Immune Globulin Dosing: Actual Versus Ideal or Adjusted Body Weight

By Michelle Greer, RN, IgCN, and Joseph DiStefano, RPh, IgCP, CSP

RECENTLY, STUDIES have examined whether methods for determining dosing strategy for immune globulin (IG) treatment could result in cost savings and better clinical outcomes and quality of life. Specifically, the studies sought to answer whether dosing should be based on adjusted (AdjBW) or ideal body weight (IBW) versus actual body weight (ABW), especially in obese individuals.

IG Dosing Guidelines

IG therapy dosing is based on body weight in kilograms. Since one kilogram is equivalent to 2.2 pounds, pounds are divided by 2.2 to convert them into kilograms. Dosing also depends on a variety of other factors, including diagnosis, physician preference, tolerability and response to therapy. For some diagnoses, physicians may prescribe a high dose of IG therapy throughout the course of therapy. For instance, patients treated with intravenous IG (IVIG) for autoimmune blistering diseases typically start with 2 grams per kilogram of body weight each month and continue this dose for the entire length of treatment. For other conditions, dosing may start high and then taper as response to treatment is noted and/or reported. For instance, dosing for chronic inflammatory demyelinating polyneuropathy (CIDP) patients might begin at 1 gram per kilogram to 2 grams per kilogram and then be tapered to 0.5 gram per kilogram to 1 gram per kilogram monthly. Conversely, in some patients, dosing may begin low and remain that way for life. This is often the case for primary and secondary immune deficiency patients in whom the dose is typically around 0.4 grams per kilogram monthly. It should be noted that for CIDP and immune deficiencies, these dosing guidelines can be prescribed for both IVIG and subcutaneous IG administration.

Proposed New IG Dosing Guidelines

Currently, U.S. Food and Drug Administration-approved dosing for all IG products is based on ABW, and traditionally, ABW is used to determine the formal study of the processes of absorption, distribution, metabolism and excretion of medicinal products (e.g., how the body chemically processes medicines). As one publication states, the proposed pharmacokinetic differences between lean and obese patients and the opportunity to reduce costs has led to the proposal that obese patients should receive proportionally lower doses of IG once a certain threshold is reached.1 Indeed, initial data shows comparable outcomes using lower doses, so the question is: With a product such as IG, for which supply can ebb and flow based on plasma donations and other factors, is it a good idea to begin dosing patients based on IBW or AdjBW to better manage and protect product supply? Especially now, when plasma donations have decreased over the last many months due to the COVID-19 pandemic, this could be a beneficial way to prescribe less product yet achieve the same clinical outcomes. Additionally, depending on where patients are infused, there could be significant clinical cost savings.

In 2017, a study compared the effectiveness of using a precision-dosing strategy (IBW or AdjBW) versus a traditional-dosing strategy (ABW) for IVIG therapy in patients with hematologic malignancies or those undergoing hematopoietic stem cell transplant. The retrospective cohort

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study included 209 IVIG patients, 125 of whom were dosed using ABW and 84 of whom were dosed using IBW or AdjBW. The primary outcome was infection rate within 30 days of IVIG administration. Secondary outcomes included 60-day infection rate, immunoglobulin G (IgG)-level response (IgG higher than 400 mg/dl) and realized and potential IVIG savings. Results showed no difference in 30-day infection rate between precision- and traditional-dosing strategies (15.5 percent versus 16 percent, respectively). Similarly, no difference was identified in the 60-day infection rate between groups (23.2 percent versus 19.8 percent, respectively). Levels of IgG obtained after IVIG repletion showed a treatment response rate of 86 percent in both groups. In addition, use of a precision-dosing strategy achieved $2,600 per month in institutional savings with the opportunity for an additional $4,600 per month in savings with complete adherence to this dosing strategy.

Another retrospective study conducted at MD Anderson Cancer Center examined all IVIG doses administered in adults ages 18 years and older from January 2011 through January 2016. Total body weight (TBW) and height at the time of administration were used to calculate prescribed dose (grams per kilogram), IBW and AdjBW. Three dosing methods were then analyzed: 1) Use of AdjBW if TBW was greater than 120 percent of IBW, 2) AdjBW for all doses and 3) IBW for all doses. Outcomes included potential IVIG use averted, direct drug cost savings and reductions in outpatient infusion times for each method. Of the 9,918 doses administered to 2,564 patients over five years, which represented an average usage of 75,994 grams per year, the study found that if dosing methods 1, 2 and 3 had been used, the annual use of IVIG would have decreased by 21.9 percent (16,658 grams per year), 24.2 percent (18,371 grams per year) and 35.9 percent (27,252 grams per year), respectively. This translated into average annual cost differences of $2.37 million, $2.62 million, and $3.89 million, and average annual outpatient infusion time savings of 841 hours, 920 hours, and 1,366 hours, respectively. The researchers concluded IVIG dosing optimization through use of alternative dosing weights represents a significant source of waste and cost reduction.

Although only a few studies have examined these different IG dosing guidelines, there are numerous unpublished anecdotal reports since dosing can be prescribed based on the prescriber’s preference or a pharmacist’s recommendation. Plus, it is always desirable for patients to be prescribed the lowest effective dose of any treatment. This is especially true for IG treatment for which infusions can be lengthy and the frequency of therapy can be years or lifelong. Additionally, with higher dosing, the potential for side effects becomes greater. Most notably, because the risk for cardiovascular adverse events is higher in obese individuals, lower doses that can generate the desired clinical response are always preferred.

### Improving Clinical Outcomes and Quality of Life

There are many benefits of IG dosing based on AdjBW or IBW, especially in obese patients to reduce the risk of adverse events, including serious ones. But, overall, benefits include use of the minimally effective dose to achieve the desired clinical outcome; improved quality of life due to shorter infusion periods; potential cost savings for patients due to smaller doses and less nursing time; overall cost savings for the healthcare industry; and optimization of the drug supply to help the greatest number of patients, especially during periods of decreased plasma donations. Indeed, adopting IG dosing guidelines based on AdjBW or IBW for all patients could magnify these benefits and may be worthy of consideration.

### References


### Table. Calculating Body Weight

<table>
<thead>
<tr>
<th>Adjusted body weight (AdjBW)</th>
<th>Formula</th>
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<tbody>
<tr>
<td>IBW + 0.4(ABW – IBW)</td>
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<table>
<thead>
<tr>
<th>Ideal body weight (IBW)</th>
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<tr>
<td>Males: IBW = 50 kg + 2.3 kg for each inch over 5 feet</td>
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<tr>
<td>Females: IBW = 45.5 kg + 2.3 kg for each inch over 5 feet</td>
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### Adjusted body weight (AdjBW)

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\text{Adjusted body weight (AdjBW)} = \text{IBW} + 0.4(\text{ABW} - \text{IBW})
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### Ideal body weight (IBW)

- Males: IBW = 50 kg + 2.3 kg for each inch over 5 feet
- Females: IBW = 45.5 kg + 2.3 kg for each inch over 5 feet

### References