



## Other uses for Symphony®

As well as supporting mothers of preterm and term infants to initiate, build and maintain milk production, the Symphony® can also be used to:

- alleviate the symptoms of breast engorgement by expressing milk
- support the healing process in cases of mastitis by removing milk from the affected breast

## Further enhancing Symphony®'s performance with PersonalFit™ PLUS pump sets

Medela is always striving to find new ways to set standards in breast pump performance. As the interface between the mother and Symphony®, the pump set – and especially the breast shield – has been a particular area of interest.

Medela had previously established correct breast shield fit was essential. However, the relationship between the breast shield flange (which had a standard angle of 90°) and superficial breast anatomy had not been widely explored. Identifying an opportunity to innovate, Medela embarked upon groundbreaking research, using its unique bank of 3D lactating breast scans to simulate and access the fit of breast shields with different flange angles.<sup>37,38</sup>

The researchers found that a 105° flange angle better matched the contours of the scanned breasts. In addition, the nipple was placed further into the breast shield tunnel and point contact was reduced at the rim: suggesting more comfort for mothers, and possibly improved milk flow.

As well as redesigning the breast shield, Medela refined the pump set so it now consists of just a few parts.

PersonalFit™ PLUS key features:

- 105° breast shield flange oval opening
- connector that closes in one click
- overflow protection at connector
- easy-to-handle membrane
- range of tunnel sizes for optimal nipple fit

The new pump set was then tested in three clinical trials. They showed using PersonalFit™ PLUS for Symphony® results in:

### More milk

Forty-nine mothers in established lactation took part in a randomised controlled trial (RCT) to assess the volume of milk expressed and breast drainage of the PersonalFit™ PLUS compared to the standard design. They performed a total of 196 breast expressions with the two pump sets. The study also assessed comfort, through a questionnaire.

The RCT found that PersonalFit™ PLUS obtained 11% more milk after 15 minutes compared to the standard design.

It also showed a 4% improvement in breast drainage – significant, as draining the breast well is a key principle of maintaining milk production.<sup>39</sup>

### More comfort

Twenty-two pump-dependant mothers rated their experiences of using PersonalFit™ PLUS at home for seven days, and after seven days of using the standard pump set. They reported significant improvements in comfort and fit, with 100% citing that they experienced minimal or no skin pressure marks when using PersonalFit™ PLUS.<sup>40</sup>

The same cohort also rated it as offering significantly better nipple suction and movement, and reported milk expression felt more natural when compared to the standard pump set.<sup>39</sup>

PersonalFit™ PLUS pump sets also have integrated overflow protection (also referred to as a closed system) in the connector. This means the mother can sit back in a relaxed position while pumping, without fear of her milk overflowing into the breast pump tubing or motor.

### More efficiency

Twenty-five healthcare professionals observed mothers using the new pump set in hospital for five days. They recorded significant improvements in both the cleaning and overall usability and handling of PersonalFit™ PLUS when compared to the standard design.<sup>41</sup>

### More flexibility

Mothers also reported that the breast shield's new rotatable oval shape gave them the flexibility to place it vertically (32% of mothers), horizontally (59%), and obliquely (9%) on the breast, depending on how they felt.<sup>40</sup> Good seal and fit was maintained in all these positions.

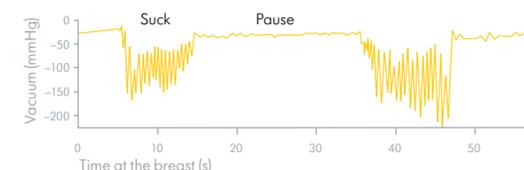
All these features and benefits combined mean that, together, Symphony® and PersonalFit™ PLUS create the complete system for initiating, building and maintaining breast milk supply.

