# ORIGINAL ARTICLE

# T a f T $\downarrow$ $\blacksquare$ bect $\blacksquare$ 6 t 24 H after St, e D e t Ba a -A te Occ.

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## ABSTRACT

## BACKGROUND

The effect a d fed a c a the method bect  $\mathbf{m} = 6$  to 24 h. after the authors' full names, academic deet d e t ba a -a te cc. La e t bee e te e t d ed. grees, and affiliations are listed in the

## METHODS

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#### RESULTS

A t ta f 217, at e t (110 the the bect  $\mathbf{I}$  , a d 107 the c t ...) e e c. ded the a a; a d  $\mathbf{M}_{i}$  a t c c ed a t a  $\mathbf{M}$  ed a f 663 🛋 je afje 🛋 j 🛋 ej. E 🛋 e ja jedaja, e ecfed \_je 🛋 a a beca e f the f e f f the  $bec_t \blacksquare . The \blacksquare b$ a ed 14% file, are to the the bect **i** and 21% file the the t A = dfed Ra, cae c e f0 (B = (c = e) cc ed 51 the the mbect 🛋 🛛 , a d 26 (24%) the c t , ate t (46%) . . (ad. jed aje aj , 1.81; 95% c f de ce je a [CI], 1.26 j 2.60; P<0.001). The e. ff fe a, m≰a \_\_\_\_c m≚e fan idfed Raj cae ce f0 ( 4 e e 55% a d 43%, e , ec t e (ad. ted ate at , 1.21; 95% CI, 0.95 t 1.54).  $th = bec_t = ..., a d = 1 f 88 (1\%)$  the c  $t_t$  ... ( )  $a_t$  , 5.18; 95% CI, 0.64 ( 42.18). M (a ( a) 90 da a 31% ( be ( bec) a d 42% the c t (ad ted , at , 0.75; 95% CI, 0.54 t 1.04). P cecc ed 11%  $f_{t}$  is a test in de estatistication de la test in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the sector in the sector is a sector in the secto d a c 🛋 cat

#### CONCLUSIONS

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Dr. Ji can be contacted at jixm@ccmu.edu.cn or at the Department of Neurosurgery, Xuanwu Hospital of Capital Medical University, 45 Changchun St., Xi Cheng District, Beijing, 100053, China.

\*A list of the BAOCHE investigators is provided in the Supplementary Appendix, available at NEJM.org.

Drs. Jovin and C. Li contributed equally to this article.

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## METHODS

### TRIAL OVERSIGHT

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patients according to the treatment they received.

## RESULTS

#### CHARACTERISTICS OF THE PATIENTS

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Table 1. Characteristics of the Patients at Baseline.*					
Characteristic	Thrombectomy (N=110)	Control (N = 107)			
Age — yr	64.2±9.6	63.7±9.8			
Male sex — no. (%)	80 (73)	79 (74)			
Medical history					
Atrial fibrillation — no. (%)	14 (13)	13 (12)			
Diabetes mellitus — no. (%)	30 (27)	29 (27)			
Hypertension — no./total no. (%)	90/110 (82)	79/106 (75)			
Modified Rankin scale score of 0 before stroke — no. (%)	85 (77)	89 (83)			
NIHSS score†					
Median (IQR)	20 (15–29)	19 (12–30)			
Distribution — no. (%)					
6–20	66 (60)	61 (57)			
>20	44 (40)	46 (43)			
Median systolic blood pressure at hospital arrival (IQR) — mm Hg‡	157 (138–175)	152 (138–166)			
Median glucose level at hospital arrival (IQR) — mmol/liter§	8.0 (6.4–9.9)	7.6 (6.0–10.2)			
Intravenous thrombolysis — no. (%)	15 (14)	23 (21)			
Imaging characteristics					
Median PC-ASPECTS (IQR)¶	8 (7–10)	8 (7–10)			
Median Pons-Midbrain Index (IQR)	1 (0-2)	1 (0-2)			
Basilar-artery occlusion site — no./total no. (%)**					
Proximal basilar artery	53/107 (50)	45/105 (43)			
Middle basilar artery	40/107 (37)	37/105 (35)			
Distal basilar artery	13/107 (12)	23/105 (22)			
Workflow times					
Distribution — no. (%)					
6–12 hr	64 (58)	71 (66)			
>12 hr	46 (42)	36 (34)			
Median duration (IQR) — min					
From stroke onset to randomization	664 (512-861)	662 (492–838)			
From stroke onset to revascularization††	790 (626–1000)	NA			
From hospital admission to groin puncture‡‡	153 (99–235)	NA			
From groin puncture to revascularization $\$$	85 (59–129)	NA			

\* Plus-minus values are means ±SD. IQR denotes interquartile range, and NA not applicable.

