Nutrition and development update

The added extra of breast milk

Lesser sins?

Attachment and overweight

Targeted help for allergies

World of nutrition

Interview with Prof. Michael Aboj-Dakn
Dear Readers

As a midwife, paediatric nurse or medical assistant, you have a very special responsibility for your patients. You’re an important point of contact and you provide lots of help to mothers and children when it comes to health issues, nutrition and development problems. You’re a trusted healthcare professional whose advice is appreciated and generally followed.

It has long been known that there’s a link between nutrition, development and infant health. Early childhood clearly sets the parameters for health well into adulthood.

The Nestlé Nutrition Institute (NNI) offers you the latest research and scientific findings from across the world through its neutral portal www.nestlenutrition-institute.org There you can find an overview of the latest literature and information about important events, as well as the chance to follow live webinar presentations by renowned specialists, available in both English and German. You’ll also find excerpts from NNI conferences, already attended by more than 2,000 midwives and paediatric nurses. Register now for free and get involved!

I hope you enjoy the articles in this issue and I wish you every success in your vital career.

Ur. med. Mike Poßner
Medical Director Europe Nestlé Nutrition Institute

Would you like further information on the topics discussed? If you visit the NNI website, you’ll find full details of the sources used for the articles in this issue.

Germans die earlier than people in other EU countries – this finding from a current study hit the headlines at the end of last year. The reasons for this, according to the researchers in this global study, are not least of all due to nutrition!

Early life determines our later health!

People who live in Germany have a lower life expectancy than people in many other Western European countries, including France, Austria and Switzerland. People in Western Europe also live longer on average (women + 1.2/men +1.3 years) than people in Germany.

The unhealthy lifestyles of many people could be behind this lower life expectancy. Apart from stress, hectic lifestyles, smoking and alcohol consumption, the wrong kind of nutrition obviously plays a large part. This is the conclusion of the large Global Burden of Disease study with data from 195 countries, which has now been published in The Lancet. The figures may shed light on how important nutrition is at each stage of life.

A good start

The first 1,000 days are critical, from conception to the end of the second year of life. In fact – and this has also been proven by numerous scientific studies – nutrition during pregnancy determines the subsequent health of the offspring. And there are already sound recommendations that future mothers should adopt a sensible lifestyle and nutrition even before conception.

With good reason, too, as the results from the Baby Care programme for a healthy pregnancy reveal:

In Germany today, 25.4 percent of all pregnant women are overweight at their first medical examination, while 14.8 percent are obese.

Underestimating the load: overweight

Being overweight not only puts a strain on the pregnant woman, it also has a negative impact on the unborn child. This is because it adversely affects the control systems for food intake and this in turn can lead to obesity, diabetes and cardio-vascular problems for the child in later life. An international study now confirms that overweight also affects the genome. Lifestyle and nutrition are likely to directly influence the epigenome (epi is Greek for “on”, “at”, “near”). In the world’s largest study of the impact of overweight on the epigenome, an international research team examined blood samples from over 10,000 women and men from Europe.

Wahl, S et al., Nature 2016
The aim of the current Gels study (healthy living in pregnancy) was to avoid excessive weight gain during pregnancy and to promote the long-term health of mother and child. 2,286 pregnant women in Bavaria received advice on a healthy lifestyle as part of regular prenatal care. One group also received three consultations on the importance of healthy eating and exercise and on how to achieve healthy weight gain during pregnancy. Although the results presented in 2018 showed no significant change in the proportion of excessive weight gain, the recommended values were frequently exceeded by the overweight and obese women in particular. Many of the pregnant women still wanted comprehensive lifestyle guidance in addition to routine care.

Rauh et al., BMC Pregnancy and Childbirth 2014

A balanced and healthy diet is very important during pregnancy. Midwives and doctors have known this for a long time and strongly recommend it. Nowadays a food combination containing a lot of fruit, vegetables, olive oil and nuts is promoted. A study in Spain with 2,700 participants has now confirmed that this combination during pregnancy is also helpful for the health of the newborn: The risk of excessive weight gain up to the age of 4 years was one third lower.

Fernández-Barrés S et al., Journal of Pediatrics. 2018

Healthy eating – for two!

