

ORAL NUTRITION SUPPLEMENTATION IN CKD When nutrition counseling per se fails to meet the difference between the spontaneous dietary intake and the recommended nutrition requirements in CKD, the use of oral nutrition supplements (ONSs) should be considered as the immediate choice of nutrition support therapy to replenish and prevent depletion of protein-energy stores. Specifically, the KDOQI/AND guidelines advocate a trial of ONS for at least 3 months to improve nutrition status if nutrition counseling alone does not attain sufficient protein and energy intake in both non-dialysis-dependent CKD and maintenance dialysis patients.<sup>18</sup> The ISRN suggested a list of indicators for commencing ONS.<sup>13</sup> These include (1) poor oral intake and/or poor appetite; (2) dietary intake of energy and protein  $30 \text{ kcal/kg/d}$  and  $1.2 \text{ g/kg/d}$ , respectively; (3) serum concentrations of albumin  $< 3.8 \text{ g/dL}$  or prealbumin  $28 \text{ mg/ml}$  (only for patients undergoing maintenance dialysis lacking residual renal function); (4) unintentional weight loss  $5\%$  of estimated dry weight or IBW over a 3-month period; (5) SGA composite nutrition score within the range for PEW; and (6) deteriorating nutrition status reflected by temporal changes in various nutrition markers. In general, ONSs provide a further  $0.3\text{--}0.4 \text{ g/kg/d}$  protein and  $7\text{--}10 \text{ kcal/kg/d}$  and demand the complement of an oral intake of  $0.4\text{--}0.8 \text{ g/kg/d}$  protein and  $>20 \text{ kcal/kg/d}$  to achieve the recommended requirements for dietary protein and energy.<sup>11,13</sup> Oral nutrition supplementation is an effective nutrition support strategy in cases of mild to moderate PEW because routine nutrition intake in many patients with CKD usually surpasses the necessary minimum level of spontaneous oral intake.<sup>46,54</sup> Various research settings have explored the effectiveness of ONSs. Metabolic studies demonstrated a positive whole-body protein balance achievable with ONSs during hemodialysis<sup>55,56</sup> in addition to sustainable anabolic effects in the postdialytic period.<sup>56</sup> Clinical trials, comprising both RCTs and non-RCTs, also supported the efficacy of ONSs in sustaining and improving nutrition status in patients with CKD. Table 3 summarizes a list of clinical trials with relevant clinical and nutrition outcome measures. Although the effect of ONSs has been evaluated in patients undergoing hemodialysis,<sup>57–69</sup> there is relatively little attention on the use of ONSs among non-dialysis-dependent CKD<sup>70</sup> and peritoneal dialysis patients.<sup>66,71,72</sup> The variety of ONSs depicted in the existing literature comprised commercial<sup>58–72</sup> and food-based<sup>57</sup> supplements taken during dialysis or at home, all of which consisted of energy-based,<sup>65,70</sup> protein-based,<sup>62–64,66,72</sup> protein-energy,<sup>57–61,67–69,71</sup> and renal-specific<sup>59,60,68,69</sup> formulas. Although the lack of placebo controls in clinical trials remains a significant limitation in the current literature,<sup>64</sup> the majority of these studies incorporated a comparative group in which patients with CKD were provided with nutrition counseling only,<sup>57–59,62,65,66,69,70,72</sup> ONS combined with IDPN,<sup>61</sup> or no supplementation.<sup>60,63,67,68,71</sup> The duration of supplementation was variable, ranging from 3 months to longer than a year. The use of an energy-based supplement in patients with non-dialysis-dependent CKD resulted in reduction of dietary protein intake, improved compliance with a low-protein diet, and decreased proteinuria.<sup>70</sup> By contrast, in patients undergoing maintenance dialysis, these supplements led to improvements in dietary intake of energy<sup>59,60,62,65,72</sup> and protein<sup>59,61–63,66,72</sup>; biomarkers such as serum concentrations of albumin,<sup>58,61–63,66–69,72</sup> prealbumin,<sup>61</sup> and total protein<sup>63</sup>; anthropometric markers including BW,<sup>62,63,65,69,71</sup> BMI,<sup>61</sup> fat mass,<sup>60,62,65,69,71,72</sup> and muscle mass<sup>62,65,71,72</sup>; and composite nutrition score such as SGA score.<sup>57,59,72</sup> The improvements were appreciated as early as 1

month<sup>62,65</sup> and were found to be sustainable.<sup>58,61,62,65,67,72</sup> Notably, there were improvements in inflammation,<sup>63,64</sup> physical functioning,<sup>64</sup> and quality of life.<sup>57,59,68</sup> Although mortality and hospitalization were frequently described in clinical trials,<sup>58,61,66</sup> the majority of studies had inadequate statistical power to sufficiently address the clinical effectiveness of ONSs. Nevertheless, large-scale observational studies had depicted lower mortality<sup>73</sup> and hospitalization<sup>67</sup> rates among patients on maintenance dialysis who consumed ONSs. To optimize the beneficial effects of oral nutrition supplementation, particular attention should be paid to the 19412452, 2021, 2, Downloaded from <https://aspenjournals.onlinelibrary.wiley.com/doi/10.1002/ncp.10658> by Egyptian National Sti. Network (Enstinet), Wiley Online Library on [18/04/2024]. See the Terms and Conditions (<https://onlinelibrary.wiley.com/terms-and-conditions>) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative