

# MALABSORPTION OF LEVOTHYROXINE IN A CHILD AFFECTED BY SHORT BOWEL SYNDROME

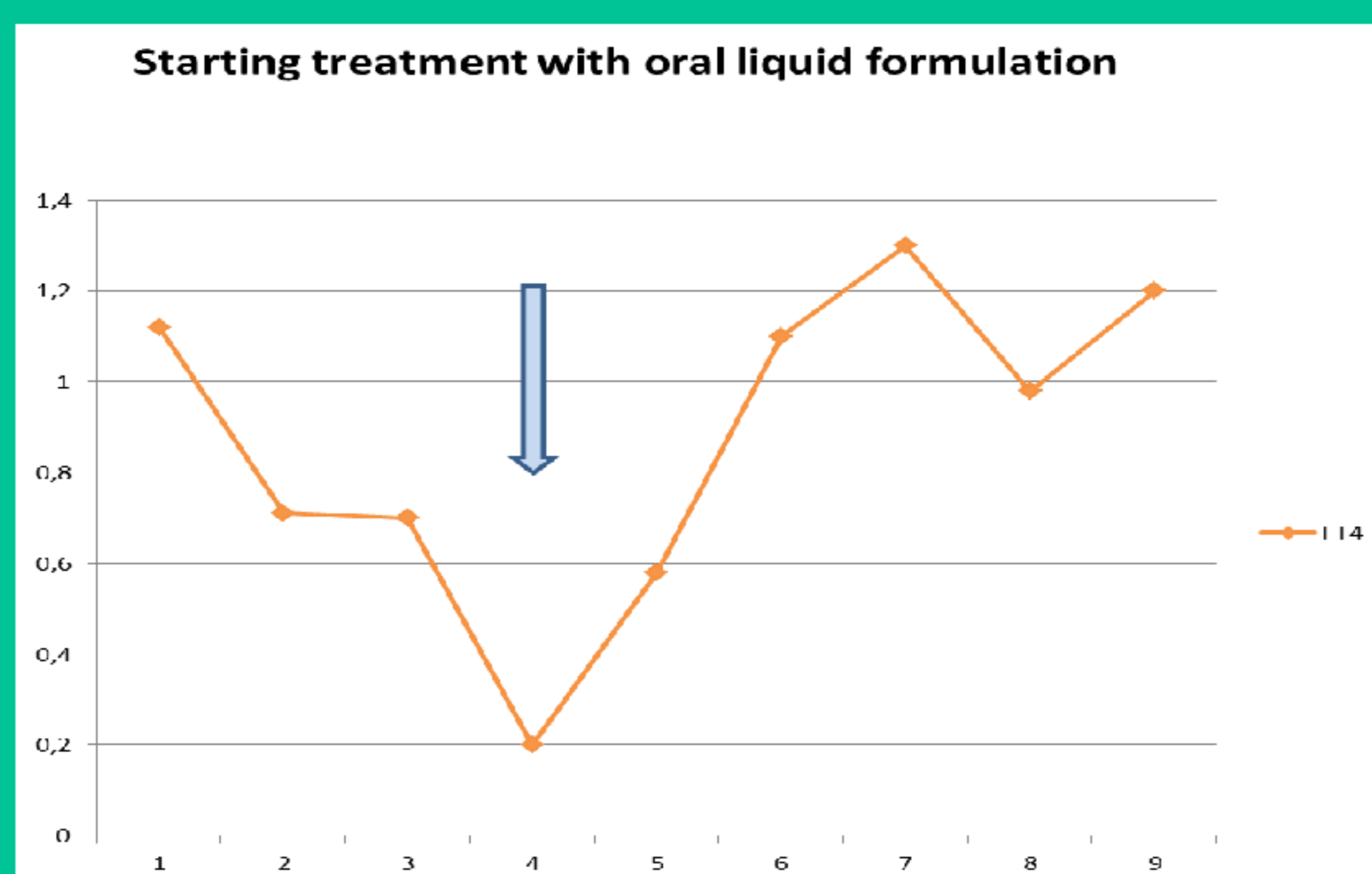
<sup>1</sup>Endocrinology and Diabetic Unit, Bambino Gesù Children's Hospital, Rome, Italy; <sup>2</sup> Hepatology, Gastroenterology and Nutrition Unit, Bambino Gesù Children's Hospital, Rome, Italy  
The authors have no financial relationships to disclose or conflicts of interest to resolve.

