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To: Sam Pool, John Young, Don Puddy

~~Results & Requested~~

Subj: ~~Needed Action on Orthostasis~~
Countermeasures

Post flight orthostasis ^{remains} is a major problem on flights of more than ⁵⁻⁶ ~~7-8~~ days and based on Skylab experience may be expected to ~~more~~ ~~reach~~ increase during the planned EDO mission extensions. * On S.L. 4 the writer demonstrated a basic mechanism in which liters of fluid are shifted from the legs and in hours and lost over a number of days. ~~Such volume~~ On return to G loads fluid may be shifted from blood stream into the legs more rapidly than it is replaced producing inadequate cardiac output & orthostasis. Other mechanisms may be operative but they can only be addressed when the basic fluid disorder is corrected.

On Earth during head down tilt bed rest, as even head down a few hundred ml. of

* I have am in the process of completing some simple but fundamental experiments that ~~not~~ demonstrate fluid may be simply shifted back into and maintained in the legs during normal ^{space-flight} operations and just before and during entry. In addition it now appears possible to accurately simply and accurately shift

fluids from the legs on Earth as in orbit
^{thus} and for the first time adequately simulate
 the flight fluid shift state. This would
 allow realistic study of countermeasures on
 Earth which is not currently possible.

It is felt that this is of sufficient
^{and simplicity} importance to give priority to further
 verification of this concept in flight and
 on Earth. ~~I have previously~~ ^{I have previously} ~~proposed~~ ^{proposed} the flight
 phase of this for years, based only on
 theory but ~~with~~ ^{with} this recent demonstration
 and with the other emphasis on this problem
 there can be little gained by further delays.

No. 17 The following is a brief description of
 the ^{problem} preliminary results and their implication for
 operations is ^{available} attached but the method consists

tissue fluid is shifted as liters on orbit,
 it by 2. The reason can be appreciated
 by examination of two curves. The
 first is the only such study available
 in which venous pressure is continuously
 measured on a ^{single} ^{supine} person, on 1 g. Abdominal
 contents produce 10-20 mm Hg. back pressure.
 Secondly a curve of tissue fluid compliance
 has been constructed F-2. This curve
 is consistent a directly measured curves
 from animals in which

15/750

~~Gregg~~
(HGP) ~~the~~ simply of applying low counterpressures ~ 70 mm Hg (less than many girdles or even tight pants) ^{to the abdominal area} on orbit and drinking replacement fluids. ~~On~~ ^{It} A demonstration may be made on orbit ~~I~~ with elastic bandages & tape measures. Ultimately it should be incorporated in a true multipurpose anti G suit.

The latter has been disclosed & advocated but ~~and~~ it is my request that the demonstration be made on the next possible flight. I do not have the time to generate & fight through the full blown D50 but have an entirely adequate plan available. The urgency of this problem would seem to justify such expediency.