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Nutritional support for cancer patients

Dr Zein: Hello, good evening, all. So, I'm Dr Heba Zein. I'm the Manager of the National Cancer Institute Outpatient Nutrition Clinic. I'm also a paediatric consultant, and I'm really honoured to be here with you all to talk about the nutritional support for cancer patients. I have no conflict of interest regarding this session. And my agenda is going to be "the prevalence of malnutrition in oncology patients and the sequelae of malnutrition." And what about the current nutrition practise all over? The nutrition care process and the screening, the ESPEN, we go into the ESPEN guidelines and some special concerns and debates and challenges. We'll go through two paediatric cases and then, we'll end by the take-home messages. Please, remember that you're free to ask through the question-and-answer button or the chat. To know the problem, we need to first to know the prevalence of malnutrition in cancer patients. And this study reveals the prevalence of malnutrition at the first medical oncology visit, meaning that these patients did not get any medical treatment or oncologist meeting or operation, which we all know that will further on lead to more nutritional derangements. And they found that the gastroesophageal and the pancreatic have the more or the highest incidence that may reach up to 25% or 26%. Then what about the prevalence of malnutrition in hospitalised patients? At the beginning of the hospital admission, it almost reaches up to 34% of patients will have nutritional malnutrition or nutritional derangements, and up to 71 will go into malnutrition with moderate and half of them severe, which is a lot, actually. A lot of studies talked about the nutrition then, the health and financial impact about the malnutrition in general patients, but what about in specific oncology patients? These multiple studies also talked about where we have longer length of hospital stay, more high-risk of surgical site infections, lower scores of quality of life, higher risk of mortality, lower tolerance of chemotherapy, more antibiotic use and even 4-fold high-risk of two-month mortality. We all need to remember that it has been estimated that up to 10 to 20% of patients, they die due to the consequences of malnutrition itself rather than the disease, so, we have to be cautious. And in order to get fast or immediate interventions before that deterioration of the patients, we need to catch the patient at the pre-cachexia status where the weight loss is still below 5%. And here, the nutritional process and the nutritional interventions will be fruitful and will have results. Whereas if we waited until we reach the refractory cachexia, usually, the patient is going to be catabolic and the survival rate is very low. And here, the nutrition support is going to be only directed towards the palliative nutrition and to alleviate the feelings of hunger and thirst. So, ESPEN guidelines on nutrition in cancer patients and the ESPEN expert groups for recommendations against cancer patients related malnutrition, they stated that to detect it is very important to screen every patient, to detect nutrition and disturbance at an early stage. How do we do this? At the first visit, at the beginning of the cancer diagnosis to evaluate the nutrition status, and this is a strength of recommendation STRONG. We do this through the nutrition care process that starts with the screening and referral system, the nutrition assessment, nutrition diagnosis, intervention and monitoring and evaluation. So, we need to ask ourselves where do we stand? What is the current practise? This is a survey, national

