

# Cystic Fibrosis Research News

**Title:**

Bile salt stimulated lipase: inhibition by phospholipids and relief by phospholipase A2

**Authors:**

Elena Venuti<sup>1</sup>, Dmitry Shishmarev<sup>2</sup>, Philip W. Kuchel<sup>2</sup>, Shoma Dutt<sup>1</sup>, Caron S. Blumenthal<sup>3</sup>, and Kevin J. Gaskin<sup>1</sup>

**Affiliations:**

<sup>1</sup> James Fairfax Institute of Paediatric Nutrition, the Children's Hospital at Westmead, NSW 2145, Australia;

<sup>2</sup> The University of Sydney, School of Life and Environmental Sciences, NSW 2006, Australia;

<sup>3</sup> Women's and Newborn Health, Westmead Hospital, NSW 2145, Australia.

**What was your research question?**

The research question was why doesn't the lipase enzyme present in breast milk called BSSL or its recombinant form made in the laboratory improve the fat digestion and absorption from the gut in infants, and older children/ young adults with cystic fibrosis?

**Why is this important?**

The study undertaken demonstrates in a test tube where we have simulated the gut environment that BSSL is inhibited by phospholipids and this inhibition is relieved by another pancreatic enzyme phospholipase A2 (PLA2). If BSSL is used to treat patients PLA2 needs to be added to the capsule.

**What did you do?**

We knew from previous work that pancreatic lipase ( the enzyme present in conventional enzyme capsules that breaks down fat which all CF patients with fat malabsorption take with their food) is inhibited by chemicals called phospholipids which come into the gut during a meal. This inhibition is relieved by another enzyme called phospholipase which is in enzyme capsules. Thus in the test tube experiments we determined whether the BSSL was inhibited by phospholipids and also if phospholipase could relieve the inhibition similar to the scenario with pancreatic lipase.



# Cystic Fibrosis Research News

## What did you find?

We found using special techniques titration and NMR spectroscopy that BSSL was inhibited by phospholipids and this inhibition was relieved by phospholipase virtually identical to the pancreatic lipase scenario.

## What does this mean and reasons for caution?

In a trial we have done previously we have shown that breast fed infants with proven fat malabsorption have a similar range of fat excretion to bottle fed infants. Breast milk has a large amount of BSSL but in an infant with pancreatic insufficiency there is no phospholipase in the gut juices and phospholipids aggregate around fat in the gut and prevent BSSL activity. Similarly when the recombinant BSSL was used in older children / young adults who have no phospholipase production from their own pancreas and none was included in the capsules given to patients, the failure of the product to work with lack of improvement in fat absorption was not unexpected.

## What's next?

If future trials are contemplated using breast milk or recombinant BSSL phospholipase should be added as without it BSSL will be inhibited and fat absorption unimproved.

## Original manuscript citation in PubMed

<https://www.ncbi.nlm.nih.gov/pubmed/?term=Bile+salt+stimulated+lipase%3A+inhibition+by+phospholipids+and+relief+by+phospholipase+A2>