Advice needed and wanted

The aim of the current Gels study (healthy living in pregnancy) was to avoid excessive weight gain during pregnancy and to promote the long-term health of mother and child. 2,286 pregnant women in Bavaria received advice on a healthy lifestyle as part of regular prenatal care. One group also received three consultations on the importance of healthy eating and exercise and on how to achieve healthy weight gain during pregnancy. Although the results presented in 2018 showed no significant change in the proportion of excessive weight gain, the recommended values were frequently exceeded by the overweight and obese women in particular.

Many of the pregnant women still wanted comprehensive lifestyle guidance in addition to routine care.

Rauh et al., BMC Pregnancy and Childbirth 2014
Numerous studies have shown the importance of love and security in infancy and toddlerhood. These studies prove the positive effects on numerous biochemical growth and development processes in the child’s body. It is what the neurologist Dr. Volker Busch refers to as the „foundation of mental health“. Conversely, the lack of attachment and touch can lead to disturbed emotional development with long-term consequences. The effect of „practising“ feelings on a regular basis in early childhood and being responsive to the child are particularly important as the first emotional imprint on the brain. No other phase of life offers the same possibility for the development of basic trust and security.

Busch V: Presentation – BFG

Attachment, security and safety in the first months of life have a proven effect on child development.

They even have a clear and positive effect on the risk of later overweight, as an American study has recently shown: Half of 280 mother-child couples received regular visits and advice from paediatric nurses during the first year of life. The objective was for the mothers to be able to better „read“ the needs of their child. Data after 3 years showed that only 11.2 percent of these children were overweight. In the other group, the figure was 19.8 percent. It was a similar situation for obesity at 2.6 and 7.8 percent.

At the same time, the study showed that support and advice is increasingly needed so young parents can respond attentively to their child’s need for attachment.

Paul IM et al.: JAMA. 2018
Breast milk and human milk oligosaccharides

The perfect infant “medicine cabinet”

A key role in the healthy development of the baby is ostensibly the child’s intestinal microbiome – previously known as intestinal flora. Breastfed children show an intestinal microbiome composition that seems to be behind greater infection protection, healthy growth and a lower risk of obesity. This once again confirms the importance of optimal early childhood nutrition.

Unique in breast milk: HMO

Breast milk contains a large quantity of special carbohydrates with a protective effect known as the human milk oligosaccharides (HMO). These special carbohydrates are found only in breast milk and are its third largest component after lactose and milk fats. Therefore there are greater quantities of HMO than that of protein, for example. And with good reason too, because they perform important functions!

Current studies indicate correlations between the intestinal microbiome and nutrition during pregnancy, delivery method and breastfeeding. What is particularly significant is that the health-enhancing composition of the intestinal microbiome forms immediately after birth and supports healthy development. This clearly has long-term effects over a lifetime.

The health-enhancing effect of human milk oligosaccharides has been known about for a long time and new details about their composition and special functions are being constantly researched. For example, they promote the important bifidobacteria in the intestine and remove pathogenic germs from the body. Their effect therefore goes far beyond the effect of known pre- and probiotics such as GOS/FOS.

The quantitatively most important HMO is 2'-fucosyllactose (2'-FL) with a 30 percent share. If breast milk contains a high proportion of 2'-FL, it promotes the development of a bifidogenic microbiome. The risk of infectious diarrhoea is also lower.

The next great step: HMO for non-breastfed babies

It’s now possible, thanks to the latest research, to enhance infant formula with HMO, the carbohydrates found in breast milk that are responsible for a wide range of protective effects. Randomised studies with a first such infant formula have shown very positive results. They confirmed not only a good tolerance and comparable growth (weight, height, head circumference) like the breastfed children. In comparison with the children who received infant formula with prebiotics, the children in the HMO group had less parent-reported instances of bronchitis and fewer respiratory infections. The use of antibiotics and antipyretic medications was also significantly lower.


Parent-reported, medically verified illnesses

<table>
<thead>
<tr>
<th>Illness</th>
<th>Infant formula with 2'-FL und LNnT HMO</th>
<th>Infant formula without HMO</th>
<th>P</th>
<th>OR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections of the lower respiratory tract (0–12 months)</td>
<td>19.3</td>
<td>34.5</td>
<td>p &lt; 0.05</td>
<td>-55% OR*</td>
</tr>
<tr>
<td>Bronchitis (0–12 months)</td>
<td>10.2</td>
<td>27.8</td>
<td>p ≤ 0.01</td>
<td>-70% OR*</td>
</tr>
<tr>
<td>Antibiotic use (0–12 months)</td>
<td>42.0</td>
<td>60.9</td>
<td>p &lt; 0.05</td>
<td>-53% OR*</td>
</tr>
<tr>
<td>Use of anti-pyretic medications (0–4 months)</td>
<td>31.8</td>
<td>40.2</td>
<td>p &lt; 0.05</td>
<td>-56% OR*</td>
</tr>
</tbody>
</table>
**C-section and nutrition**

**Few reasons justify C-section**

The number of C-sections has increased massively in the last 15 years.