## Background

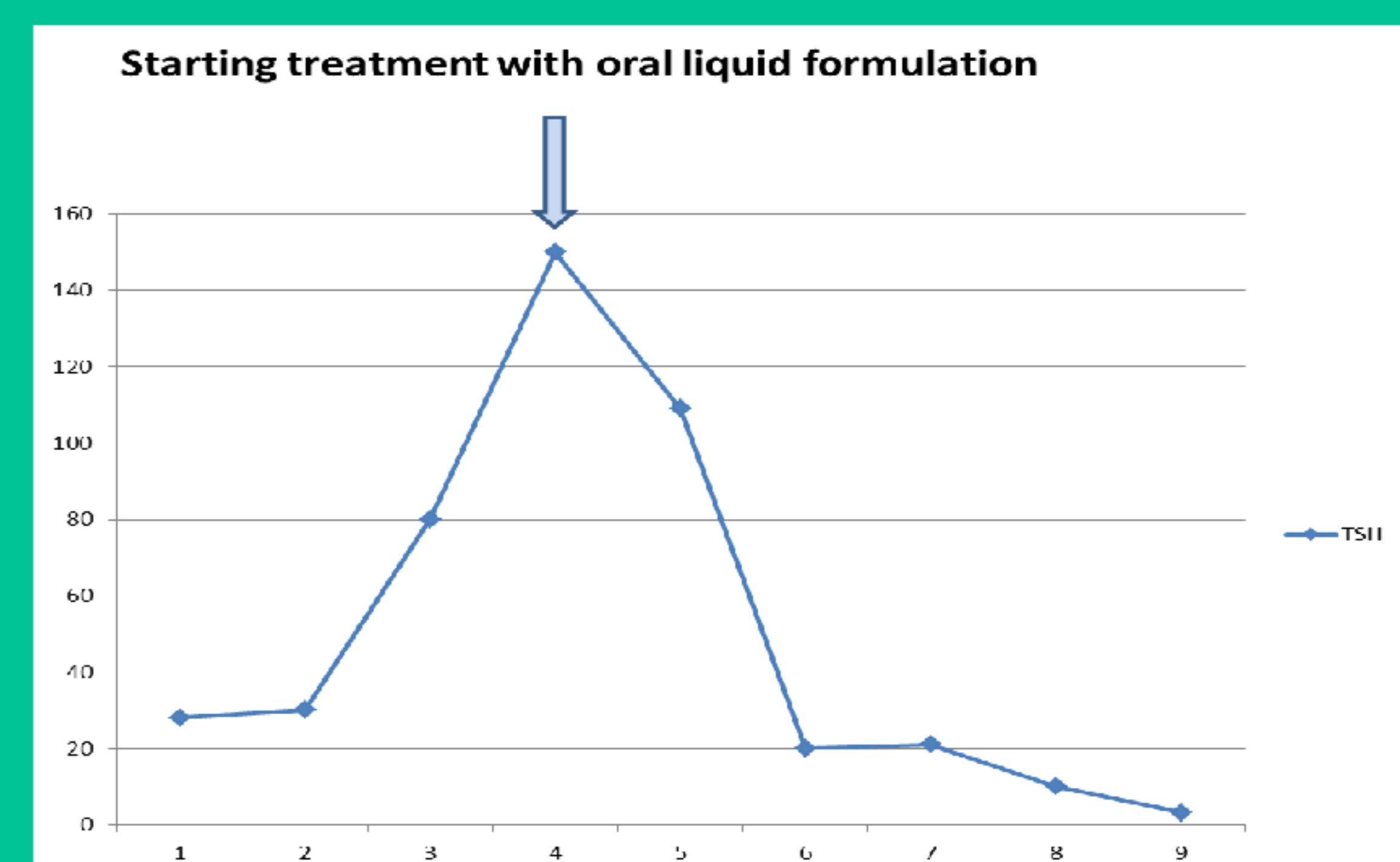
- Hypothyroidism is a common problem during childhood generally due to autoimmune thyroid disease. It can also occur in the case of severe urinary loss of serum proteins, as well as in the case presented below<sup>1</sup>.
- The most accepted practice in the treatment of hypothyroidism consists in the oral administration of levothyroxine (LT<sub>4</sub>).
- Many conditions may affect the absorption of LT<sub>4</sub>: the adherence to therapy by the patient, fasting state, intake of certain food, certain drugs and gastrointestinal diseases that impair the integrity of intestinal barrier or reduce the area of absorption (gastritis, short bowel syndrome, inflammatory bowel diseases, lactose intolerance and celiac disease)<sup>2,3</sup>.
- Approximately 70% of tablet LT<sub>4</sub> is absorbed and the intestinal absorption is maximal (T max) in the two hours after tablet's ingestion. The tablet needs a complete dissolution for the permeation of LT<sub>4</sub> in the upper intestine (duodenum and jejunum). This issue explains why patients with short bowel syndrome (due to bowel resection) require a higher dosage of LT<sub>4</sub><sup>2,3</sup>.

