



Perspective

How Can We Improve the Appetite of Older Patients on Dialysis in Japan?

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Abstract: It is necessary to ensure adequate energy and protein intake in dialysis patients. However, in addition to the decline in dietary intake in older dialysis patients due to aging, the rate of anorexia is high in dialysis patients, which increases the risk of protein–energy wasting (PEW), sarcopenia, and frailty. There are many causes of anorexia in dialysis patients, including older dialysis patients, and approaches to improve the appetite of such patients have been reported; however, there has been no established approach to improve appetite adequately. Therefore, a key practical goal is to identify anorexia early and implement timely interventions before weight loss occurs. Appetite assessment tools and weight loss assessments are helpful for the screening and early identification of anorectic signs. Nutritional interventions include reducing dietary restrictions, using oral nutritional supplements, and intradialytic parenteral nutrition, as well as replenishing energy, protein, and zinc to prevent the development of nutritional disorders among older dialysis patients. Appetite assessments, early intervention, and dietary and nutritional counseling are key to improving appetite in these patients. The aging rate of dialysis patients in Japan is unprecedented globally, and I believe that this is a situation that will eventually occur in other countries as well. I discuss the factors that contribute to anorexia, especially in older dialysis patients, and Japan’s efforts to address this problem, such as the relaxation of dietary restrictions and the use of oral nutritional supplements.

Keywords: aged; anorexia; appetite; dialysis; diet



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1. Introduction

The goal of nutritional therapy for dialysis patients is to maintain good nutritional and physical status, prevent the onset and severity of complications such as heart failure, infectious disease, cerebrovascular disease, etc. while maintaining the quality of life and activities of daily living. Although it is necessary to ensure adequate energy and protein intake, in addition to the decline in dietary intake in older dialysis patients due to aging, the rate of anorexia is high in dialysis patients, which increases the risk of protein–energy wasting (PEW), sarcopenia, and frailty. There are many causes of anorexia in dialysis patients, including older dialysis patients, and approaches to improving appetite have been reported, including early appetite assessment, consideration of dialysis conditions, and prescription of medications. However, there has been no established approach to adequately improve appetite. Therefore, the practical goal is to identify anorexia early and implement timely interventions before weight loss occurs. The number of chronic dialysis patients in Japan is 344,640 [1], and the prevalence of dialysis patients is the second highest in the world (after Taiwan) [2]. In Japan, the aging dialysis population is remarkable, with an average age of 69.67 years, and the average age is increasing every year [1]. While the age group with the highest percentage is 70–74 years old for both men and women, the number of patients younger than 70 years has been decreasing since 2017; the increase in the number of dialysis patients in Japan is primarily due to the increase in the number of patients older than 70 years. I believe that this unprecedented aging of dialysis patients is a situation that will eventually occur in other countries. In this study, I discuss the factors

that contribute to anorexia, especially in older dialysis patients, as well as the steps that are being taken to address this issue in Japan.

2. Loss of Appetite in Dialysis Patients

Appetite is regulated by various factors, such as hormones and peptides, that stimulate the appetite when hungry and suppress it when full. However, the aging process reduces the ability to control these factors, making older adults more likely to have a decreased appetite [3,4]. Appetite loss has been observed in approximately 40% of patients undergoing dialysis [5,6].

In addition to factors specific to renal failure (e.g., uremic substances and inflammation), gastrointestinal disorders, taste abnormalities, poor oral hygiene, depression, and social and economic poverty, the effects of comorbidities have been implicated as causes of decreased appetite in patients undergoing dialysis [6,7]. End-stage renal failure has been associated with the retention of uremic substances and the short-term dysregulation of appetite-regulating substances in the gastrointestinal tract, resulting in early satiety and delayed gastric emptying [8]. Thus, the conditions of older patients on dialysis are further complicated by aging, their psychological and social backgrounds, and other factors that can lead to appetite loss.

