

Efficacy of Caspofungin against Invasive *Candida* or Invasive *Aspergillus* Infections in Neutropenic Patients

Robert Betts, M.D.¹
 Axel Glasmacher, M.D.²
 Johan Maertens, M.D.³
 Georg Maschmeyer, M.D.⁴
 Jose A. Vazquez, M.D.⁵
 Hedy Teppler, M.D.⁶
 Arlene Taylor, M.S.⁶
 Robert Lupinacci, M.S.⁶
 Carole Sable, M.D.⁶
 Nicholas Kartsonis, M.D.⁶

¹ Department of Infectious Diseases, University of Rochester, New York.

² Department of Internal Medicine I, University Bonn, Bonn, Germany.

³ Department of Clinical Hematology and Stem Cell Transplantation, U.Z. Gasthuisberg, Leuven, Belgium.

⁴ Department of Hematology and Oncology, Klinikum Ernst von Bergmann, Potsdam, Germany.

⁵ Division of Infectious Diseases, Department of Medicine, Henry Ford Hospital, Detroit, Michigan.

⁶ Clinical and Quantitative Sciences, Merck Research Laboratories, West Point, Pennsylvania. Support by Merck Research Laboratories.

Address for reprints: Nicholas A. Kartsonis, M.D., Clinical Research, Merck Research Laboratories, Merck & Co., BL 3-4, PO Box 4, West Point, PA 19486-0004; Fax: (484) 344-3370; E-mail: nicholas_kartsonis@merck.com

Dr. Betts has conducted studies on patients for which there was payment for cases enrolled. Payment was made to Dr. Bett's department, not directly to Dr. Betts himself.

Dr. Glasmacher has received speakers' honoraria from Gilead. He has acted as a scientific consultant and received research support and speakers' honoraria from Janssen-Cilag/Ortho-Biotech and MSD Sharp and Dohme. He has also received research support and speakers' honoraria from Pfizer, and has acted as a scientific consultant for Schering-Plough.

BACKGROUND. Neutropenia is an indicator of poor prognosis in patients with fungal infections. All available clinical trial experience from the caspofungin development program was reviewed to ascertain the efficacy of caspofungin in neutropenic patients with documented invasive aspergillosis (IA) or invasive candidiasis (IC).

METHODS. The review was limited to neutropenic patients with proven IC or proven/probable IA at caspofungin onset. Data were available from four clinical trials. All patients had an absolute neutrophil count < 500/mm³ at the initiation of caspofungin. In all cases caspofungin was administered as monotherapy at a dose of 50 mg/day, after a 70-mg loading dose. In all patients efficacy was assessed at the completion of caspofungin therapy. Success included complete and partial responses.

RESULTS. Sixty-eight neutropenic patients were identified with documented invasive infection, including 27 with IC and 41 with IA. Most patients had acute or chronic leukemia. A favorable response was noted in 63% (17 of 27 patients) of patients with IC, including a 58% (14 of 24 patients) response as first-line therapy and a 100% (3 of 3 patients) response as salvage therapy. Success in candidemia was 68% (17 of 25 patients). Outcomes across the different *Candida* species were similar. Favorable responses were noted in 39% (16 of 41 patients) of patients with IA, including a 42% (5 of 12 patients) response as first-line therapy and 38% (11 of 29 patients) response as salvage therapy. Success by site of IA was 40% for pulmonary (12 of 30 patients), 43% for sinus (3 of 7 patients), and 25% for skin/disseminated site (1 of 4 patients).

CONCLUSIONS. A review of the caspofungin database demonstrates that this echinocandin is effective in neutropenic patients with documented cases of IC or IA. *Cancer* 2006;106:466-73. © 2005 American Cancer Society.

KEYWORDS: caspofungin, neutropenia, candidiasis, aspergillosis.

Invasive candidiasis (IC) and invasive aspergillosis (IA) have been recognized worldwide as important infectious etiologies in immunocompromised patients.¹⁻⁸ The significant morbidity and mortality seen in these patients is attributed, in part, to the poor host defenses encountered in this patient population. The presence of neutropenia

Dr. Vazquez has received grant support and been a member of the Speakers' Bureau for Merck and Pfizer, has received grant support and has acted as a scientific consultant for Fujisawa, and has received grant support and acted as a scientific consultant for Schering-Plough and Astellas.