**medela**   
mother's milk,  
everyday amazing™

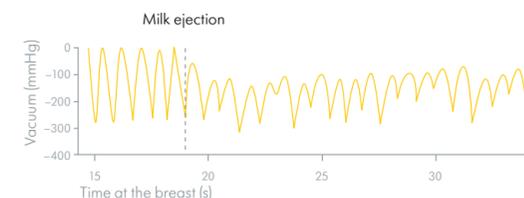
# Demonstrating the clear advantage of using Symphony® to initiate, build and maintain lactation

As a leading breastfeeding partner in hospitals, Medela and its innovative products have focused on mother and infant wellbeing for more than 50 years. When breastfeeding is impaired or not possible, using the Symphony® breast pump with the PersonalFit™ PLUS pump set helps mothers to give their infants the benefits of an exclusive human milk diet.

The Symphony® is unique among breast pumps because its programs are based on Medela's extensive research into breast anatomy and the science of breast milk removal. It is clinically proven to help initiate, build and maintain milk supply – by mirroring infant sucking behaviour at different stages of lactation, as outlined over the next few pages.



Example of an infant's non-nutritive sucking pattern. The trace exhibits short bursts of sucking, and longer periods of pausing typical of infant sucking behaviour before milk has come in.



The sucking pattern of an infant during established lactation. A faster pattern is applied to stimulate milk ejection. After this a slower pattern removes milk.

### Mimicking infant sucking behaviour

The two graphs on the left show how infants apply vacuum at the breast.

Symphony® has unique programs which mirror both these infant sucking behaviours, so that the right pattern can be applied at the right time.

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Discover what PersonalFit™ PLUS can do for your next generation. Go to [medela.com/pfp](http://medela.com/pfp) or contact your Medela representative

**PersonalFit™ PLUS pump sets for Symphony®**

More milk. More comfort. More efficiency.



## The four stages of lactation

All mothers experience the same continuum of physiological processes to reach an adequate milk production,<sup>1,2</sup> whether delivering at term or prematurely.<sup>3</sup> The first stage usually occurs during pregnancy. Once the infant is born, Symphony® can help during the next three stages as follows.

### 1 Develop

From as early as the first month of pregnancy, mammary gland structure starts to differentiate in preparation for lactation, with a complex system of branching milk ducts and milk-producing cells called lactocytes developing within it.<sup>4</sup>

The progression of ‘secretory differentiation’ (lactogenesis I) varies between individuals,<sup>5</sup>

but on average lactocytes are able to synthesise milk by week 22.<sup>4</sup> However, hormones – particularly progesterone – prevent large amounts of milk being produced during pregnancy.

### 2 Initiate

The Initiate stage begins after the birth of the infant. Delivery of the placenta causes a decline in progesterone, so the lactocytes can activate and start producing milk. Additionally, the stimulatory trigger of the infant sucking at the breast supports this activation.

Ideally, this stimulation should happen as soon as possible after birth, with the infant continuing to feed every two to three hours thereafter over the first few days.<sup>6</sup> Secretory activation (lactogenesis II or milk coming in) then usually occurs around two to four days postpartum,<sup>7,8</sup> although the timing varies between mothers. If it occurs after 72 hours, it is defined as delayed secretory activation (see box right).

Prior to secretory activation, there is little milk for the infant to remove:<sup>8</sup> healthy term infants transfer on average 56 ml (1.89 fl oz) of colostrum in the first 24 hours, increasing to 185 ml (6.2 fl oz) and 393 ml (13.2 fl oz) on days two and three respectively, however, these numbers vary significantly between infants.<sup>1</sup> While these volumes are small, this early milk contains a potent array of growth factors and proteins, similar to those found in amniotic fluid. Therefore, it aids infant transition from intrauterine to extrauterine nutrition.

During the first few days infants use an irregular suction pattern. A large proportion of the infant’s time at the breast consists of non-nutritive sucking (no milk transfer), with short bursts of nutritive sucking (milk transfer) and periods of irregular pausing.<sup>9–12</sup>

When it is not possible for the infant to stimulate the breast like this – due to

prematurity, illness or maternal separation, for example – the mother will require assistance to initiate lactation.