Loss of appetite on dialysis days in hemodialysis patients affects energy and protein intake on both dialysis and non-dialysis days. In particular, many patients have decreased appetite on dialysis days [9], with average intakes on dialysis days reported to be 77.5 kcal/day lower in energy and 4.79 g/day lower in protein than on non-dialysis days [8]. One report compared appetite and hunger between dialysis and non-dialysis days and found that appetite decreased the most at lunch and dinner on dialysis days [10,11].

Following the spread of the coronavirus disease (COVID-19) in 2020, some facilities in Japan stopped serving food and beverages during dialysis, and patients stopped eating food when they underwent dialysis. Notomi et al. [12] investigated the relationship between the discontinuation of cafeteria services at a dialysis facility (as part of the measures taken against the spread of COVID-19) and dry weight. They reported no changes in dry weight in the group that did not patronize cafeteria services before COVID-19 (non-users). However, a reduction in dry weight was observed in the group of patients who patronized cafeteria services until discontinuation due to COVID-19 (0.8% at 7 months and 1.2% at 10 months), which was significantly different from that observed in non-users (7 months, $p = 0.007$; 10 months, $p < 0.001$). Thus, it was concluded that dialysis patients need to take action to compensate for the lack of energy and nutrients in response to their altered eating rhythms associated with dialysis and the discontinuation of food provision due to COVID-19 infection control.

Moreover, action must be taken to detect and intervene early in appetite loss, especially in older patients on dialysis. As anorexia in dialysis patients becomes more severe, the complication rates of hypoalbuminemia and underweight increase, which are associated with a higher risk of hospitalization [4] and prolonged recovery time after the completion of dialysis [13]. Decreased appetite progresses from increased protein catabolism to the development and severity of PEW, sarcopenia, and frailty, with a consequent impact on life expectancy [14].

3. Appetite Assessment and Appetite-Related Factors

Including older patients, the causes of anorexia in patients undergoing dialysis are diverse, making definitive treatment difficult. A systematic review of the treatment of age-related anorexia revealed a lack of evidence and an overlap between nutritional interventions for anorexia and nutritional disorders. Megestrol acetate is a drug that improves appetite [15]; however, relevant evidence is lacking, and its cautious use has been called for [16]. Based on the action points for treating anorexia, the implementation of a nutritional assessment and plan should be considered [17] (Figure 1). Early detection of anorexia may

enable timely intervention before weight loss occurs. Action points related to appetite assessment and appetite loss are as follows.