† Scores on the National Institutes of Health Stroke Scale (NIHSS) range from 0 to 42, with higher scores indicating more severe neurologic deficits.

‡ Data were missing for one patient in the thrombectomy group.

Data were missing for 11 patients in the thrombectomy group and for 13 in the control group. To convert the values for glucose to milligrams per deciliter, divide by 0.05551.

The posterior circulation Acute Stroke Prognosis Early CT Score (PC-ASPECTS) is a measure of the extent of posterior circulation early cerebral ischemia. Scores ranges from 0 to 10, with higher scores indicating fewer early ischemic changes. Shown are values as assessed by the core laboratory. Scores were not available for four patients in the thrombectomy group.

The Pons-Midbrain Index, a measure of the extent of early cerebral ischemia in the pons and midbrain, ranges from 0 (absence of early cerebral ischemia in the midbrain and pons) to 8 (>50% early cerebral ischemia on both sides in these brain-stem territories); 1 point is attributed to infarction of less than 50%, and 2 points to infarction of 50% or more on one side of the pons or midbrain. Scores were not available for four patients in the thrombectomy group.

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(Tabe S4). A  $t_{t}$  (a f 22.  $a_t$  e  $t_t$  a ed  $a_t$  the the bect is center of 4.5 for a figure (1) e e\_{6} 12 (55\%) for the ecce ed that a ethe the the for a e that 4.5 for a ed  $a_t$  the eff for a e that 4.5 for a ed  $a_t$  the eff for a e that 4.5 for a ed  $a_t$  the the for a e that 4.5 for a ed  $a_t$  the the for a e that 4.5 for a ed  $a_t$  the the form a e that 4.5 for a ed  $a_t$  the the form a e that 4.5 for a ed  $a_t$  the the form a ed  $a_t$  the the form a ed  $a_t$  the the form a ed  $a_t$  ed  $a_t$  the form a ed  $a_t$  the form a ed  $a_t$  ed  $a_t$ 

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#### Table 2. (Continued.)

- \*\* Scores on the Barthel Index range from 0 to 100, with higher values indicating good performance of daily living activities. A score between 95 and 100 indicates no disability that interferes with daily activities. Included in this analysis were patients who were alive at 90 days.
- †† Patency was defined as a score of 2 or 3 on the Arterial Occlusive Lesion scale, which ranges from 0 (complete occlusion) to 3 (complete recanalization and restoration of the target artery). Data for follow-up angiography were not available for 57 patients because of clinical instability or death.
- \*\* The EuroQoL Group 5-Dimension 3-Level (EQ-5D-3L) patient-reported questionnaire is a standardized instrument for the measurement of health status. Scores range from -0.149 to 1.00, with higher scores indicating better quality of life. Data were available for 68 patients in the thrombectomy group and for 52 in the control group.
- Image: Reperfusion on digital subtraction angiography was defined as a modified TICI grade of 2b or 3. A modified TICI reperfusion grade of 2b or higher indicates antegrade reperfusion of more than half the ischemic territory of the previously occluded target artery.<sup>13</sup> Nine angiographic images were missing or could not be assessed for modified TICI because of poor image quality.
- ¶¶ Symptomatic intracranial hemorrhage was defined as parenchymal hemorrhage type 2 on follow-up imaging and neurologic worsening of at least 4 points on the NIHSS, according to the Safe Implementation of Thrombolysis in Stroke–Monitoring Study (SITS-MOST) criteria, or any symptomatic intracranial hemorrhage and neurologic worsening of at least 4 points on the NIHSS, according to the second European–Australasian Acute Stroke Study (ECASS II) criteria. Follow-up scans were unavailable because of clinical instability or death in 8 patients in the thrombectomy group and in 19 in the control group. The risk ratios are presented as unadjusted values because of nonconvergence in the adjusted analysis.