In Germany, almost a third of all births were C-sections. This is significantly above the global average of 21 percent, where there are big regional differences, as an article series in The Lancet reveals.

"In cases where there are complications, C-sections save lives and we must improve access in poorer regions," explains the Belgian gynaecologist Marleen Temmerman. “But we shouldn’t overuse them.” In Germany, medical reasons for a C-section include: advanced age of the woman at the birth, as well as greater occurrence of overweight, hypertension and diabetes.

Temmerman M, Lancet 2018

**Delayed intestinal colonisation after C-section**

Infant intestinal microbiome develops in the first weeks of life dynamically and changes in the process. In the case of C-sections, this colonisation with important bacterial strains, such as bifidobacteria, is significantly delayed compared to children born vaginally.

Because of these differences, it was assumed that the vaginal microbiome is the source of infant intestinal colonisation. But recent studies have shown that this is only a small part and that the maternal intestine is the most significant element. However, two studies from Sweden and the USA show that a C-section greatly disrupts this transfer. Since a C-section is always performed with antibiotics, this can be partly responsible for this difference.

Sakwinska O, NNI European Meeting 2018 – available as a webinar at www.nestle-nutrition.org

**Breastfeeding advice – particularly important for C-section mothers**

In Canada, the number of C-sections is 27 percent.

A study with more than 3,000 births investigated the relationship between delivery method – vaginal, planned and emergency C-section – and breastfeeding behaviour. It revealed that following a planned C-section more mothers had no intention of breastfeeding or refrained from attempting breastfeeding (7.4 % and 4.3 %) compared to mothers following a vaginal birth (3.4 % and 1.8 %) or an emergency C-section (2.7 % and 2.5 %). They also more frequently stopped breastfeeding prematurely before the 12th week. The authors recommend targeted advice for this group.

Hobbs AJ et al., BMC Pregnancy Childbirth 2016
“You don’t have to eat for two, but you do have to think for two.”

An interview with Prof. Michael Abou-Dakn, Director of the Gynaecology and Obstetrics Clinic at the St. Joseph hospital in Berlin

Prof. Abou-Dakn, it’s becoming increasingly clear how important proper nutrition for pregnant women is for the long-term health of the child. Can you make any recommendations?

There are shelves full of advice books and other recommendations on this topic from specialist organisations. But a balanced diet is important, ultimately the well-known food pyramid also applies in this period. In a vegetarian or vegan diet, however, you need to know what the nutrient substitution is like when certain substances are absent. You don’t have to eat for two, but you do have to think for two — so make sure you have a sensible diet for both of you.

A small tipple or passive smoking (if the partner smokes) have long been considered “lesser sins”. But the negative impact on the long-term health of the child of even the tiniest amounts is now apparent.

Toxins of any kind must, of course, be avoided, even in small quantities. We therefore strongly recommend that female smokers quit smoking during pregnancy and do so radically. This also includes their partners. It has been shown that men in particular are more health-conscious at this time and quite willing to think about smoking. Of course, it’s best if both quit. There’s no exception to abstaining from alcohol, particularly in the first few months, because we don’t know precisely in which areas the damage occurs. So the simplest thing to do is refrain from alcohol completely during pregnancy.

The delivery method also influences how the child’s intestinal microbiome develops?

The intestinal microbiome is playing an increasingly important role in medicine as a whole.

I personally believe that administering antibiotics before a C-section, for example, influences infant intestinal colonisation. Positive active agents are suppressed and pathogens take root. There are large studies that show that after a planned C-section and because of the microbiome changes this causes, among other things, children then have a factor that contributes to the development in childhood of non-infectious diseases like diabetes. This is probably due to the lack of natural colonisation that takes place under natural childbirth.

"The microbiome is playing an increasingly important role in medicine as a whole."