Dr. Teppler, Ms. Taylor, Mr. Lupinacci, Dr. Sable, and Dr. Kartsonis are employed by Merck Research Laboratories.

Received February 22, 2005; revision received May 12, 2005; accepted July 13, 2005.

at the time of diagnosis in particular has been repeatedly identified as a reliable indicator of poor prognosis in patients with invasive fungal infections.^{9–12}

Many of the current antifungal therapies for neutropenic hosts have noteworthy limitations. Amphotericin B deoxycholate has served as the mainstay for treatment of invasive infections in neutropenic patients since its licensing nearly 50 years ago.^{13–15} However, infusion-related toxicities, nephrotoxicity, and electrolyte disturbances often limit treatment with amphotericin B or its lipid formulations.¹⁴ Furthermore, recent studies have demonstrated relatively poor efficacy for the polyenes in the treatment of neutropenic patients with IA.^{16,17} Although voriconazole has demonstrated efficacy in IA,^{16,18} to our knowledge few randomized IC studies for voriconazole (and fluconazole) have permitted the enrollment of neutropenic patients.^{19–23} Furthermore, triazole agents manifest significant drug interactions with other agents frequently used in these neutropenic hosts.

A medical need remains for novel, effective, and safe agents in the treatment of neutropenic patients with serious *Candida* or *Aspergillus* infections. One possible therapeutic alternative for IC and IA is caspofungin, a parenteral echinocandin antifungal with activity against *Candida* and *Aspergillus* species.^{24–27} In a large multicenter study, caspofungin was found to be as effective as amphotericin B for the primary treatment of IC.²⁸ Caspofungin has also demonstrated efficacy as a salvage option in patients with documented IA.²⁹ More recently, caspofungin was found to be as effective as liposomal amphotericin as empiric therapy in patients with persistent fever and neutropenia.³⁰ In all these studies caspofungin has demonstrated an excellent safety profile with few serious drug-related adverse events and few therapy discontinuations resulting from drug-related toxicity.^{28–30}

In an effort to ascertain whether caspofungin would provide an effective alternative for neutropenic patients with invasive infections, we performed a retrospective, post hoc review of all the completed studies within the current Merck database. Herein we describe the baseline characteristics and caspofungin-associated outcomes from 68 neutropenic patients who had documented evidence of IC or IA, as defined by consensus guidelines,^{31,32} at the onset of caspofungin therapy.

MATERIALS AND METHODS

Retrospective Review

This review was limited to clinical trials from the caspofungin clinical development program. All neutropenic patients with documented (proven) IC or

(proven/probable) IA, as defined by consensus definitions on invasive fungal infections issued from both the European Organization for Research and Treatment of Cancer (EORTC) and the National Institute of Allergy and Infectious Diseases Mycosis Study Group (NIAID-MSG),^{31,32} were identified before the initiation of caspofungin therapy. For IC, proven disease required clinical evidence of infection and at least one positive culture for *Candida sp.* (or histopathological evidence of *Candida* infection) from an invasive, sterile site. For IA, proven (or definite) disease was defined as the presence of either 1) tissue histopathology with evidence of invasive *Aspergillus* infection, or 2) a positive culture for *Aspergillus sp.* from tissue obtained by an invasive procedure (e.g., open lung biopsy, transbronchial biopsy, percutaneous needle aspiration). Probable IA signified the appropriate host factors in a patient with clinical and radiographic evidence of disease and either 1) a positive culture for *Aspergillus sp.* from at least one sputum or bronchoalveolar lavage (BAL), or 2) two or more consecutively positive results from plasma for *Aspergillus* galactomannan obtained via a sandwich enzyme-linked immunoadsorbent assay (ELISA).