Subgroup	Control T no./to	<b>hrombectomy</b> otal no.	Adjusted Rate Ratio (95% CI)	
All patients	26/107	51/110	<b>⊢</b> ∎1	1.81 (1.26-2.60)
Age				
≤70 yr	23/80	42/81	<b>⊢</b> ∎→1	1.70 (1.17-2.48)
>70 yr	3/27	9/29	k	3.04 (0.93-9.87)
Sex				
Male	22/79	38/80	<b>⊢</b> ∎1	1.61 (1.09-2.36)
Female	4/28	13/30	j <b>i</b> i	2.95 (1.14-7.59)
NIHSS score				
6–20	20/61	41/66	<b>⊢</b> ∎	1.80 (1.21–2.67)
>20	6/46	10/44	F <u>·</u> ■ I	1.83 (0.73-4.58)
NIHSS score				
6–9	6/11	6/6		NE
10–20	14/50	35/60	<b>⊢≡</b> −−−	2.00 (1.23-3.25)
>20	6/46	10/44	F <u>,</u> ■{1}	1.83 (0.73-4.58)
Randomization window				
6–12 hr	16/71	29/64	¦ <b>⊢ ≡</b> I	1.89 (1.15-3.09)
>12-24 hr	10/36	22/46	<u>⊢∎</u> I	1.71 (1.01–2.90)
Baseline PC-ASPECTS				
9 or 10	13/45	17/38	K <del>a</del> −4	1.42 (0.86-2.34)
<9	13/62	32/68	·	2.17 (1.28-3.66)
Location of basilar-artery occlusion				
Proximal	11/45	28/53	∎	1.96 (1.15-3.36)
Middle	8/37	18/40	<b>⊬</b> ∎1	1.67 (0.87-3.22)
Distal	7/23	3/13		NE
		Control Bette	r Thrombectomy Better	

#### Figure 3. Subgroup Analyses of a Modified Rankin Scale Score of 0 to 3 at 90 Days (Primary Outcome).

Scores on National Institutes of Health Stroke Scale (NIHSS) range from 0 to 42, with higher scores indicating greater neurologic deficits. The posterior circulation Acute Stroke Prognosis Early CT Score (PC-ASPECTS) is a 10-point grading system that measures the extent of posterior circulation early cerebral ischemia; scores ranges from 0 to 10, with higher scores indicating fewer early ischemic changes. The adjusted rate ratio in subgroups of patients with a baseline NIHSS score of 6 to 9 and with distal basilar-artery occlusion could not be estimated (NE) because of limited sample sizes. The trial was not powered for and had no prespecified correction for multiple comparisons for a definitive analysis of subgroups.

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## SAFETY OUTCOMES

t (acc d t the SITS-MOST c te a) a t f be eft fa f th  $\mathbf{M}$  bect  $\mathbf{M}$  , af le the the mbect  $\vec{n}$  is the test that a le test that a le test that the number of the sector  $\vec{n}$  is the C t 5.18; 95% CI, 0.64 t 42.18); t c de ce ba ed t a NIHSS c e f at ea t 6 t a t a , ECASS II c  $e_3$  a 9%  $f_4 e_5$  is bec, if  $f_4$  f  $a_5$  e  $f_1$  10. The effection of the formula of the formu  $a_t$  90 da a 31% the the bect  $\blacksquare$  ... the NIHSS c e f e that 10. ad 42% the cost of the diastructure of the dia t, 0.75; 95% CI, 0.54 t 1.04) (F . S9). I the that the end t f fact the state of the stat 👔 🖬 bect 🖬 ..., ced e-eaged c 🛋 - c c at , a d.a.t c a 👍 e b a 🖽,  $ca_1$ ,  $c.d.d.ec_1$ ,  $efa_1$ , ada,  $edc_1$ ,  $f._3c$  **m**  $eaf_3e_{11}$  **m**  $bec_1$  **m** fd  $a \in b$ ,  $a_{t}$ , cc ed 12 f 110, a- ba a -a e cc.  $a_{t}^{8,21}$  e  $e_{t}$  c e d e stes (11%). The cdece finded ca c 🛋 ca- 🖬 estates 🖕 dd sha e a ebae e t a  $\mathbf{M}$  a  $t_1$  e  $t_2$  ... (Tabe 2 a d fa  $c_1$   $t_2$  e e a  $a_1$   $\mathbf{M}$  ca e  $t_1$   $c_1$   $\mathbf{M}$  a Tabe S8 a d S9).

# DISCUSSION

O taked that and e becatet to de the  $\mathbf{M}$  bect  $\mathbf{M}$ . the to ede the arage cc. and O. take  $\mathbf{M}$  take  $\mathbf{M}$  to the total takes  $\mathbf{M}$ . ca ca e tha the ta da d med ca ca e a e. c me, a m d f ed Ra, ca e c e f 0 t 3 a The 95% c fde ce se = a f (a e b) e e - e e e f d f c a a f a bee, 🛋 . jo 🛋 e fa 🛋 d f ed Ra, ca e ha bee ed a 👍 e 🛋 . jo 🛋 e 👔 e ato taceeba 🚛 ha etha a be ed the Ha Ch ee, .. at , the ee a, ab t da a  $\mathbf{I}$  a  $\mathbf{I}$  add  $\mathbf{t}$ ,  $\mathbf{a}_{t} \mathbf{e}_{t}$  de  $\mathbf{e}_{t} \mathbf{t}_{t}$   $\mathbf{I}$  add  $\mathbf{t}$ 

t, e et a d the t a c ded a a e, . t f. ate t h had ece ed tea 🖬 e t th tae a te ae, a effect e tea⊯e tf

t, edet ba a-ate cc. .<sup>19,20</sup> The e-The cde ce f  $\mathbf{i}_{ij} \mathbf{i}_{ij} \mathbf{i}_{ij}$  c faca a  $\mathbf{i}_{ij} \mathbf{e}_{ij}$  a e. f BASICS d d f. e. fabe efca haea₁24 h. baed the ma def - effect fth mbectmin, ad the e a a . e-., (6% . 1%; ad ted,  $a_t$ , De, tethe c. f,  $a_teth$ , e tethe e... a d 2% the c t ... (ad ted e ad the be eft f the model a c mi-

> ⊯<sub>t t</sub>le e e a , ab t f tle e t f . ta.Etettde ⊯a adde \_et ead the efma f the eect f , ater the edet ba a are cc. -

 $\mathbf{I}_{\mathbf{A}} = \mathbf{I}_{\mathbf{A}} + \mathbf{I}_{\mathbf{A}} +$ de ce fa díf c<sub>it</sub> a <sub>i</sub>ta<sub>i</sub>t, def ed a b <sub>it t</sub>he. 🛋 <sub>i</sub>c 🛋 e, <sub>i</sub>the ba í da<sub>i</sub>a and dfed Ra, cae c e f0 t 3, a f 🛋 the ta that ee aa abeat the  $\frac{1}{2}$  be  $\frac{1}{2}$   $\frac$ ... d ffe e ce  $f_t$  e a a f  $f_t$  e a c de ed  $f_t$  be mea f  $f_t$  ,  $a_t e f_t^{12}$  a d c e f $0_{t}$  4 c. ded, e , af d  $t_{t}a_{t}$  - a d  $\mathbf{m}$ , ed t a , at e t  $t_{t}$  ba a  $e_{t}$ ,  $e_{t}$ ,  $T_{t}$  **is bec**<sub>t</sub> **is** a cated a  $e_{t}$ ,  $e_{t}$ ,  $T_{t}$   $c_{t}$  a  $e_{t}$  a **is exe** ted b 🔥 ced a c 🛋 cat a d ce eb a 🚛 🖞 e te c 🛤 te e t 🖬 🛲 be e e hae that is a laebee the e. t fee. a ae f the t a e. t. Sec d, ce the f, c.d a le cdece f 🛋 t 🛋 - , ... at that a e ed e ee at e f the t ... Hee,  $\mathbf{M}$  ta tat 90 f. ta e. tt the ... at  $\mathbf{M}$  ted. The e e t d ffe f 🛋 the e f 🛋 e t fe t the t a, a d c e e t e e t d d ta fedacatea, ≝et fbaa-ate t cc.Ethe ≤ e, the cae fille de-👔 e (BASICS a d BEST) a d a e 🛋 a 🐧 🛛 cc. . . . a t e t a . ed 🛋 th e f the E d a c a Tea H e t f Ac te a t a the th H b t c, a d the ab t t de-Ba a -A e Occ. (ATTENTION) f a f e e m e a be ef f f f m bec f m - a f e fe. f i chae e ded f i e f f e f i e f i e f i e f i e f i e f i e f e Journal.<sup>18</sup> BASICS et ctede 🖬 et tot, at et 🖬 et e a et White, ... at the the , e e ted the 6 h afte e t**™**ated Ha Ch e 9.1 9.999.99(h)147 (3()() -15 (e) -3 (e)-.01 (t)

a e cc. , a ⊯ jed, , f f, afe f ece ed - i afje ⊯ f⊯ ef jada i je c $fae = fae a_t a_t de cef df c_t a_t a_t 90 da fae a_t 90$  $f_{th}e_{t} = f_{t} = f_{t}$ , ja edacace je 👔 4.5 🖡 cacaea e. T 🖬 🖬 bec ji 🛋 a cajed afje The , , f f ate t that is - c de ce f ce eb a te ta e. tc. e **M** a la e bee e a ted t the e e s... ted b a a t (2016YFC1301) **M** e t that, a te t had t ta , a f the Nat a M t fScecead Tech the but cd. .

I a ta Chathat a tried ea f eff cac, ef. d that at et the t, ed e the the fit a treat NEJM.

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Dc. ef 🛋 , ded b 🖞 ea 🖞 a e a a abe 🖞 thef tet fith a treat NEJM. .

a a ab e

#### APPENDIX

Theath 'f and acadamac de ee a e a f : Td G.J, M.D., Chah L, M.D., L fe W., M.D., Chae W., M.D., Ja Cie, M.D., Cia ci, Ja, M.D., Zi, ia Si, M.D., Z e Ga, M.D., C fe S, M.D., We i Cie, M.D., Ya Pe, M.D., Cie Ya, M.D., M We, M.D., T L, M.D., L. We, M.D., G d Xa, M.D., HaYa, M.D., M Re, M.D., Ja a Da, M.D., X fe L., M.D., Ph.D., Q Ya, M.D., Y L., M.D., Q fe Zh, M.D., Wa cha Sh, M.D., Q Zh, M.D., X a b L, M.D., Za G, M.D., Q Ya, M.D., Che be H., Ph.D., We b Zha, M.D., Q fe Ma, M.D., Y ji. Zia , M.D., L. Ja, M.D., H Zia , M.D., Da d S. Lebe d, M.D., H La , M.D., A i ( i P. Jadia , M.D., Ph.D., Cha 🛋 We, M.D., Sc ((B , Ph.D., La f Zi, M.D., H a e Ye, M.D., MacRb, M.D., M ) e Cha , M.D., Ha S , M.D., J Che, M.D., Ph.D., a dX  $\blacksquare$  J, M.D., Ph.D. The a the 'aff at a eaf : the De a  $\blacksquare$  of the end