We know from breastfeeding that the intestinal microbiome of the mother is also found in the intestinal microbiome of the infant. So we need to pay very close attention to what we give the mother — not only during C-sections, but also during pregnancy and lactation. Further research is needed here.

Are human milk oligosaccharides, or HMO, likely to play an important part in the healthy effect of breast milk?

They’re the second major topic being discussed in the breastfeeding scene. The highly individual pattern of up to 200 different HMO is one of the miracle cures in breast milk. Many infectious diseases in childhood can be prevented by breastfeeding.

It has recently become possible to enrich infant formula with HMO. Is this an opportunity for mothers who can’t breastfeed?

It’s certainly a step forward that we now have an infant formula that contains at least two of these very special oligosaccharides. One must certainly look at the long-term effects of this enrichment on the health development of the child. Do individual HMO work for themselves or does a specific combination of substances matter? We don’t have any investigations into this at present. Initial studies are quite encouraging, but they were mainly aimed at nutrition. I’m keen to see what further studies on this enrichment will yield.

You’re known for being a strong advocate of breastfeeding and also for running the largest maternity clinic in Germany. In your experience, are there any reasons why a mother should not breastfeed?

There are reasons in Germany to discourage mothers from breastfeeding, but they’re extremely rare. In this country, women are still advised not to breastfeeding if they’re HIV-positive, but the WHO sees it differently today. Very rarely medication is also a reason.

The main reason not to breastfeed or to stop breastfeeding prematurely, however, is the mother’s wish, which we also have to accept. The problem we have in Germany is not how many women breastfeed after the birth — we have fantastic numbers — but what happens in the first few weeks. Unfortunately, we have not made any significant improvement in recent years. We still have very few mothers who exclusively breastfeed for five or six months.

The causes for this are complex; in addition to the education of the parents, there are sadly still plenty of prejudices and a lack of support for mothers and couples. So there’s still a lot to do.
A healthy lifestyle during pregnancy is crucial for both mother and child. However, the recommendations are still frequently disregarded, often out of ignorance. Targeted advice and warning of – supposedly harmless – dangers is therefore a core task.

**Tempting poison**

Alcohol is known to have a damaging effect on the developing infant. This is why most pregnant women consistently refrain from drinking alcohol – often the first sign for those around them of the happy news. After all, the damaging effects of FASD (Foetal Alcohol Spectrum Disorder) often only appear years later.

**FASD includes all the effects of alcohol-related disorders due to alcohol consumption by pregnant women. It is the most common cause of non-genetic mental and physical disabilities.**

Alcohol is a cytotoxin and embryos are particularly sensitive to it during organ development and formation. In contrast to other toxic substances, the placenta cannot filter it from the mother’s blood, so the child in the womb rapidly has the same alcohol level. All organs and organ systems of the embryo can be affected. Small stature, underweight and a smaller head circumference are particularly common, in addition to delayed mental development and behavioural disorders.

The number of children born each year in Germany with varying degrees of FASD is estimated at 10,000, but the number of unreported cases is likely to be significantly higher.

**Even tiny amounts are harmful!**

What about the odd tipple now and then during pregnancy? Scientists from Bristol Medical School reviewed a total of 4,700 articles on alcohol consumption by pregnant women. For many there were no clear differences between the children of mothers who abstained and those who drank moderately. A clear outcome was that consuming approximately 30 grams of alcohol per week (roughly one glass of wine) increases the risk of babies being born too early and underweight. One problem is that the damaging effects only become apparent later in life. There is no reliable limit at which alcohol is harmless. Pregnant women should therefore avoid alcohol completely – without exception.

This also follows the recommendations of international organisations.

It needs to be made perfectly clear. Because one in four women in Germany still drinks alcohol although she’s expecting a child.
Nutrition and development update

Smoking outside isn't the answer

Even smoking outside is harmful, as the experts are keen to point out. According to the latest research, children then suffer more frequently from bronchitis or asthma. Because anyone who goes outside to smoke carries back into the home nicotine and carcinogenic substances, as well as other toxins, on their hair, hands and clothes. In addition, smoke particles are still exhaled one and a half minutes after taking the last draw.

So it’s best for soon-to-be parents to give up smoking completely, well before the start of pregnancy. Because it takes time for the toxins to disappear from the body – and from the home.

However, around two thirds of all smokers stop smoking during pregnancy or after childbirth. But the others still need to be convinced!

Risks of vegan nutrition

Experts at ESPGHAN warn against a one-sided and seemingly health-enhancing diet for pregnant women and children.

It is well known that a lack of nutrients such as vitamin B12, calcium, zinc and high-quality proteins can lead to malnutrition and permanent damage to the child’s nervous system. Mary Fewtrell at the University of London therefore strongly advises parents who feed their child a vegan diet to strictly follow the medical and dietary instructions of their doctors.

The greatest danger, the lack of vitamin B12, can have a destructive effect on the child’s brain and in extreme cases even lead to death.

The risk of developing an allergy is inherited. Children whose parents both suffer from the same allergy are particularly at risk. 60 to 80 percent of them will also become allergic. For children without a hereditary predisposition, the probability is 5 to 15 percent.

However, as numerous studies have shown, the risk can be reduced. In addition to breastfeeding and the use of hypoallergenic infant formula in the first four months of life, the main focus must be the avoidance of passive smoking, vehicle exhaust fumes and moulds, as well as a healthy indoor climate.

Unless they themselves have an allergy to potential allergy triggers like fish, hen eggs or milk, pregnant women and breastfeeding mothers may confidently consume these products.

Although traces of foreign protein pass into the breast milk, they do not trigger an allergy in the vast majority of babies, even in cases of increased risk. Instead, the child’s immune system will develop a tolerance effect.

Deutsche Haut- und Allergiehilfe e.V., 2018

Allergies – Advice and prevention

For parents it’s a big worry: Your child has an allergy, he’s crying and restless. Early advice and reassurance are important here. Because help is often possible.

Dealing with allergy risk

The risk of developing an allergy is inherited. Children whose parents both suffer from the same allergy are particularly at risk. 60 to 80 percent of them will also become allergic. For children without a hereditary predisposition, the probability is 5 to 15 percent.

However, as numerous studies have shown, the risk can be reduced. In addition to breastfeeding and the use of hypoallergenic infant formula in the first four months of life, the main focus must be the avoidance of passive smoking, vehicle exhaust fumes and moulds, as well as a healthy indoor climate.

Unless they themselves have an allergy to potential allergy triggers like fish, hen eggs or milk, pregnant women and breastfeeding mothers may confidently consume these products.

Although traces of foreign protein pass into the breast milk, they do not trigger an allergy in the vast majority of babies, even in cases of increased risk. Instead, the child’s immune system will develop a tolerance effect.

Deutsche Haut- und Allergiehilfe e.V., 2018

Link between family history of allergies and allergy development

<table>
<thead>
<tr>
<th>Family history</th>
<th>No allergies</th>
<th>1 parent with allergy</th>
<th>2 parents with allergy</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of infants who develop an allergy</td>
<td>5–15% risk</td>
<td>20–40% risk</td>
<td>40–80% risk</td>
</tr>
</tbody>
</table>

Some 2–3 % of all infants develop a CMPA during infancy.

Those who develop an allergy require treatment.

Breakdown of peptide sizes when partially and extensively hydrolysed: oral tolerance is the objective

In HA formula, the cow’s milk protein is broken down by hydrolysis into small peptides which are no longer recognised as foreign by the infant’s immune system. In extensive hydrolysate (eHF) the peptide strands are broken down into very small parts, in partial hydrolysate (pHF) only into parts so allergy tolerance can develop.
Cow’s milk protein allergy in infancy

The number of allergic reactions, particularly to food, continues to increase in infants and toddlers. A cow’s milk intolerance is often the trigger at this age. A cow’s milk protein allergy (CMPA) is one of the most common food allergies in infancy! Studies assume that 2 to 3 percent of all infants develop a cow’s milk protein allergy, according to other studies it is up to 7.5 percent.

Recommended diet for hereditary allergy load

Breastfeed? YES → Exclusively

NO → Hereditary allergy risk?

NO → Partially

YES → Breastfeeding + partial hydrolysate with proven efficacy in studies

Breastfeeding + partial hydrolysate with proven efficacy in studies

Standard infant formula (with intact protein) or partial hydrolysate

Preventing CMPA

The most significant findings of the latest research:

- Since CMPA is much less common in breastfed children, breastfeeding should therefore be encouraged.
- Partial hydrolysates with proven efficacy in clinical studies are recommended for prevention in non-breastfed infants if there is a hereditary allergy risk.
- **WARNING:** Only those partial protein hydrolysates are recommended for prevention for which there is sufficient clinical data confirming their efficacy.
- EFSA (European Food Safety Authority) and FDA (U.S. Food and Drug Administration) consider a partially hydrolysed protein source to be a protein source that can be used in infant formula, whether or not it has a preventive effect against allergies.

Vandenplas Y, Nutrients 2017

Treatment

If a cow’s milk protein allergy occurs, a strictly cow’s milk-free diet is required to avoid further overreactions. There are also special foods for infants and toddlers with food allergies that contain all the nutrients needed for healthy development.

- Extensively hydrolysed infant formula (eHF) in which the proteins of the cow’s milk are broken down to such an extent that their constituents no longer trigger allergies.
- Amino acid-based special formula (AAF) must be used in rare cases, such as where symptoms are severe or eHF is not tolerated.
- CMPA occurs less frequently in fully breastfed children. In this case, a strict cow’s milk protein-free diet of the mother is required. Stopping breastfeeding is not necessary and the mother should be encouraged to continue with breastfeeding. Targeted nutritional advice for breastfeeding women is required in order to avoid a nutritional deficiency.

**WARNING:** Partially hydrolysed formula (pHF) are used for prevention and must not be used for therapy.

Vandenplas Y, European Meeting 2018
Planetary health diet and environment

Food systems provide the opportunity to sustainably support human health and the environment. But our current behaviour is threatening both, according to The Lancet, which has now presented a large-scale study on the subject.

Thirty-seven researchers from 16 countries have developed a planetary health diet, which gives equal weight to promoting health and respecting the environment. What’s new about the EAT Lancet initiative is the comprehensive approach to healthy eating and environmental protection. But this requires a fundamental change in diet: Lots of vegetables, lots of nuts, little meat and a wide scale cut in red meat and sugar consumption – this would save millions of lives each year and prevent the destruction of our planet. But it also means rethinking our agriculture and, above all, a commitment by politicians to implement these proposals. In addition to The Lancet, members of the EAT-Lancet Commission include the independent research institute Stockholm Resilience Centre and the Norwegian NGO EAT.

The presentation of EAT-Lancet in Oslo on 17 January can be seen and heard “live” at https://www.thelancet.com/commissions/EAT

Is Dad to blame?

“Fathers are forgotten when it comes to healthy eating.”

Lynne Daniels, Queensland University of Technology

Are well-meaning fathers to blame if their toddlers are overfed and overweight? This is what a study by Queensland University of Technology in Australia suggests. The researchers compared the feeding practices of mothers and fathers. The preliminary result was that fathers want their children to eat up and put on weight. And this is despite the fact that they are otherwise not overly concerned about their children’s nutrition. For study lead, Professor Lynne Daniels, this is because fathers are simply overlooked when it comes to healthy nutrition for babies and toddlers. They prefer to pressure their children to eat up and do what they’re told.

So 70 fathers were recruited onto the on-going NOURISH program at Queensland University of Technology. A group of around 700 mothers receive detailed advice on the positive consequences of correct nutrition. It turned out that this advice made fathers rethink their feeding practices. They should therefore have greater involvement in terms of advice. According to Daniels, this is something that will become increasingly important because of the social changes meaning that more fathers will be involved in feeding.

The study was presented at the European Congress on Obesity in Vienna, 2018.

Use the Nestlé Nutrition Institute website

Once you’ve registered, you can use all of the NNI online offer – including our extensive range of publications in the library, exclusive videos by leading experts, training courses and customised updates for your particular area of interest.

Publisher:
Nestlé NutritionInstitute Germany
D-60523 Frankfurt, nni@de.nestle.com · www.nestlenutrition-institute.de
Editors: Dr. Mike Poßner, Herbert Lechner M. A.
Realisation: lechnerpress, 84163 Aufkirchen, Eichenring 6a
Figs.: Nestlé, Kerstin Pukall, Kzenon/Drobot Dean/Alexandr Vasilyev/Dr. N. Lange/Julydfg/Monstar Studio(3)/Okzana Kuzmina/Fabian Faber/Marko Novkov@adobestock.com
© Nestlé Nutrition Institute Germany

World of nutrition

Science for Better Nutrition
nestlenutrition-institute.org