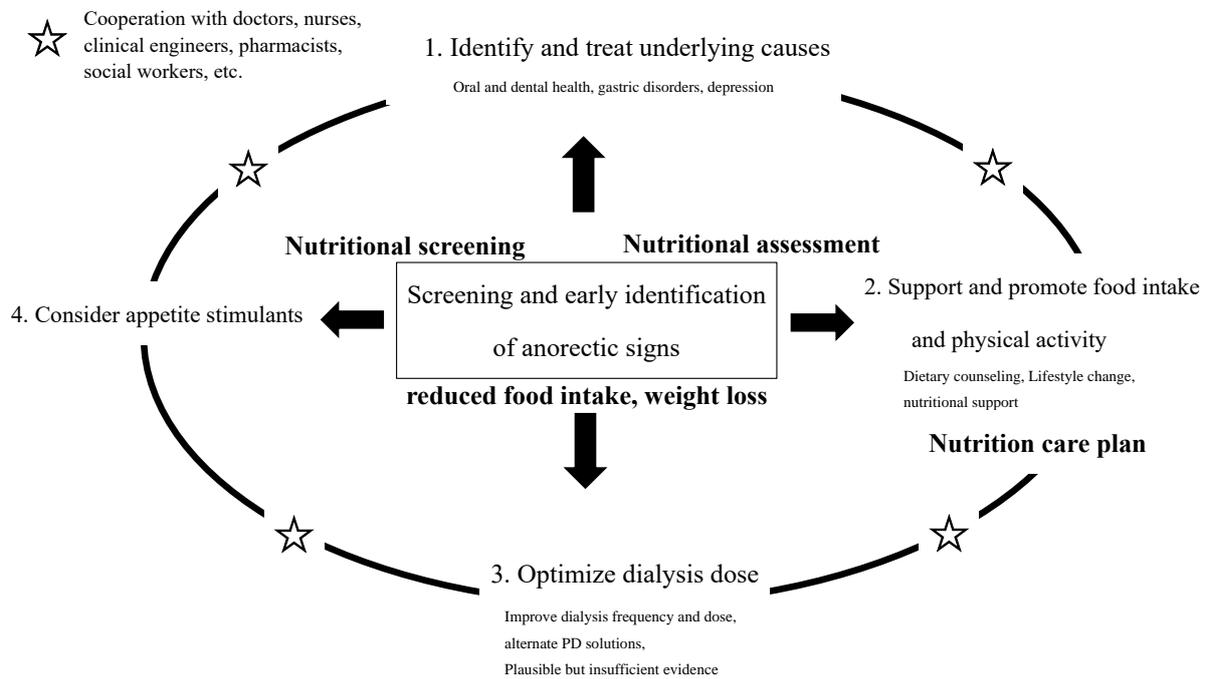


Figure 1. Proposed action points including nutritional intervention to treat anorexia in patients with CKD. Reproduced with permission from Carrero JJ et al., Nutrition Management of Renal Disease; published by Elsevier, 2021.

3.1. Appetite Assessment

Common items in various nutritional screening and assessment tools include weight loss and decreased or altered dietary intake. This indicates that weight loss and decreased food intake are important factors in nutritional status, not only in hemodialysis patients.

Simple methods for assessing anorexia include the numerical rating scale (NRS) [18], the Council on Nutrition appetite questionnaire (CNAQ) [19], the Simplified Nutrition Assessment Questionnaire (SNAQ) [19], Appetite and Diet Assessment Tool (ADAT) [20], self-assessment of appetite changes [21], subjective assessment of appetite [6,10], Visual analogue scale (VAS) [22], Functional Assessment of Anorexia/Cachexia Therapy (FAACT) score [23], and Anorexia Questionnaire (AQ) [21] (Table 1). The VAS and FAACT are significantly associated with decreased food intake in patients on dialysis. These methods can also be used for monitoring anorexia. In contrast, a method that does not use an assessment chart and only asks the dialysis patient whether they have an appetite during dialysis is simpler and can become a routine part of daily practice.

Table 1. Characteristics of selected appetite assessment tools.

| Appetite Assessment Tool | Time Frame of Assessment | Description |
|---|----------------------------|--|
| numerical rating scale (NRS) [18] | Dietary habits for a week | Simple and easy to quantify. Determines present appetite indicated with a line on a scale (each end of the scale: 'Appetite' or 'No appetite'). |
| Council on Nutrition appetite questionnaire (CNAQ) [19] | Dietary habits for a month | Contains 8 questions related to appetite, food intake, satiety, and number of meals consumed per day derived from the Appetite, Hunger and Sensory Perception Questionnaire (AHSPQ). |

Table 1. Cont.

| Appetite Assessment Tool | Time Frame of Assessment | Description |
|---|----------------------------|---|
| Simplified Nutrition Assessment Questionnaire (SNAQ) [19] | Dietary habits for a month | Contains four questions related to appetite, food intake, satiety, and number of meals consumed per day. |
| Appetite and Diet Assessment Tool (ADAT) [20] | everyday | 44-Item self-administered questionnaire divided into three sections about appetite and eating habits in general, on dialysis, and on non-dialysis days, respectively. |
| self-assessment of appetite changes [21] | Last month (30 days) | Compares present appetite vs. appetite over the last month (increased, decreased, or unchanged). |
| subjective assessment of appetite [6,10] | Last week (7 days) | Compares present appetite vs. appetite last week (increased, decreased, or unchanged). |
| Visual analogue scale (VAS) [22] | At that point | Simple and easy to quantify. Determines present appetite indicated with a line on a scale (scale extremities: 0 mm, 'no hunger'; 100 mm, 'hunger'). |
| Functional Assessment of Anorexia/Cachexia Therapy (FAACT) score [23] | At that point | 12 questions related to appetite and food intake. Each question allows for 5 answers (i.e., not at all, a little bit, somewhat, quite a bit, very much.) |
| Anorexia questionnaire (AQ) [21] | At that point | 4 questions on the presence of early satiety, taste/smell alterations, meat aversion, and nausea/vomiting. |

3.2. Consideration of Dialysis Conditions

Increased appetite and the frequency of dialysis with hemodiafiltration have been suggested to improve nutritional status, appetite, and food intake [24]. Information should be shared with the clinical staff to discuss dialysis requirements (e.g., method, membrane, volume, and duration).