#### How Symphony® supports mothers during the Initiate stage

The Symphony® breast pump has a unique INITIATE program, developed through a research partnership with Professor Paula Meier and the Rush University Medical Center, Chicago, US.<sup>13</sup> INITIATE stimulates the breast in a similar way to a healthy term infant in the first few days. It does this by mimicking the same irregular sucking and pausing patterns as described.

INITIATE key features:

- fixed 15-minute pumping session
- irregular stimulation and expression patterns
- variation of pattern frequencies
- incorporation of pauses

For optimal results, the program should be used every two to three hours until the mother expresses 20 ml (0.67 fl oz) or more in three consecutive pumping sessions. This indicates milk has come in. To account for potential delayed secretory activation, this pattern can be used for the first five days if necessary. However, as INITIATE is not designed to extract milk, it should not be used past day five. The mother can then progress to the Symphony® MAINTAIN program, designed to be used after secretory activation.

### 3 Build

The mother’s milk production starts to rise rapidly after secretory activation. A healthy term infant’s milk intake can increase to over 500 ml (16.9 fl oz) at the end of the first week.<sup>1</sup>

Infant breastfeeding behaviour develops according to these changes.<sup>2,14</sup> The infant begins to spend a larger proportion of time removing milk, using a biphasic sucking pattern. At the start of a feed, the infant sucks quickly to stimulate milk ejection, then switches to a slower pattern to remove milk.

This stage lasts for the first month of breastfeeding as the mother’s physiology balances supply and demand. If breastfeeding is impaired or not possible, frequent and effective pumping is essential during this period, for two reasons:

1. to help maximise milk output, allowing the infant to benefit from an exclusive human milk diet
2. to help the mother achieve an adequate milk supply for the future

#### How Symphony® supports mothers during the Build stage

Once milk has come in, mothers use the Symphony® MAINTAIN program. Its research-based 2-Phase Expression® technology is designed to mimic the two phases of infant sucking.

MAINTAIN key features:<sup>15,16</sup>

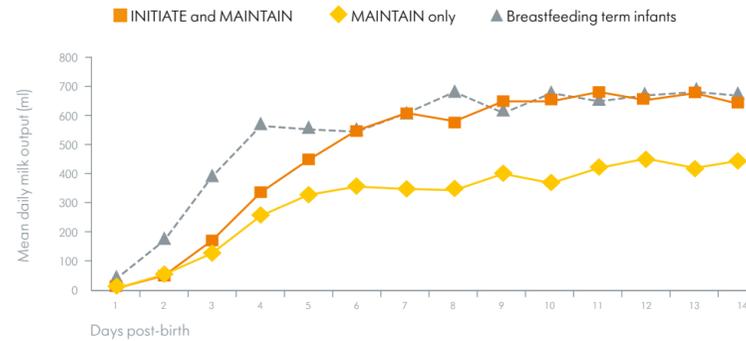
- higher-frequency stimulation phase: 120 cycles per minute to elicit milk ejection
- expression phase: around 60 cycles per minute to remove the milk

As outlined before, at this stage pumping is not only about obtaining milk – it is about building supply for the future. This is particularly important for mothers of preterm infants, whose daily milk intake will be less than a term infant at first, but who will eventually require a ‘full-term’ milk supply.

Therefore, mothers should be encouraged to build milk volumes equivalent to a term infant’s intake. Not achieving milk volumes of 500 ml (16.9 fl oz)<sup>13</sup> and above within the first two to four weeks can make future exclusive breastfeeding – or exclusive pumping – a difficult goal.