'aff as a eaf : the Dea Mess fNe e (T.G.J., Ja Che, L.J., H.Z., X.J.), the Dea Mess fNe -(C.L., L.W., C.W., W.Z., Q.M., Y.Z., H.S.), the Sale of the C.L.), the De a 🗰 e a filme e c Med c e (J.D.), a d the Ce le f E de ce-Ba ed Med c e (C.H.), X a . H . la, a d la De a 📈 c l f Rad , Be Cha a H . la (Q.Y.), Ca , a Med ca U e  $_{,1}$ , a d Pe U e  $_{,1}$  C ca Re ea c  $_{,1}$  I  $_{,1,1}$ ,  $_{,2}$ , Pe U e  $_{,1}$  F  $_{,1}$ H ,  $_{,2}$  (C.Y.), Be ,  $_{,1}$  e De a  $_{,2}$ Zha, h. Aff a, ed H., a f. E. a Med ca U. e , , Zha, h. (W.C.), the De a 🛋 e , f. Ne. e, the F. (Pe. e' H, a fCha, h, Cha, h, (Y.P.), the De a  $\mathbf{M}e_{\mathcal{A}}$  fNe, e, Ta Ha, H, a (M.W.), the De a  $\mathbf{M}e_{\mathcal{A}}$  fNe, e, B ha H, a fBe U e  $\mathcal{A}$  (W.S.), a d the De a  $\mathbf{M}e_{\mathcal{A}}$  fNe, e, Ta Teda H, a (Z.G.), Ta, eae, Sec d'Aff´a, edH . ,a fS ci U e ,; , S / i . (G.X.), ,i e De a , Me , fNe . e , Aff a, edH . ,a fG / i . Med ca U  $e_{t}$ , G  $a_{t}$  (H.Y.), the De a the t f Ne , Sha ha B. e C H , a, Sha ha (M.R.), the De a the t f Re , Sha ha B. e C H , a, Sha ha (M.R.), the De a the t f Re (X.L.), a d the De a the t f C t ca Cae Med c e, Da, a d S, at t c D (Y.L.), Aff a, ed J H , a, Med ca Sch f Na U  $e_{t}$ , Na , the De a the t f Ne , X , a H , a a d Sec d Aff a, ed H , a, A the Med ca U  $e_{t}$  (The d M , a Med ca U  $e_{t}$ ), the De a the t f Ne , L He , e' H , a, L (Q Zh), the De a the t f Ne , Sha ha d Sec t f Ne , Sha ha d Sec t Aff a, ed H , a f the PLA, Ta , a (Q fe Zh), the De a the t f Ne , L He , e' H , a, L (Q Zh), the De a the t f Ne , Sha ha d F t Med ca U  $e_{t}$ , Ya, a (H.L.), the De a the t f Ne , Ya, a a Med ca U  $e_{t}$ , Ya, a (H.L.), the De a the t f Ne , Ya, a a Med ca U  $e_{t}$ , Ya (A (L.L.), the De a the t f Ne , Ya (A (L.L.), the De a the t f Ne , Ya (A (L.L.), the De a the t f Ne , Ya (A (L.L.), the De a the t f Ne , Ya (A (L.L.), the De a the t f Ne , Ya (A (L.L.), the De a the t f Ne , A (L.L.), the De a the t f Ne , Ta (L.L.), the De a the t f Ne , Ta (L.L.), the De a the t f Ne , Ta (L.L.), the De a the t f Ne , Ta (L.L.), the De a the t f Ne , Ta (L.L.) the De a t (L.L.) the det (L.L.) the det( De a 🛋 f Ne , Na a Ce (a H) a f X a Med ca U e (, Na a (C.W.), de Ce eb ac a Ce (e, He a P ca  $Pe \cdot e'$   $H \cdot a, Ze \neq 1$ . (L.Z.),  $f_{1}e De a \neq f_{1}$   $Re = e, H \cdot a$   $Fa = Pe \cdot e' H \cdot a, Se \neq e$ (H.Y.),  $a d_{f1}e De a \neq f Re = fRe = fR$ fe Sch f Med c e, U e 🐧 f Cafa, L A ee, L A ee (D.S.L.); the De a 🛤 d f f Ne . e, Ba Ne ca I  $_{1,1}$   $_{e}$ , P $_{1}$  e , AZ (A.P.J.); A  $_{a}$  B  $_{a,1}$   $_{c}$  , M e e, NC (S.B.);  $_{A}$   $_{i}$  e  $S_{1,2}$  e U  $_{5}$  H  $_{2}$   $_{a}$  Va d'Heb , Bace a (M.R.); a d  $_{14}$  e De a  $_{14}$  e De a  $_{14}$  e f Ne  $, P_{.11}$  b  $_{14}$  I  $_{.14}$  e f B a D de a d Rec e , U e  $_{.1}$  f  $P_{.11}$  b  $_{14}$  Med ca Ce  $_{.16}$  e a dVe, e a Affa P<sub>iff</sub> b | Hea<sub>if</sub> CaeS<sub>i</sub>, Ge a<sub>i</sub> cRe e a c Ed ca<sub>i</sub> a dC ca Ce e, P<sub>iff</sub> b | (I C e).

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