## Case presentation

- A six-year old child affected by congenital multiple jejunal atresias presented TSH 30 µUI/ml (0.6-6.3) and free T4 0.71 ng/dl (0.7-1.8), TGAb 34.5 U/ml (0-40) and TPOAb 20.8 U/ml (0-60).
- He was administered LT<sub>4</sub> tablet 25 µg/day (2.5 µg/kg/day); the US showed a normal gland. After one month of treatment: TSH 80 µUI/ml, free T4 0.7 ng/dl, the dosage was increased to 25 µg 5 days per week and 50 µg twice (4 µg/kg/day).
- Although the dosage was high, after one month TSH increased >150 µUI/ml and free T4 was 0,2 ng/dl. Poor compliance could be ruled out.
- A severe malabsorption of oral LT<sub>4</sub> was hypothesized.
- LT<sub>4</sub> oral solution, available in Italy, has a more rapid absorption than tablets in studies done in adult populations<sup>4</sup> and this characteristics would have been an advantage in our patient, so we decided to switch to the treatment with LT<sub>4</sub> oral solution at the same dosage.
- After 4-6 months of treatment with LT<sub>4</sub> oral solution the values of TSH and free T4 were within the normal range.



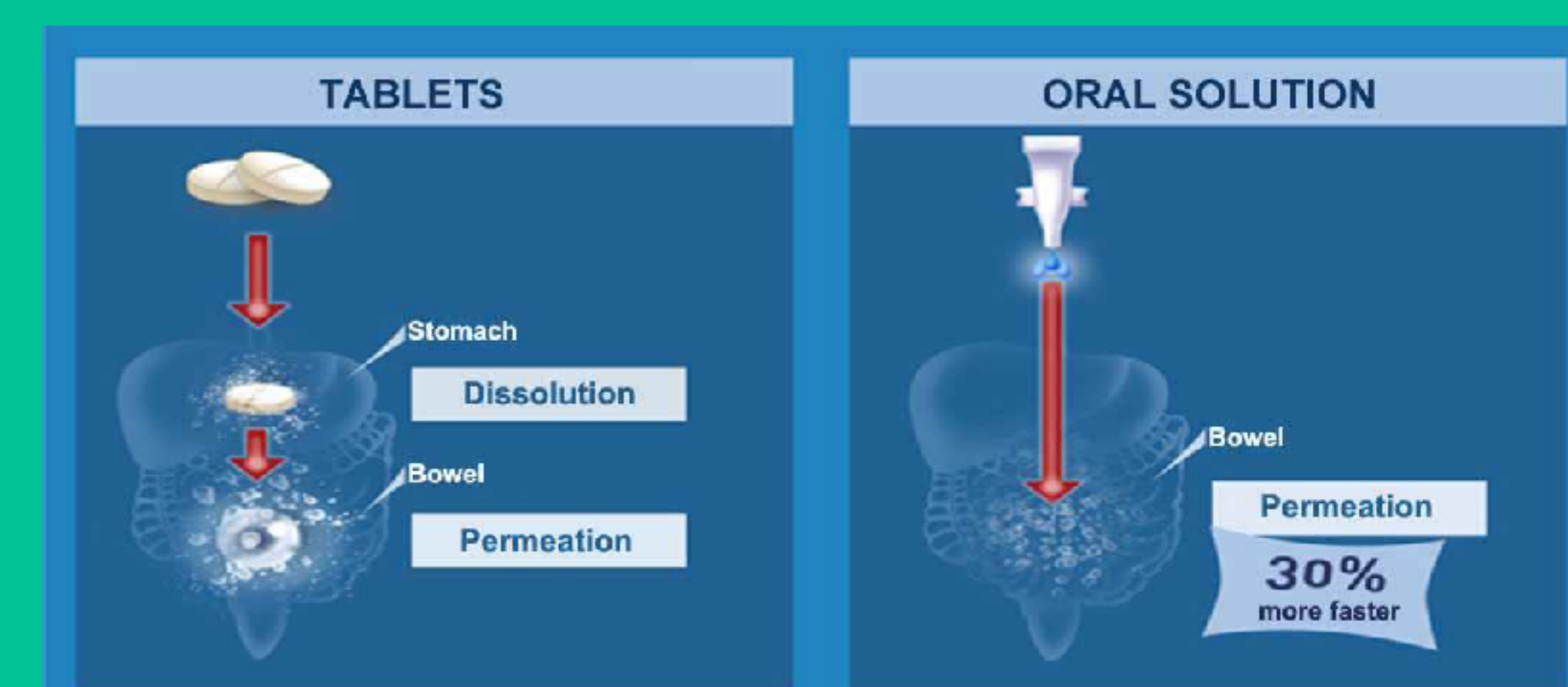
Levels of FT4 before and after the switch of treatment



Levels of TSH before and after the switch of treatment

## Conclusions

- Short bowel syndrome is the most common cause of intestinal failure in children and causes altered absorption of many drugs.