survey, that was conducted in the US in 2019 to see the nutrition coverage in the outpatient cancer centres. They found that per-day registered nutrition evaluated and counselled an average only around six to five oncology patients and only 50% of the centres are screened for malnutrition. And of these 50%, almost 60% used a validated malnutrition screening tool, and we all should use a validated malnutrition screen tool. What are validated malnutrition screening tools? There are many like the MUST, the MNA nutrition assessment. And in our facility and the National Cancer Institute we use the NRS endorsed by the ESPEN, and it's very easy to do and to perform. And this is for the adults, and for the paediatrics, we use the Paediatric Yorkhill Malnutrition Score. And recently, we adopted the Abbott Middle Upper Arm Circumference tool for the paediatrics. As you see here, this is the NRS and it consists of two parts. This is the initial screening questions, and if the patient answered yes to any of these simple questions, we go into part-two. Part-two consists of two columns. One discusses the impaired nutrition status and the other the severity of the disease. If the patient scores 3 or more, he's at risk. And it's a very simple tool to detect the patients at an early-stage, as we said, at the pre-cachexia stage. This is the Paediatric Yorkhill Malnutrition Score. And I don't know if you can see here, it's a very easy tool to be done also. And the smaller ring, you put the height, and the bigger one, the weight. When the two aligns together, the body mass index is calculated automatically. And here, these are the papers where you evaluate the body mass index score, and if it is low then these reference ranges, you give the patient number 1 score and you calculate the other questions, it's very easy for each patient. Then, you go into the follow through, the calculations of the score. For the MUAC tool, it's very even easier and it calculates the Z Score for the mid-upper arms circumference, and it is validated especially in malnutrition and as you see, each one there's two, one small and one big one. And it is according to the age, each one of them has two, one grey and one white for different age groups. It's very easy to be conducted and very validated. And actually, I compared it with the varying non-growth curves to see the results, if there is really full function of growth or below the percentile, for example. And it's really working and it's very accurate. Please, remember to ask questions at any time. In the National Cancer Institute, we are ambassadors for the ASPEN and the Malnutrition Awareness Week. And this year actually we conducted a screening in one day, cross section screening in the paediatric outpatient clinic. This is outpatient. We screened total off 96 patients in one day using the MUAC tool. And this is the criteria of the patients where with the diagnosis and the age group. And as you see here, this is the Z Score of the patients and this is the number of patients. This is minus one, minus two, minus three, which indicates mild, moderate and severe. And minus four, malnutrition. And almost, total number of the malnourished patients was 58 with a percentage of 60%. Notice that these patients, not all of them, are cured or under current treatment, some of them just for follow-up and they are already in remission. So, again, screening is very, very crucial for early detection of patients. This is our team, part of our team that I'm really proud to be part of them in the National Cancer Institute. And we are using the MAUC tool. So, ESPEN put guidelines for the clinical nutrition in cancer. The last one was updated in 2021 and it consists of general concepts for the treatment through the nutrition care process, the screening and assessment, and the energy substitute requirements, interventions and exercise and pharmacology and some interventions related to specific conditions like surgery, radiotherapy and chemotherapy. For the screening and assessment, as we said, they recommend screening at the time of the diagnosis. And if the patients... we will go further into the nutrition assessment and calculation. The golden standard for calculations of the energy needs is the indirect calorimetry. And we have to ask ourselves like very important questions. Did the weight loss start already? Yes, or no? Because the substrate calculation here is a little bit different. If the patient already did not start the weight loss or is still in a good nutritional status, this calculation is going to be 25 to 30% kcal per kg per day. However, if the patient's already weight loss, it's going to be a little bit different. As we see here, the protein intake should be above 1 gr per kg per day, which is more than the usual for the normal population. And, if possible, we need to reach up to 1.5. And this is a very important issue that they recommend against the use of routine supplementations of vitamins and minerals unless there is evidence of deficiencies. So, what about if there is a patient who is already into weight loss? They recommend that many of them have insulin resistance and in this case, we need to increase a little bit of the fat content in relation to the carb content to maintain