Data were available from four multicenter clinical trials: the noncomparative caspofungin salvage IA study (Protocol 019), the comparative IC study (vs. amphotericin B, Protocol 014), the noncomparative IA/IC compassionate use study (Protocol 024/025), and the comparative empirical therapy study in patients with persistent fever and neutropenia (vs. liposomal amphotericin, Protocol 026).^{28–30,33–34} The empiric therapy study was incorporated in this review as it included a subset of patients who had IC or IA based on clinical, radiographic, and/or microbiological evidence of infection at study entry but in whom the results of these prestudy evaluations were not available until after caspofungin was initiated (such infections were categorized as 'baseline' invasive fungal infections). All patients included in this review had an absolute neutrophil count (ANC) < 500/mm³ at the onset of caspofungin therapy. It is noteworthy that all protocols were approved by the institutional review boards of all participating centers. Written informed consent was obtained from all enrolled patients

Treatment Regimen

All patients were administered caspofungin at a dose of 50 mg/day, after a 70-mg loading dose on Day 1. In two studies (Protocols 019 and 024/025), caspofungin was administered as salvage therapy in patients refractory or intolerant of at least one other antifungal regimen. In the remaining two studies (Protocols 014 and 026), caspofungin was administered as primary

therapy. In all patients, caspofungin was given intravenously (i.v.) as a single daily dose infused over approximately 1 hour. The review was limited to patients receiving caspofungin monotherapy; therefore, patients who received other systemic antifungal therapies concomitantly with caspofungin were not included. For patients with IC, antifungal therapy was to be administered for at least 14 days after the last positive culture for *Candida sp.* recovered from the site of infection. For patients with IA, the duration of caspofungin therapy was based on the severity of underlying disease, recovery from immunosuppression, and rapidity of clinical response. In general, patients were treated for a minimum of 14–28 days. Therapy for IA was maintained for at least 7 days after resolution of symptoms and at least 7–14 days after resolution of neutropenia ($ANC > 500 \text{ mm}^3$). After completion of caspofungin therapy, suppressive antifungal therapy was permitted, as clinically indicated and tolerated.

Efficacy Assessment

Efficacy was assessed at the completion of caspofungin therapy. At this timepoint a favorable response included all patients with either a complete or partial response. A favorable response in patients with IC required either resolution (complete response) or significant improvement (partial response) of all signs, symptoms, and radiographic abnormalities attributed to *Candida* AND eradication of *Candida sp.* from follow-up cultures from the invasive site. In IA, a complete response required resolution of all clinical signs and symptoms attributable to IA and complete resolution of radiographic or bronchoscopic abnormalities. A partial response necessitated clinically meaningful improvement (resolution or near-complete resolution) of all clinical signs and symptoms attributable to IA and significant improvement (at least 50% reduction) in all radiographic or bronchoscopic abnormalities. Efficacy was primarily assessed using a modified-intention-to-treat (MITT) approach, which included all patients with documented (proven) IC or (proven or probable) IA who received at least 1 day of caspofungin therapy. A secondary analysis focusing solely on those patients receiving at least 7 days of caspofungin therapy was also performed. Confidence intervals (CI), when performed, were calculated as 95% exact confidence intervals (95% CI) based on the binomial distribution. Recurrence during the post-therapy period also was assessed in all patients with a favorable response at the end of therapy, but the extent of follow-up varied based on the protocol and indication under study (posttherapy range of 2–12 weeks for IC and 2–4 weeks for IA).

Safety Assessment

All patients who received at least one dose of caspofungin study therapy are included in the safety analyses. Safety measures evaluated across all studies included the following parameters: serious drug-related adverse events, drug-related adverse events, and discontinuations due to drug-related adverse events. These measures were assessed throughout the entire caspofungin treatment course and for 14 days after therapy.