- In this case we observed how the TSH value decreased only after the switch from the LT<sub>4</sub> tablets to the LT<sub>4</sub> oral solution.
- The most important advantage of LT<sub>4</sub> oral solution consists of a faster absorption, which is very crucial in a population of patients having a limited absorption of drugs.
- We can certainly highlight the implications of the liquid formulation of LT<sub>4</sub>, a novel and useful formulation in cases where the absorption of drugs is clearly hindered.



## References

- Lorini R, Gastaldi R, Traggiai C, Perucchin PP. Hashimoto's thyroiditis. *Pediatr Endocrinol Rev* 2003 ; 2: 205-11
- Liwanpo L, Hershman JM. Conditions and drugs interfering with thyroxine absorption. *Best Pract Res Clin Endocrinol Metab* 2009; 23 : 781-92
- Ianiro G, Mangiola F, Di Rienso TA, Bibbò S, Franceschi F, Greco AV and Gasbarrini A. Levothyroxine absorption in health and disease, and new therapeutic perspectives. *Eur Rev Pharmacol Sci* 2014; 18: 451-456
- Brancato D, Scorsone A, Saura G, Ferrara L, Di Noto A, Aiello V, Fleres M, Provenzano V. Comparison of TSH levels with liquid formulation versus tablet formulations of levothyroxine in the treatment of adult hypothyroidism. *Endocrine Practice* 2013, AACE

## Further information

laura.paone@opbg.net