euglycemic state and decrease their glycaemic load. But about the nutrition interventions? Of course, there is always the dietary advice and we start with a dietary advice. I've seen a lot of patients taking supplementations without the proper dietary advice and the result is very low. Dietary advice is very important and very crucial. Increase the oral intake. The treatment of the nutrition impacts symptoms like the vomiting, the early satiety, whatever, and ONS. This is regarding the oral nutrition interventions. And they recommend against some, you know, when you Google or a lot of patients they say we want to starve the tumour, they recommend against these types of treatments or behaviours. And when we go to the medical nutrition, if the oral is still insufficient, they recommend enteral, if the oral nutrition is still insufficient, or even parenteral. Beware of the refeeding syndrome, which has a very high-incidence in these patients. And don't forget, in some selected patients, we can use the home enteral and home parenteral. And of course, this is selected and with proper education for each patient. And of course, don't forget the exercise. What about the pharmaconutrients and pharmacological agents? They suggest the considering of the corticosteroids use. When? With the patients with advanced disease, when they are anorectic to or for a restricted period of time and, of course, look for the side effects of the corticosteroids. Some recommend the use of progestins. However, some centres they do not use progestins as it has potential serious side effects like the thromboembolism, which we all know that it is already high in these patients. And one of the maybe fully studied is the use of the Omega-3 fatty acid for patients undergoing chemotherapy and at risk of weight loss. They found that it stabilises the body weight. Don't forget about the use of the nutrition-related symptoms like, for example, the prokinetic agents that may alleviate the nutrition-related symptoms. What about other agents? There are many anecdotal reports out regarding the branched-chain amino acid, the androgenic steroids, non-steroidal and the cannabinoids still insufficient. So, what about specific condition? In the surgery whether the ERAS rules and continue the nutrition supplementations or the nutrition interventions following the discharge, always give the patient a discharge plan. And this actually, a very important note or a point, that in upper GI cancer patients and the head and neck patients, they recommend the use of oral enteral immuno-nutrition therapy containing glutamine, arginine and omega-3 fatty acids. What about the radiotherapy if the patient's going to undergo radiotherapy to head and neck, or the throat or the gastrointestinal tract? And we all know the consequences of the radiotherapy, especially on these effects, oral nutritional supplements could be provided and ordered in order to avoid nutrition and deterioration. And please, don't forget to assess the swallowing and the dysphasia in these patients. If there is a specific condition where there is oral intake going to be very difficult, the use of feeding tubes, like the nasogastric or the percutaneous tubes at the PEG and radiation-induced severe mucositis or in obstructive tumours of the head and neck, for example, of course, it is considered through a multidisciplinary team. The parenteral nutrition is not usually recommended as a routine, only if intake is difficult. Insufficient data to provide glutamine as a prophylaxis. However, if there is evidence of mucositis, we can use oral nutrition containing immuno-nutrition like glutamine or the mouth wash with glutamine, it has been good effect. The use of probiotic in these patients, there is insufficient data. What about the patient undergoing medical oncology treatment? Again, the nutritional and also, again, a routine supplementation of glutamine is not recommended. What about the cancer survivors? We recommend that they go into healthy weight. As we all know that obesity has a high-risk factor for many of the cancer diseases and provision of healthy lifestyle and healthy balanced food. What about the palliative situation? We don't go aggressively into palliative conditions, only to treat nutrition impact symptoms and metabolic derangements and implementation of nutrition interventions is giving only after considering the prognosis and the expected benefit on the quality of life, potentially, the survival and even the burden of the nutritional care itself. If the patient is at the end of stage, only maybe we provide hydration or if there is acute metabolic derangements like electrolyte in disturbances. Please, don't forget to submit questions and ask questions at any time. ESMO provided clinical guidelines for the cachexia and it was released in June, 2021. They divided patients into three categories according to the probability of survival, and this is going to be reflected on the focus of care. If the patient has a probability of survival more than six month, you'd go through the nutrition care process with every step. And if the patient has a survival maybe of a few three to six months or less, you start to decrease the