RESULTS

Enrollment and Baseline Characteristics

Sixty-eight neutropenic patients were identified with documented invasive infection from these 4 studies: 27 patients with proven IC and 41 patients with proven or probable IA. The baseline characteristics of these 68 patients are presented by infection type in Table 1. The patients with IC were evenly distributed by gender, with ages ranging between 20–74 years (median, 54 yrs). Acute leukemia (67%) was the most common underlying condition. Candidemia, or a hematogenous evidence of infection (based on 1 or more positive blood cultures for *Candida sp.*), was the most common site of infection (25 of 27 patients; 93%). The two remaining patients had disseminated infection, including one patient with acutely disseminated disease (including culture-confirmed involvement of blood, lung, and skin) and another patient with histopathologically proven and radiographically confirmed evidence of chronic disseminated (or hepatosplenic) candidiasis. At study entry, the majority (67%) of patients had severe neutropenia, as defined by an $ANC < 100 \text{ cells/mm}^3$. Most infections were due to *C. tropicalis* (37%), *C. albicans* (22%), or *C. krusei* (11%).

Conversely, the majority of patients with IA were male between the ages of 20 and 89 years (median, 53 yrs). Acute leukemia (56%) was the most common underlying condition, but chronic leukemia and myelodysplastic syndrome accounted for approximately one-fourth of the cases. Approximately one-quarter of the patients (24%) were recipients of an allogeneic hematopoietic stem cell transplantation. The lungs (73%) were the most common site of infection, followed by the sinuses (17%) and disseminated disease (7%). Approximately half of the patients (56%) had proven cases of infection.

Duration of Therapy

Most patients with IC (89%) received caspofungin as primary therapy. For patients with IC, the mean duration of caspofungin therapy was 15.7 days (median, 14.5 days; range, 3–57 days). The majority of patients

TABLE 1
Baseline Patient Characteristics in Neutropenic Patients with Invasive Fungal Infections

Baseline characteristic	Patients with invasive candidiasis (n = 27)		Patients with invasive aspergillosis (n = 41)	
	No. ^a	%	No. ^a	%
Gender				
Male	13	(48.1)	25	(61.0)
Female	14	(51.9)	16	(39.0)
Median age in yrs (range)	54	(20–74)	53	(20–89)
Underlying disease				
Acute leukemia	18 ^b	(66.7)	23 ^c	(56.1)
Chronic leukemia	2	(7.4)	6	(14.6)
Non-Hodgkin lymphoma	3	(11.1)	3	(7.3)
Other hematologic diseases	4	(14.8)	9	(22.0)
Likelihood of infection (per EORTC/MSG criteria)				
Proven	27 ^d	(100.0)	23 ^e	(56.1)
Probable	NA	—	18	(43.9)
Neutropenic status at caspofungin onset				
ANC of 101–499 mm ³	9	(33.3)	20	(48.8)
ANC < 100 mm ³	18	(66.7)	21	(51.2)
Type of therapy				
Primary	24	(88.9)	12	(29.2)
Salvage	3	(11.1)	29	(70.7)

EORTC/MSG: European Organization for Research and Treatment of Cancer/National Institute of Allergy and Infectious Diseases Mycosis Study Group; ANC: absolute neutrophil count.

^a Data are numbers with associated percentage (%), unless otherwise indicated, for each of the two conditions (invasive candidiasis and invasive aspergillosis). It is interesting to note that none of the patients had a mixed infection with both invasive candidiasis and invasive aspergillosis.

^b Includes 12 patients with acute myelogenous leukemia and 6 patients with acute lymphoblastic leukemia. One of the patients (4%) of the patients was a recipient of an allogeneic hematopoietic stem cell transplantation.

^c Includes 21 patients with acute myelogenous leukemia and 2 patients with acute lymphoblastic leukemia. Ten patients (24%) patients were recipients of an allogeneic hematopoietic stem cell transplantation.

^d Sites of invasive candidiasis included candidemia (25 patients), chronic disseminated candidiasis (1 patient), and acutely disseminated candidiasis (1 patient, involving the blood, lung, and skin).

^e Sites of invasive aspergillosis included pulmonary disease (30 patients), sinus (7 patients), skin (1 patient), and disseminated infection (3 patients).

with IA (71%) received caspofungin as salvage monotherapy. The mean duration of caspofungin therapy in patients with IA was 25.2 days (median, 12.0 days; range, 1–93 days). Only three patients (one with IC and two with IA) received concomitant granulocyte transfusions during caspofungin therapy.

