–3.

• Produce prototype batches of selected drug products.
FDA Approves First 3D-Printed Epilepsy Drug Experts Assess the Benefits and Caveats.
Fitzgerald, Susan
DOI: 10.1097/01.NT.0000472137.66046.b5
The First FDA Approved Drug Made by a 3D printer is Levetiracetam

UPDATE: March 22, 2016

SPRITAM® (levetiracetam) tablets are now available. Read Aprecia Pharmaceuticals’ announcement.
Thermal Stabilization of Viral Vaccines in Low-Cost Sugar Films


https://www.nature.com/articles/s41598-019-44020-w
Child

- Medication refusal due to taste,
- Inability to swallow tablets/capsules
- Disease relapse
Pharmacist

• Reformulation of solid oral dosage forms into liquids/suspensions
• Problem: Lack of stability data
Pediatrician

- Constraints in prescribing due to palatability, especially antibiotics
- Home drug reformulation by parents
- Disease relapse due to poor medication adherence (prednisone, antibiotics)
Mother

• Specific prescribing requests based on palatability: antibiotics

• Home drug reformulation

• Child’s disease relapse due to poor medication adherence, need for more medical attention, missed work, school, sleep
Daughter

- Choking due to dental extractions
- Addition of medications to soft foods
- Compliance problems with liquids (taste) and solids (swallowing)
- Tablet crushing
Summary

• Technology has improved the capability to produce palatable and swallowable formulations

• Technology has not translated into much daily improvement in formulations, especially generics/off-patent drug products

• Availability of mini-tablets and oral dissolvable products, taste-masking, and new just-in-time technologies like 3D printing for small batches, would be a real improvement for children, adults, the elderly, physicians, and pets
Thank you

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