Professor Meier and her team conducted a blinded, randomised controlled trial (RCT) of 105 mothers with preterm infants. They found that using INITIATE followed by MAINTAIN demonstrated significantly greater daily and cumulative milk output, and greater milk output per minute spent pumping, from day four postpartum.<sup>13</sup>

The same RCT found that mothers using INITIATE followed by MAINTAIN made 50% more milk available within the first 14 days (see graph below), with mothers more likely to achieve a supply greater than 500 ml (16.9 fl oz) per day by the end of this period.<sup>13</sup> Similar results have been demonstrated for pump-dependent mothers of term infants.<sup>17,18</sup>



Randomised controlled trial demonstrating mean daily milk output was significantly higher ( $p < 0.05$ ) from days 6–13 when using the INITIATE program followed by the MAINTAIN program, compared to the MAINTAIN program alone.<sup>13</sup> This higher output is comparable to reference data of term breastfeeding infants.<sup>1</sup>

### 4 Maintain

By one month postpartum, the mother’s milk production stabilises at around 800 ml (27 fl oz) per day and remains relatively constant between one and six months.<sup>2</sup> The production of breast milk is now governed by supply and demand.

In order to maintain their mother’s lactation, infants remove an average of 67% of the available milk from the breast during feeds.<sup>19</sup> If a mother is unable to breastfeed exclusively, she will need to remove a similar amount of milk when pumping.

#### How Symphony® supports mothers during the Maintain stage

Medela research showed that when mothers pump with the Symphony® at their maximum comfort vacuum, they can remove 65.5% of the available milk in the breast,<sup>20</sup> close to the 67% an infant would remove.<sup>19</sup>

To achieve optimal results when using MAINTAIN, mothers should switch from the stimulation phase to the expression phase as soon as the milk flows, then

adjust the vacuum to the highest level that still feels comfortable.

The Symphony® is a double breast pump. Other Medela-backed research of mothers in established lactation found that double pumping using MAINTAIN obtained 18% more milk on average than pumping sequentially over the same period.<sup>21</sup> The milk expressed also had a higher energy content than the milk obtained by sequential pumping.<sup>21</sup>

Comfort is especially important for pump-dependent mothers, particularly because pain and discomfort can inhibit milk ejection and reduce milk removal.<sup>22</sup> The Symphony®’s range of vacuum settings makes it easy for mothers to find their maximum comfort vacuum, and, in tests, mothers considered its 2-Phase Expression® technology more comfortable than a single-phase breast pump.<sup>15,16</sup>

## Delayed secretory activation

There are many factors in the early postpartum period that can result in delayed secretory activation.<sup>23</sup>

#### Maternal factors:

- primiparity<sup>24</sup>
- caesarean section<sup>25</sup>
- preterm delivery<sup>7</sup>
- negative labour experience, anxiety or stress<sup>26</sup>
- high body mass index<sup>27</sup>
- illness (such as gestational diabetes)<sup>28</sup>
- lack of social support<sup>23</sup>
- reduced breastfeeding frequency<sup>29</sup>
- use of supplements, such as glucose water or formula<sup>23</sup>

#### Infant factors:

- low birth weight and early gestational age<sup>29</sup>
- labour medications<sup>30</sup>
- poor sucking skills and diminished alertness<sup>23</sup>

To help minimise these factors’ impact, close observation of the mother-infant pair is required. In addition to double pumping with the Symphony® as described, the following interventions can support the mother’s ability to produce adequate volumes of milk:

#### Encouraging skin-to-skin between the mother-infant pair.<sup>31</sup>

**Feeding or pumping** in the first hour after birth. It has been shown that pumping in the first hour removes more milk than pumping within the first six hours, and will increase milk production in the following weeks.<sup>32</sup>

**Feeding or expressing frequently**, ideally more than six times a day. It has been shown that pump-dependent mothers who express this often have greater milk production than those who pump less frequently.<sup>33</sup>

**Using container sizes** that reflect the volumes the mother will be expressing, to help manage her expectations.

**Expressing close to the infant** or directly after/during skin-to-skin. This has also been shown to increase milk yield.<sup>34</sup>

**Showing mothers** how to use their hands for breast massage, in combination with pumping.<sup>35,36</sup>