Efficacy

At the end of caspofungin therapy, favorable outcomes were noted in 63% (95% CI, 42–81%) of the neutropenic patients with IC, with all but 2 patients demonstrating a complete response to caspofungin (Table 2). The two patients with a partial response, both with candidemia, had significant clinical improvement in symptoms (without complete resolution) in the setting of negative blood cultures at the end of caspofungin therapy. A favorable response was noted in 68% patients with candidemia (15 complete responses and 2 partial responses). However, neither of the two patients with disseminated candidiasis manifested a favorable response. Patients with less severe neutropenia (an ANC of 100–499 mm³) and

patients who resolved their neutropenia while receiving caspofungin therapy tended to fare better than patients with severe neutropenia and those without granulocytic recovery. Outcomes by *Candida* pathogen were 6 of 10 patients (60%) for *C. tropicalis*, 2 of 6 patients (33%) for *C. albicans*, and 3 of 3 patients (100%) for *C. krusei*. All the patients with infections involving *C. parapsilosis*, *C. guilliermondii*, or *C. glabrata* also had favorable responses. Notably, 15 of 21 patients (71%) receiving at least 7 days of caspofungin therapy for IC manifested a favorable response.

In neutropenic patients with IA, favorable responses with caspofungin were noted in 39% (95% CI, 24–56%), including a 42% response as first-line therapy and 38% response as salvage therapy (Table 2). Although the success rates were relatively similar across the different sites of infection, patients with acute leukemia and patients with probable likelihood of infection tended to have higher favorable response rates. Similar to patients with IC, the patients who resolved their neutropenia while receiving caspofungin therapy tended to fare better relative to those

TABLE 2
Favorable Efficacy Outcomes in Neutropenic Patients with Invasive Fungal Infections

	Patients with invasive candidiasis (n = 27)		Patients with invasive aspergillosis (n = 41)	
	No./m ^a	%	No./m ^a	%
Overall success	17/27	(63.0)	16/41	(39.0)
Complete response	15		2	
Partial response	2		14	
Underlying disease				
Acute leukemia	11/18 ^b	(61.1)	13/23 ^c	(56.5)
Chronic leukemia	1/2	(50.0)	0/6	(0)
Non-Hodgkin lymphoma	3/3	(100.0)	0/3	(0)
Other hematologic diseases	2/4	(50.0)	3/9	(33.3)
Likelihood of infection (per EORTC/MSG Criteria)				
Proven	17/27 ^d	(63.0)	6/23 ^e	(26.1)
Probable	NA	–	10/18	(55.6)
Neutropenic status at caspofungin onset				
ANC 101–499 mm ³	9/9	(100.0)	9/20	(45.0)
ANC < 100 mm ³	8/18	(44.4)	7/21	(33.3)
Neutropenic progression during caspofungin				
Resolved (ANC > 500 mm ³)	14/18 ^f	(77.8)	13/24 ^g	(54.2)
Not resolved (ANC < 500 mm ³)	3/9	(33.3)	3/17	(17.6)
Type of therapy				
Primary	14/24	(58.3)	5/12	(41.7)
Salvage	3/3	(100.0)	11/29	(37.9)

EORTC/MSG: European Organization for Research and Treatment of Cancer/National Institute of Allergy and Infectious Diseases Mycosis Study Group; ANC: absolute neutrophil count.

^a“No.n/m” signifies the number of patients with favorable response/the number of assessable patients in that subgroup.

^bSuccess in 8 of 12 patients with acute myelogenous leukemia (67%) and 3 of 6 patients with acute lymphoblastic leukemia (50%).

^cSuccess in 12 of 21 patients with acute myelogenous leukemia (57%) and 1 of 2 patients with acute lymphoblastic leukemia (50%).

^dSuccess by site of infection: 17 of 25 patients (68%) with candidemia, 0 of 1 patient with chronic disseminated candidiasis, and 0 of 1 patient with acutely disseminated candidiasis.

^eSuccess by site of infection: 12 of 30 patients (40%) with pulmonary disease, 3 of 7 patients (43%) with sinusitis, 1 of 1 patient with cutaneous infection, and 0 of 3 patients with disseminated infection.