invasiveness of the interventions. And also, of course, this is in a multidisciplinary team. If the patient has less than three to six weeks, only it is a comfort-directed care for the hunger and the thirst or the usual distress from these symptoms. Home parenteral nutrition should be offered to patients if whole the length of the survival is expected to be more than six months and/or it is going to be severely affected and compromised by the progressive malnutrition, and mind, in your mind if there is indicators of a potential benefit. You don't provide parenteral nutrition without any potential benefit. When the performance status is still less than three and a low level of systemic inflammation through the modified loss prognostic score, and usually, with an absence of metastatic disease. And this is an algorithm that summarises what we have said and some of the flow of the how to go into the nutrition interventions. If the intake is more than 75%, you just give dietary advice. If it is between 60 to 75, you can add ONS tools plus the dietary advice. If the intake is still 60% requirements for one to two weeks despite the ONS and the dietary advice and so and so, and then, maybe, we will go on to decide to go enteral by a tube. If it is four to six weeks, we go into a nasal enteral tube. And if it is a for a long time, you go to something permanently, which is an ostomy. The decision of the site of the ostomy or the enteral tube with the GERD or the duodenal, of course it depends, number one, on the side of the tumour initially, and on other parameters like if there's good gastroparesis, bronco-aspiration risk. If there is, yes, we prefer to go away from the stomach and we do jejunotomy or naso-duodenal according to the duration or the length expected. And if there is no risk, we go into gastrostomy or the nasogastric. If it is an enteral feeding or oral intake is insufficient or not feasible or contraindicated, we go to parenteral nutrition. If it is for a short-time, we give a peripheral parenteral nutrition. We don't go central. And if it is expected to be more than seven days and in some certain conditions like paediatrics, maybe, at this time, we go central. Some specific conditions that we should not forget. The dysphagia. We should always assess dysphagia and the possibility of aspiration in all head and neck cancers, brain tumours and brain primary tumours and/or brain metastasis, grade three and four oral mucositis, lung cancer and any mediastinal masses may compress on the oesophagus and may induce also dysphagia. And there are some challenges and the calculation of the body weight in cases of oedema and ascites, for example. So, at this time, we use the Dry weight. And if there is the limp amputation, we need to provide a proper calculation or adjusted calculation of the body after the amputation. In paediatric short stature, please, know that these are populations that are growing, maybe at the end they are going to be treated from the disease itself, but we are left with a short child or short adult. We should assess the bone age and the growth hormone, especially after brain tumour treatments and radiotherapy, especially, radiotherapy at the sella turcica, for example. Neutropenic diet. This is actually a debatable issue; this meta-analysis study released this year. Neutropenic diet cannot reduce the risk of infection and mortality in oncology patients with neutropenia. However, in my opinion, we conducted a neutropenic diet in the wards and we found that it really decreased the incidence of typhlitis and gastroenteritis. And I guess these studies should be adapted to each country. I mean, the socioeconomic and the hygiene standards are different from a developed country, for example, and a developing country, for example. So, maybe, we can't go into very drastic manoeuvres, but at least, there are some contraindications or known contraindications in neutropenic diet like the daily meal, the open counter, the open packets, the food that contains cultured probiotics, for example. And this should be avoided. Some conditions in the paediatric age-group, we calculate, according to the Schofield equation, the resting energy expenditure and then, we multiply by the stress factor. And this is from the ASPEN for the calculations of the PN and macronutrients. And as you look here, always, the protein is high, always the protein is high. When you calculate for cancer patients it always gives high. Some challenges that the osmolarity of the parenteral nutrition, in the peripheral line, should not exceed the 900 mOsm. So, total fluid requirements in paediatrics along with blood and blood products transfusion is actually a real challenge, parenteral nutrition through a central line NTP and compounding, and this in certain conditions, maybe could be the only solutions. As we see here in this patient, this patient is five-years-old as he has a relapse in AML, and his weight... He was admitted in the ward, not an ICU patient. His weight was for 14, this is the first case, 14 kg. His height was 105 cm. And his mid upper arm circumference showed -3 Z Score. He presented with grade-3 oral mucositis, and herpes simplex with 20% intake, only 20% intake of the total energy intake needs.