However, it should be noted that increased dialysis efficiency, while potentially improving appetite [24], can lead to a loss of amino acids [25,26] and the removal of micronutrients. Thus, the dialysis conditions should be determined based on the nutritional status of the patient.

Metabolic acidosis is also known to cause loss of appetite and easy fatigability. In their analysis of the DOPPS (dialysis outcomes and practice patterns study) of approximately 17,000 hemodialysis patients, Tentori et al. reported that the lower the pre-dialysis bicarbonate concentration, the higher the risk of all-cause mortality [27]. In addition, Vashistha et al. reported that a low pre-dialysis bicarbonate concentration was associated with a higher risk of all-cause mortality, cardiovascular death, and infection-related death based on data from approximately 110,000 hemodialysis patients in the Da Vita group [28]. Therefore, the adequate correction of metabolic acidosis is considered important, and the K/DOQI (National Kidney Foundation Kidney Disease Outcomes Quality Initiative) guidelines recommend a pre-dialysis bicarbonate concentration of at least 22 mEq/L [29,30]. Blood bicarbonate is negatively correlated with serum albumin and phosphorus levels and normalized protein nitrogen appearance; furthermore, in cases of high blood bicarbonate, poor protein intake may be the cause [31]. Therefore, ensuring adequate dietary intake—including protein intake—is necessary to improve metabolic acidosis. If a dietary approach is difficult to implement for dialysis patients with decreased appetite, one approach is to consider dialysate solutions. Acetic-acid-free dialysate with a high bicarbonate concentration of 35 mEq/L is excellent for improving metabolic acidosis, and there have been reports of increased protein intake after switching to acetic acid-free dialysate [32].

3.3. Review of Drug Prescription

In a study examining the association between anorexia and polypharmacy, the total number of medications prescribed did not significantly differ between the two groups; however, the anorexia group received significantly more sleeping pills [33].

Taste abnormalities are present in approximately 30% of patients on dialysis, which are associated with poor nutritional status and life expectancy [34]. One of the main causes of dysgeusia in dialysis patients is inadequate zinc intake, which is associated with dietary restriction, anorexia, intestinal malabsorption [35], and chronic kidney disease. Zinc administration has been reported to increase protein intake [36]. Antihypertensive medications also decrease zinc levels, such as angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, and calcium channel blockers. Appropriate and periodic prescription reviews are necessary in the treatment of anorexia. The cause of dysgeusia should be identified, and appropriate actions should be taken to address it.

3.4. Oral Care

Poor oral health affects appetite. As the number of natural teeth and appetite are independently associated with changes in body weight, tooth loss may increase the risk of dysphagia, leading to changes in food preference, food avoidance, and decreased energy intake [37].

3.5. Post-Dialysis Fatigue (PDF)

Dialysis patients often experience symptoms of fatigue and discomfort after dialysis [38]. More than 80% of dialysis patients experience symptoms of fatigue [39] and have been reported to rest or nap within 5 h of dialysis [40]. PDF [41] has been assessed on the basis of 'time', 'frequency', and 'intensity' by asking about 'time to recover from haemodialysis' (recovery time) [38–42], and various measures have been studied, but no international guidelines have been established for optimal measurement methods; if PDF is severe, it may indicate reduced food intake or missed meals after dialysis. A study of the new PDF scale reported that patients with normalized protein catabolic rate (nPCR) less than 0.8 had lower nPCR and serum albumin as the new PDF scale increased [43]. As reduced food intake and habitual skipping of meals can lead to decreased appetite, assessing symptoms of fatigue and malaise after dialysis can be effective in preventing decreased appetite. Standard dialysis is a type of dialysis in which patients go to a dialysis center three times a week. The rule that the medical staff ask a simple question before starting dialysis—"How long did it take you to feel better after your last dialysis session?"—is a simple assessment, but we believe it is a means of early detection of appetite loss.