^fIn the patients with invasive candidiasis who recovered from neutropenia while receiving caspofungin therapy, neutropenia recovered on average 13.4 days (median, 8 days; range, 3–56 days) after the initiation of caspofungin therapy.

^gIn the patients with invasive aspergillosis who recovered from neutropenia while receiving caspofungin therapy, neutropenia recovered on average 12.5 days (median, 7 days; range, 2–74 days) after the initiation of caspofungin therapy.

patients with no evidence of neutrophilic recovery. However, three patients with IA who remained persistently neutropenic while receiving caspofungin demonstrated clinical and radiographic improvement at the end of caspofungin therapy (mean duration, 37 days; total mean cumulative dose, 1870 mg) without subsequent recurrence of IA. Furthermore, five other successfully treated patients who achieved neutrophilic recovery while receiving caspofungin had both clinical and radiographic improvement of their infections before neutrophil recovery. Finally, 16 of 30 patients (53%) receiving at least 7 days of caspofungin therapy for IA were successfully treated with caspofungin.

Mortality and Infection Recurrences

The overall mortality rate either while receiving caspofungin therapy or during the 14-day posttherapy pe-

riod was 37% (10 of 27 patients) among neutropenic patients with IA. The median time of death after the initiation of caspofungin was 8 days (range 4–24 days), with the majority of deaths (7 of 10 patients; 70%) occurring more than 7 days after its onset. Three of the 10 deaths were attributed to the *Candida* infection. This included 2 patients with septic shock, both of whom died fewer than 7 days after the onset of caspofungin therapy (4 days and 6 days, respectively), and 1 patient with disseminated candidiasis (with multiple skin and central nervous system [CNS] lesions attributed to *Candida* infection) who died 9 days after the initiation of caspofungin. The remaining deaths were attributed to worsening underlying disease (e.g., acute myelogenous leukemia [AML] or intraabdominal hemorrhage secondary to leukemia-induced thrombocytopenia) or other nosocomial complications (e.g., *Staphylococcus aureus* bacteremia, bacterial pneumo-

nia/respiratory failure, or congestive heart failure). None of the deaths were attributed to caspofungin therapy. Recurrence due to IC was not observed during the follow-up period in any of the 17 patients who demonstrated a favorable response to caspofungin.

In contrast, death occurred in 19 of 41 (46%) patients with IA. The median time of death after the initiation of caspofungin therapy was 10.3 days (range, 1–39 days), with the majority of deaths (12 of 19, 63%) occurring more than 7 days after caspofungin onset. In fact, all but 2 deaths occurred at least 72 hours after caspofungin initiation. The majority of these deaths (12 of 19 deaths; 63%) were attributed to IA or its associated respiratory complications (i.e., respiratory failure/arrest, asphyxiation, or alveolar hemorrhage), with 7 of 12 deaths (58%) occurring after the first week of caspofungin therapy. In the remaining seven patients, death was attributed to deterioration of the acute leukemia, multiorgan failure, bacterial sepsis, or brain hemorrhage (in a patient with CNS lymphoma). None of the deaths were attributed to caspofungin therapy. Autopsy results were evaluated in 6 of these fatal cases (32%), and in all cases histopathology demonstrated the presence of IA. Recurrence of IA was noted during the follow-up period in only 1 of the 16 patients who had initially responded favorably to caspofungin therapy.

Safety

All 68 neutropenic patients were assessed for safety. The incidence of clinical or laboratory drug-related adverse experiences in patients with IC or IA was relatively low (31% and 15%, respectively). Only one (1%) serious adverse experience (rash) was reported as possibly related to caspofungin therapy. After the fifth dose of caspofungin, this patient developed a maculopapular rash, with a hemorrhagic component, which ultimately spread over the entire body. The rash was not associated with vesicles, urticaria, or mucous membrane involvement. The rash did not result in the discontinuation of caspofungin and resolved completely during the follow-up period. Only 1 patient (1%) had their caspofungin therapy discontinued as a result of drug-related toxicity (increased serum creatinine). This patient was treated with a polyene during the prestudy period, which was associated with the development of acute renal insufficiency. Subsequently, while receiving caspofungin, the patient's serum creatinine continued to increase, leading to the discontinuation of caspofungin after 12 days of therapy.