When we calculated his energy according to the Schofield equation, he needs 813 kcal per day. And with the stress factor, the total calorie calculator is almost around 1000. And this patient had no central line inserted. His platelets were 15.000. So, at this, you can see no nasogastric tube could be inserted or central line insertion, it is also contraindicated. And this child has very high possibility of refeeding syndrome. So, when we recalculated all this, we found we will give fluids at the total parenteral nutrition, half of his requirements, 520 kcal. And we had, when we calculated the final volume of this only 520 kcal, which is the 50% of his total needs, it was because with this peripheral line, we cannot go into concentration, we need to calculate the osmolarity. The final volume was almost 1000 ml in a peripheral line. And his fluid maintenance, when we calculated, total fluid maintenance was 1.2 litres per day. And this is very challenging actually because the child was receiving blood platelets and so and so. So, what we did is we tried to accelerate the oral intake, and we found that he tolerated a fat free oral nutrition supplement and it was okay for him. We started at 330 kcal and we gradually increased, please remember, some oral nutrition supplements, especially, in paediatrics, they contain probiotics, and if the patient is neutropenic at this condition, it should be contraindicated. And actually, this patient recovered and he was discharged. This is the patient, as you see here, grade 3 mucositis with the herpes and ulcers. And this is after gradual improvement. And this is the first case, and now, we will go into the second case. Also, please ask any questions if you have any. This is a case of hepatoblastoma. And this toddler was two-years-old, a male, and presented to our clinic in September, 2021. His date of birth was September, 2019. Diagnosed with hepatoblastoma at the age of one-year of age. He went into hepatoblastoma high-risk protocol, neoadjuvant chemotherapy. Then, he went into right hepatic segmentectomy and then, adjuvant chemotherapy. And as you see, this is very extensive for his age. And he ended it in August and came to our clinic, outpatient clinic, was outpatient. We saw him as an outpatient. And in September, only one month after finishing his adjuvant chemotherapy, his weight was 10, and his Z Score for the weight was -1.7 and height was 67, and his Z Score was -3. When you replotted him on the growth curves, as you see, he fell way down below the growth curves, the percentile. And we go into the assessment, again, we finished, the parameters now, the biochemical, he had a normochromic anaemia of the chronic disease. Haemoglobin was 8.8. Others, a part of that, was okay. And the clinical assessment of the patient. And here, I want to emphasise that we need to assess everything. We found that the patient has a tight tongue, and this may affect his swallowing and his intake. And we told the mother how to encourage the child into how to increase his intake only by assessing his condition because she, at this time, she refused to do an operation for his tongue tie. He also had a brachycephaly with a delayed motor and mental milestone and history of constipation. However, the swallow test showed no dysphagia, of course, I said, please, don't forget the swallow test in some cases. And these conditions actually raised a question, maybe, the patient has hyperthyroidism, for example. The diet, he only consumed 50% of his needs with low protein intake, and we said, we need to give high-protein, only takes liquids or semi-solid food. The nutritional diagnosis. He has a faltering of growth according to the NICE guideline. So, we went into further investigations and as you saw before in the growth curves, especially the height was way down. We did a thyroid profile, a bone-age, vitamin D, phosphorus, of course, for the refeeding. And we calculated his nutritional needs according to the daily recommended intake. We found for his age he it was 80 kcal per kg, which is a total of 800. And we needed to monitor or address this point because we needed this patient, maybe, this contributed as a start, but we needed to go more because we needed for a catch-up growth. So, for a catch-up growth, we calculated according to this equation, the DRI multiplied by the ideal body weight, the weight divided on the actual weight, and this will give us that targeted calorie needs per kg. Of course, we gave him high protein, and we gave him omega-3 supplementation, multivitamins and minerals needed for the general growth and treatments of anaemia according to his condition, and the investigations. Of course, don't forget the counselling, education and the reassurance of the mother. And his born age and thyroid profile were normal. And this is the follow-up of the patient. We continued following him up to six months and we started with the 10, and then, in November he gained only half kilo but then, 11 kilos. And then, in January, only three months after he came, at the beginning he was 12 kilos. And by May, 2022, his age was almost three, weight 13 and his height was 88. And you see here at the growth course there's improvement in his growth curves.

And the patient continued his monitoring and the patient actually now he's here, and though he was laughing and going and the mother was very delighted. So, my take home-message is malnutrition has deleterious effect on the cancer patients. Early screening via a validated tool is really crucial. Nutrition cares should be implemented accordingly. Oral or enteral immune nutrition is recommended peri-operative in upper GI and head and neck operations. Paediatric age group has special nutrition challenges that should be addressed. And thank you.