3.6. Physical Activity

In a cross-sectional observational study of elderly hospitalized patients, good appetite during hospitalization was associated with higher habitual physical activity in the week before admission [44]. In this study, habitual physical activity was assessed using the Physical Activity Scale for the Elderly (PASE), which included leisure-time activities as well as home and work-related activities. A study of elderly maintenance hemodialysis patients reported that the frequency of exercise per week was independently associated with anorexia, and in addition to low muscle mass, slow walking speed was strongly associated with anorexia [45]. Although specific types of exercise and exercise duration were not specified, maintaining physical activity in daily life may be closely related to appetite. Therefore, exercise and rehabilitation interventions to maintain physical function and physical activity may improve appetite loss in dialysis patients.

4. Nutritional Intervention during Anorexia and Decreased Food Intake

If an older patient undergoing dialysis complains of anorexia, the risk of nutritional problems is increased. Anorexia and decreased or absent food intake should be suspected

when there is little or no weight gain. When anorexia or decreased food intake occurs, the following interventions should be considered.

4.1. Relaxation or Removal of Diet Restriction or Diet Therapy

Dietary energy deficiency (<35 kcal/kg body weight (BW)/day) and protein deficiency (<0.8 g/kg body weight (BW)/day) are found in 52–92% and 32.3–81% of dialysis patients, respectively [46]. Consuming enough energy and protein is a major challenge for dialysis patients. It is clear that patients with reduced appetite have even lower energy and nutrient intakes. Therefore, there is little need to continue their dialysis diet.

The patient's interest in and satisfaction with food may be restored through the relaxation or removal of dietary restrictions.

4.2. Supplement Energy and Protein with Snacks and Frequent Meals

Ways to increase energy intake include adding fried foods that absorb a lot of oil or fatty meats in dishes or using butter or honey. Older adults may have difficulty eating enough fatty foods, but they can supplement energy and protein by eating small amounts of doughnuts, sandwiches, croissants, etc., outside of mealtimes. In addition, medium-chain triglycerides (MCTs) oil is tasteless, odorless, and can be easily used like a dressing. MCTs are useful as an energy source because they do not form micelles, enter the general circulation quickly through the portal vein. And MCTs consumption may trigger acylation (activation) of ghrelin, leading to increased appetite [47]. In addition to their use in the diet, they can be added to ice cream or yogurt during supplementary meals to increase energy levels in addition to protein intake; elderly dialysis patients treated with 12 g/day of amino acids for 6 months had improved appetite [48]. While a balanced diet of amino acid-rich meats, fish, eggs, beans, and dairy products is important, patients with decreased appetite may also benefit from the use of amino acid-rich oral nutritional supplements (ONS).

4.3. Use of ONS

ONS with limited protein should not be used; those that are high in energy and protein should be used instead. Some reports have suggested that ONS ingestion before meals promotes satisfaction and influences food intake [49]. To address the reduced food intake due to decreased appetite, the use of ONS as part of a meal or during or after dialysis has been considered, and significantly reduced mortality and readmission rates in dialysis patients who received ONS have been reported [49–51]. The recommended amount of nutritional intake from ONS in dialysis patients is 7–10 kcal/kg BW of energy and 0.3–0.4 g/kg BW of protein. Once the amount of supplemental nutrition from ONS has been determined, it is recommended that it be divided into two to three portions per day and continued for a minimum of 3 months [29].

Compared to hemodialysis, hemodiafiltration dialysis—which has recently been implemented in many facilities in Japan—is more efficient in removing medium molecular weight proteins and other substances, while albumin leakage is high [25,26]. Hemodialysis accelerates the breakdown of systemic and muscle proteins, and muscle protein breakdown is accelerated in the 2 h after the end of treatment [52]. Although muscle protein breakdown decreases 2 h after the end of treatment, systemic protein breakdown continues to increase. This suggests the importance of nutritional intake during or immediately after dialysis. Therefore, the use of food or ONS during or immediately after dialysis should be actively sought.