DISCUSSION

In the current study, we present the results derived from 4 prospective clinical trials regarding the efficacy of the echinocandin, caspofungin, in the treatment of 68 neutropenic patients with either IC or IA. It is important to note that all patients included in this review had documented evidence of infection (proven IC or proven/probable IA), consistent with the recent EORTC/NIAID-MSG consensus guidelines.³⁰ The design and implementation of these four studies was conducive to a retrospective review across all protocols because the caspofungin treatment regimen, outcome definitions, and the primary evaluation time-points were similar among all of the studies.^{28–30,33–34}

This review demonstrates the utility of caspofungin as an antifungal agent in neutropenic patients with documented *Candida* or *Aspergillus* infections. The favorable outcomes noted in both IC (63%) and IA (39%) are supported by the preclinical evaluations of caspofungin.^{24–27} Furthermore, the success rates for caspofungin are comparable to the success rates noted for comparator agents in these respective studies for neutropenic patients with either IC (amphotericin B 40%, liposomal amphotericin 42%) or IA (liposomal amphotericin 8%).^{28,30} Because most patients included in this review had acute or chronic leukemia, the results bear particular clinical relevance to patients with hematologic conditions who develop neutropenia as a result of either a malignancy or the cytotoxic chemotherapeutic regimens used to combat such neoplasms. Its favorable efficacy profile, coupled with its relatively few drug–drug interactions and excellent safety profile, makes caspofungin a practical alternative for the treatment of invasive *Candida* and *Aspergillus* infections in the neutropenic patient population.^{28–30,35}

This review highlights several significant observations that warrant further discussion. First, the data provide additional confirmatory evidence with regard to the critical effect that ongoing immunosuppression plays in the prognosis of invasive fungal infections, particularly IA.^{36,37} Clearly, less severe neutropenia (ANC 100–499 mm³) at the time of study entry and the reversal of neutropenia while receiving therapy were associated with improved outcomes in these patients. Combining the data across the 2 conditions further highlights this finding: success in 18 of 29 patients (62%) with an ANC < 100 mm³ versus 15 of 39 patients (38%) with an ANC 100–499 mm³ and success in 27 of 42 patients (64%) with neutrophil recovery versus 6 of 26 patients (23%) without neutrophil recovery. Nevertheless, it is important to emphasize that caspofungin was associated with favorable outcomes in some pa-

tients with IC (3 of 9 patients) and IA (3 of 17 patients) despite a lack of granulocytic recovery during the caspofungin treatment course. Furthermore, many of the successfully treated patients who achieved neutrophilic recovery while receiving caspofungin had both clinical and radiographic improvement in their infection before neutrophil recovery.^{29,34} Whether other measures, such as combination antifungal therapy or other ancillary interventions (i.e., granulocyte transfusions), could improve outcomes in patients with severe or persistent neutropenia warrants further investigation.^{38,39}

Second, favorable outcomes were seen in neutropenic patients who were receiving the echinocandin either as primary therapy (58% in IC patients, and 42% in IA patients) or as salvage therapy (100% in IC patients, and 38% in IA patients). Notably, the outcomes in this study were not predicated on the type of prior antifungal therapy. Patients who had failed amphotericin, lipid preparations of amphotericin, and/or triazoles (fluconazole or itraconazole), still responded favorably to caspofungin.^{29,33-34} Fundamentally, this finding is consistent with the known differences between the mechanisms of action of the echinocandins, which target the fungal cell wall, and the azoles and polyenes, which target the fungal cell membrane.⁴⁰⁻⁴³

The results of the current study provide relevant clinical experience for the use of caspofungin in neutropenic patients with documented fungal infections. Although additional clinical experience is needed to fully determine the utility of caspofungin in this arena, the current data suggest that caspofungin may represent an effective and well-tolerated therapeutic option for such immunocompromised patients with *Candida* or *Aspergillus* infections.

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