Dr Mahmoud: Good evening, all. Thank you, Heba, so much for such an informative talk. As you can see, it's a very big topic, actually, the nutrition support for cancer patient. And I liked that you handled it in just one setting, of course, the general aspect of this big subject. What I would like to emphasise on that really a medical nutritionist is an important member of the multidisciplinary team who is taking care of our cancer patients. So far, we don't have some questions from the audience, but I have a couple of questions for you, if you allow me. First, I would like you to highlight the concept behind the medical nutrition and how can we differentiate it from just the regular dietary service.

Dr Zein: Okay, this is a very good and important question, actually. Because medical nutrition from its name, medical, it is medical, it is structured nutrition-based treatment. So, it is a treatment actually for medical diseases, it is directed for medical diseases. It's not for regular people who are not complaining from any disease. Regular people you can give them diet or some dietary advices. Dietary advice is apart from the nutritional treatment or the medical nutrition therapy, but it's not the only, so, and it is provided by a resisted clinical nutritionist or a registered dietitian. And it has structured steps. It goes through the nutrition care process from the nutritional assessment, and we need to provide something called the nutritional diagnosis. We need to know what is the nutritional disease. As we you give a medical diagnosis for diseases, we put a nutritional diagnosis for the nutritional condition for such a medical disease.

Dr Mahmoud: Yeah, this is exactly what I wanted to hear because, as you said, in some studies they undervalue the medical nutrition itself through the screening, through the management, process, management itself, through the diagnosis. We need to have a diagnosis for cancer patients regarding nutrition, not just dietary support for these patients.

Dr Zein: Yes, of course. And it is a whole, as you saw, in the algorithm; it starts from the dietary advice and it ends by the parenteral nutrition whether peripheral and central. So, it is invasive.

Dr Mahmoud: Yes, exactly. Okay, regarding screening for some patients, how frequent do we need to screen patients for nutritional status, especially, those patients who are suffering leukaemia? Because you know they need maybe two or three years of treatment and management. So, how frequently should we screen these patients regularly?

Dr Zein: Okay, this is a very excellent question. So, you know, at the time of the diagnosis with the first visit from the medical oncologist, the patient should be screened. Then, if the patient has no nutritional derangement, we will re-screen. When do we re-screen? This is the question, actually. We re-screen when we introduce a new chemotherapy or radiotherapy that we know that it has very high nutritional side effects. This is if the patient is going to be taken care in a day-care or an outpatient. So, you go into a re-screening and if the patient is already admitted at the hospital, is going to take his medications in the hospital, you will screen in the hospital. What about re-screening in the hospital, if you did the first re-screening and the patient was, by the risk, by the screen, did not have any nutrition affection or risk of malnutrition? You re-screen. But when the patient is at hospital, you screen after only one week because this patient is hospitalised.

Dr Mahmoud: So, there's a difference between hospitalised patient and outpatient.

Dr Mahmoud: Yes, of course. Outpatient, only when you're going to introduce a new line of treatment.

Dr Mahmoud: New line of treatment.

Dr Zein: Yes. And generally, you should not be more than three months. You should not leave the gap more than three months. Even as a follow-up.

Dr Mahmoud: Three months as an outpatient and regularly during the inpatients. Okay, you mentioned in the lecture the refeeding syndrome. What do you mean by refeeding syndrome and how can we prevent it?

Dr Zein: Refeeding syndrome is a very important metabolic condition where the patient go from the starvation status into the feeding status. At in this condition when in the starvation status, we have a very low insulin level and high glucose level, and when you start giving the glucose coming from the feeding, you start into the feeding mood. And at this condition you need a lot of phosphorus and potassium and ATPs. So, the patients go into hyperphosphatemia which is the whole mark of the refeeding, and hypokalaemia and hypoglycaemia even. So, there is certain algorithms or criteria for the refeeding syndrome, and cancer patient is one of them that we really find a lot, and even at the patient who is already admitted at the hospital and you are doing regularly his labs and you already find hypokalaemia and hyperphosphatemia initially even before the start of the feeding, this is a a risk factor and you have to correct the electron first and then you start very gradually. We calculate, we give half calculated calorie requirements and sometimes even below because it has many side effects and some of them could be lethal.