4.4. Intradialytic Parenteral Nutrition (IDPN) Study

In the ESPEN study, nutritional intervention in dialysis patients with nutritional disorders was the first attempt to improve their nutritional status through nutritional guidance. If this was inadequate, ONS were attempted. The next step was to consider an IDPN [26]. In this case, the use of IDPN is conducted for nutritional supplementation. As IDPN alone cannot meet the nutritional requirements of patients, adjustments should be made while considering the concomitant use of diet, enteral nutrition, and ONS.

5. Specific Nutritional Counseling

Nutrient requirements are set based on guidelines [26,29], but no standard diet exists. Specific individualized suggestions are required for a patient to consume the necessary energy and protein in the form of foods and dishes, and how to practice the management of minerals such as salt and potassium must be considered as well. The patient's dietary status and intentions should be ascertained—such as the extent to which the patient can or cannot cook, whether the patient mainly consumes home-cooked meals, what kinds of foods are often purchased, who the key persons are, and so on—and suggestions should be made regarding food choices and how to adjust the amount of food used. The patient's dietary situation can also be assessed, following which suggestions can be made regarding food selection and usage [53]. Dietary suggestions that do not compromise food satisfaction and happiness may influence the food intake of patients [34].

During nutritional guidance, the dietitian may tell the patient something along the lines of “The recommended daily protein intake is 45 g”. However, the patient may not understand correctly that the guideline is “up to 45 g of meat (protein food) per day”. Therefore, those who provide dietary guidance must give patients specific amounts (guideline amounts), rather than numerical values (g). Next, suggestions for food use and cooking methods should be made, according to the individual's life background [54]. Improving the eating environment may be a more effective strategy for improving the appetite of patients [55].

In addition, attention should be paid to nutritional counseling techniques. Incremental behavior-change techniques can increase confidence in behavior-change self-effectiveness by gradually and incrementally raising the goal toward achieving the behavior [56]. According to social cognitive theory, two factors determine whether an individual can perform a behavior: outcome expectations, which are expectations or images associated with the outcome of performing a certain behavior, and self-efficacy, which is the confidence in one's ability to perform the behavior required to achieve that outcome successfully [56]. The likelihood of performing a behavior is high if both of these factors are high. When providing nutritional counseling to patients, they should be aware of the goals to focus on. Dietitians should set goals that the patient will follow and aim to achieve [53]. Patients need to be able to follow their daily diet without difficulty.

6. Support from Conservative Phase to Dialysis Phase (Dialysis Transition Phase)

Before and after the induction of dialysis, patients are often physically and emotionally unstable. During the transition to dialysis, the patient's diet changes according to the renal replacement therapy (e.g., outpatient hemodialysis, home hemodialysis, or peritoneal dialysis) chosen by the patient, and the treatment methods and diet change significantly. In particular, the diet from the conservative phase to the dialysis phase includes increased protein intake as well as fluid, potassium, and phosphorus management [26,29]. As the patient's physical condition and appetite improve with dialysis therapy, it is important to educate the patient about diet, not only at the time of dialysis induction, but also after one month when the patient has settled into dialysis, or at the time of transfer to a maintenance dialysis facility. In this case, the incremental behavior-change technique described above should be utilized [56].

7. Conclusions

There are many causes of anorexia in dialysis patients, including older patients. To improve appetite in older patients on dialysis, we must identify anorexic conditions early, identify the associated cause(s), and intervene to resolve the problem. Nutritional interventions include reducing dietary restrictions, using ONS and IDPN, and supplementing with energy, protein, and micronutrients to prevent the development of nutritional disorders. Specific recommendations and educational techniques are key to nutritional counseling (Figure 2). This paper described the practicalities of improving the appetite of elderly dialysis patients in Japan at this time from a dietitian's perspective. It is difficult to provide

a clear answer on how to improve appetite in older patients on dialysis. However, the proportion of elderly dialysis patients in Japan will not decrease. Therefore, appropriate interventions to increase appetite become even more necessary. Food and food culture are unique to each country. I suggest that research should focus on traditional Japanese dietary patterns in order to suggest dietary patterns for Japanese dialysis patients to prevent appetite loss and dietary guidance to improve appetite. And dialysis treatment is a multi-professional collaborative treatment. Dietitians alone cannot intervene to solve problems. Therefore, in countries with an ageing population of dialysis patients, it is important to combine the assessments of different professions and consider methods to improve the appetite of individual elderly dialysis patients.

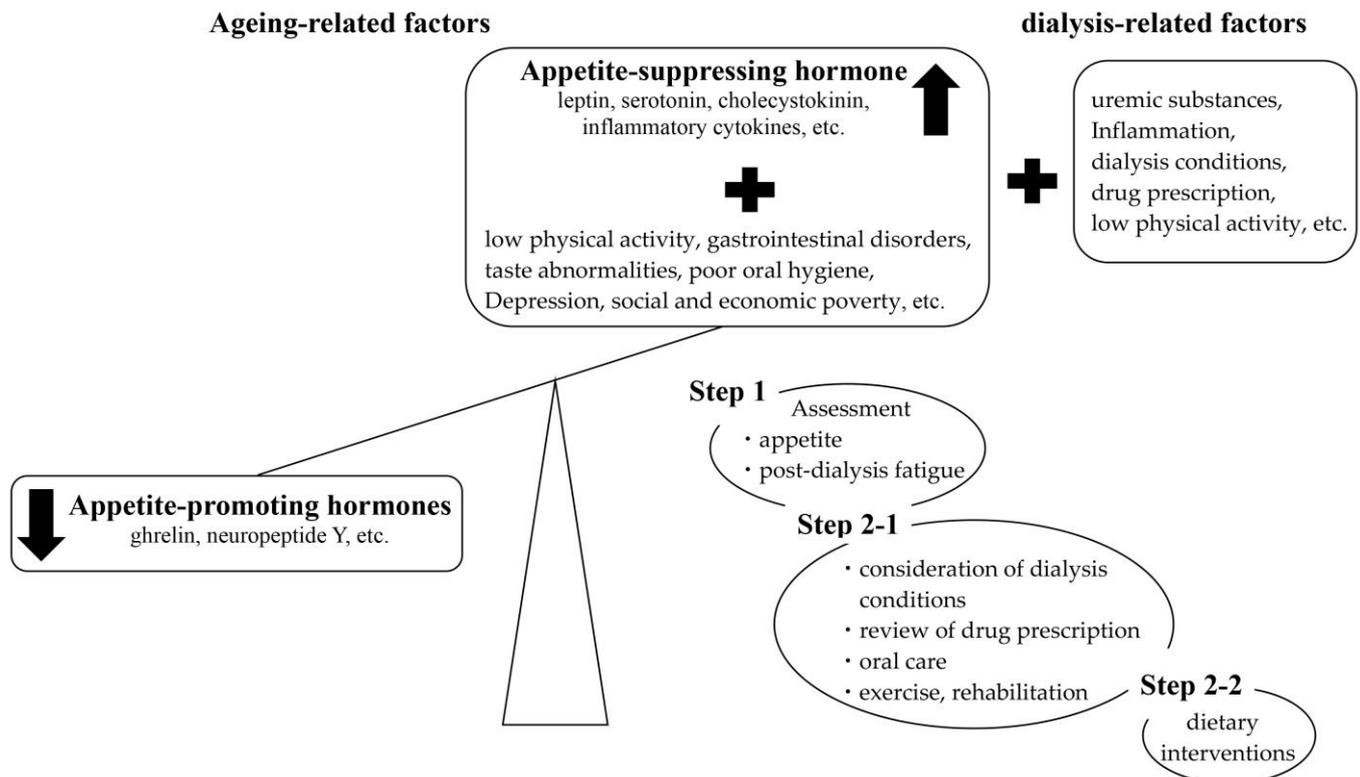


Figure 2. The causes of anorexia with the countermeasures against loss of appetite.

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