Dr Mahmoud: Okay. Coming to the point of TPN, the total parenteral nutrition, what's your indications or what's the guideline saying regarding the education of TPN and also regarding the enteral feeding? What are the absolute contraindications or what is contraindication to start enteral feeding?

Dr Zein: Okay, to start with, if the patient is hemodynamically unstable, this is contraindication for both, because some say or think that we can give TPN, it is through the IV. No, first stabilise the hemodynamic stability of the patient. And this is for both actually. So, and when we go for the enteral nutrition, what are the absolute contraindication for the internal nutrition? Again, hemodynamic instability. If the GIT is not functioning, meaning obstructed or whether it is due to mechanical obstruction or physiological obstruction like ileus, for example. Or if there is a severe intolerance like intractable diarrhoea, intractable vomiting or if there is a severe GIT bleeding. These are the absolute.

Dr Mahmoud: Bleeding for some obstruction?

Dr Zein: Sorry?

Dr Mahmoud: Or infection or obstruction or cancer-related, all of the GIT...

Dr Zein: If it is affecting and leading to obstruction.

Dr Mahmoud: Yes.

Dr Zein: Okay? But if it's not leading to obstruction then, we will go into some relative contraindications. Like if there's ketoacidosis, this is a relative contraindication. You have to assess the general condition of the patient. Lactic acid above 2, also it is a relative contraindication. Maybe, you can have trophic feeding, or according, again, to the general condition, but if there are absolute like, if the patient is bleeding, has a GIT hematemesis, for example, how you're going to feed the patient? This is an absolute contraindication. If the patient and cancer patient have typhlitis, for example, these are some of the conditions are very specific conditions related to the cancer patients. We go on NPO for a while until we make sure that the patient is not going to go into macrocytosis and trichuriasis, for example.

Dr Mahmoud: Okay. You said that neutropenic diet is a debatable issue, but is there any specific diet that is not permitted during the neutropenic episode of cancer patient?

Dr Zein: Yeah, as I said, maybe some are not debatable, maybe some items are debatable and some items are not debated. Maybe, we go from the debatable items like fruits, fresh fruits. This is debatable. Some

surgeons say you can give fresh fruits only if it has a thick peel and you can wash good and you peel it. And some centres give also vegetables. For example, in my centre we prefer not to give fresh vegetables, especially, leafy vegetables because actually sometimes it is difficult to be washed. Some vegetables like strawberries could be highly contaminated with germs or something. And the non-debatable, like the daily meat, the opened, especially the opened daily meat from the counter. You know, when you go to grocery and there is a counter, and they put cuts, not closed system. This is also maybe one of the non-debatable, actually, this is non-debatable. And of course, if the rice, for example, is prepared and left outside of the refrigerator, rice especially should be taken immediately. And also, I think that it contains probiotic or active life. Probiotics actually, not pasteurised egg, raw egg, for example, for the high-risk of salmonella infection. These are not debatable.

Dr Mahmoud: Okay, great.

Dr Zein: The honey, the botulism.

Dr Mahmoud: Yeah.

Dr Zein: Also.

Dr Mahmoud: Contraindicated.

Dr Zein: Yeah, in our centre is contraindicated.

Dr Mahmoud: Just with a neutropenic diet, but otherwise.

Dr Zein: Only with the neutropenic, only with severe neutropenia, less than 1500.

Dr Mahmoud: Okay, that's actually all from my side. I would like to thank you again so much. And I would like to thank organisers and ESO. If you have any issues, if you have any other concerns, there is, I think, time is off already.

Dr Zein: Thank you, Dr Mahmoud. Thank you.

Dr Mahmoud: Thank you very much.