



1  
00:00:04,470 --> 00:00:02,470  
and we mentioned that earlier today some

2  
00:00:07,110 --> 00:00:04,480  
of the crew members spent time taking

3  
00:00:09,750 --> 00:00:07,120  
ultrasound images of their spines and

4  
00:00:12,629 --> 00:00:09,760  
also body measurements these activities

5  
00:00:14,709 --> 00:00:12,639  
are part of a large array of experiments

6  
00:00:16,710 --> 00:00:14,719  
that are trying to find out how spending

7  
00:00:18,790 --> 00:00:16,720  
a long time in weightlessness impacts

8  
00:00:20,070 --> 00:00:18,800  
the human body

9  
00:00:21,990 --> 00:00:20,080  
all of that is of course done with an

10  
00:00:23,269 --> 00:00:22,000  
eye toward correcting the negative

11  
00:00:24,950 --> 00:00:23,279  
results of that

12  
00:00:27,029 --> 00:00:24,960  
another one of those experiments is

13  
00:00:29,910 --> 00:00:27,039

directly aimed at what the crew members

14

00:00:32,229 --> 00:00:29,920

eat and how a certain diet might help

15

00:00:34,310 --> 00:00:32,239

them stay fit that investigation is

16

00:00:36,389 --> 00:00:34,320

called pro-k and the principal

17

00:00:38,630 --> 00:00:36,399

investigator is with me this morning dr

18

00:00:40,549 --> 00:00:38,640

scott m smith is a researcher in the

19

00:00:42,389 --> 00:00:40,559

biomedical research and environmental

20

00:00:45,670 --> 00:00:42,399

sciences division here at the johnson

21

00:00:48,389 --> 00:00:45,680

space center in houston pro k is looking

22

00:00:50,389 --> 00:00:48,399

into whether a particular diet can

23

00:00:51,270 --> 00:00:50,399

help in when it comes to bone and muscle

24

00:00:53,910 --> 00:00:51,280

loss

25

00:00:56,310 --> 00:00:53,920

where did the idea for using food as a

26

00:00:57,189 --> 00:00:56,320

counter measure come from

27

00:00:58,950 --> 00:00:57,199

well

28

00:01:00,229 --> 00:00:58,960

first let me step back and say that that

29

00:01:02,950 --> 00:01:00,239

i lead what's called the nutritional

30

00:01:04,710 --> 00:01:02,960

biochemistry lab here at jsc

31

00:01:05,830 --> 00:01:04,720

and our job is to understand the role of

32

00:01:09,350 --> 00:01:05,840

nutrition

33

00:01:10,630 --> 00:01:09,360

in keeping people healthy during flight

34

00:01:11,910 --> 00:01:10,640

sorry

35

00:01:13,270 --> 00:01:11,920

and

36

00:01:16,230 --> 00:01:13,280

you know it's it's very well known that

37

00:01:17,749 --> 00:01:16,240

nutrition is critical for bone health

38

00:01:20,789 --> 00:01:17,759

things like vitamin d

39

00:01:22,550 --> 00:01:20,799

calcium are the more obvious

40

00:01:24,230 --> 00:01:22,560

nutrients that we associate with bone

41

00:01:25,429 --> 00:01:24,240

health but there's a lot of things that

42

00:01:28,070 --> 00:01:25,439

are involved

43

00:01:30,230 --> 00:01:28,080

in the diet that can impact

44

00:01:32,950 --> 00:01:30,240

on bone and

45

00:01:34,789 --> 00:01:32,960

the pro-k experiment came out of

46

00:01:36,469 --> 00:01:34,799

some literature in the in the general

47

00:01:38,390 --> 00:01:36,479

field of nutrition

48

00:01:39,510 --> 00:01:38,400

looking at the relationship of dietary

49

00:01:41,109 --> 00:01:39,520

protein

50

00:01:43,670 --> 00:01:41,119

and bone health

51  
00:01:46,069 --> 00:01:43,680  
and we did some studies on the ground

52  
00:01:48,630 --> 00:01:46,079  
bed rest studies where we put people to

53  
00:01:50,149 --> 00:01:48,640  
bed to simulate the effects of

54  
00:01:51,910 --> 00:01:50,159  
for a long period of time for a long

55  
00:01:54,870 --> 00:01:51,920  
period of time

56  
00:01:56,709 --> 00:01:54,880  
and what we're looking at is the

57  
00:01:58,230 --> 00:01:56,719  
the relationship of what they what they

58  
00:02:00,789 --> 00:01:58,240  
ate and bone

59  
00:02:02,310 --> 00:02:00,799  
and we found a pretty clear relationship

60  
00:02:05,749 --> 00:02:02,320  
between

61  
00:02:08,229 --> 00:02:05,759  
animal protein that we dub pro

62  
00:02:10,229 --> 00:02:08,239  
and potassium which is the chemical

63  
00:02:12,630 --> 00:02:10,239

abbreviation for potassium is k

64

00:02:14,470 --> 00:02:12,640

and thus the the name pro k

65

00:02:16,710 --> 00:02:14,480

uh was born as we started developing

66

00:02:18,309 --> 00:02:16,720

this as a flight experiment and the

67

00:02:20,390 --> 00:02:18,319

premise here is to

68

00:02:22,390 --> 00:02:20,400

feed them more or less of one or the

69

00:02:24,070 --> 00:02:22,400

other to find out and find out the

70

00:02:25,270 --> 00:02:24,080

result that's that's absolutely right

71

00:02:28,150 --> 00:02:25,280

and what we're doing

72

00:02:30,630 --> 00:02:28,160

is modifying the ratio of those two

73

00:02:32,869 --> 00:02:30,640

things animal protein and potassium in

74

00:02:34,790 --> 00:02:32,879

the diet and it's that's a key thing to

75

00:02:36,070 --> 00:02:34,800

get from a nutrition point of view

76

00:02:38,790 --> 00:02:36,080

we're not talking about lower high

77

00:02:40,470 --> 00:02:38,800

protein diets the protein is constant

78

00:02:42,869 --> 00:02:40,480

across the study

79

00:02:45,670 --> 00:02:42,879

all we're looking is the balance between

80

00:02:48,309 --> 00:02:45,680

animal protein or red meat if you like

81

00:02:49,670 --> 00:02:48,319

and potassium and potassium tends to be

82

00:02:51,350 --> 00:02:49,680

rich in things like fruits and

83

00:02:53,990 --> 00:02:51,360

vegetables

84

00:02:57,030 --> 00:02:54,000

also nuts and other things like that

85

00:02:58,790 --> 00:02:57,040

any theory going in as to why these two

86

00:02:59,990 --> 00:02:58,800

things were that important why they were

87

00:03:01,030 --> 00:03:00,000

having the effect on the bed rest

88

00:03:03,830 --> 00:03:01,040

patients

89

00:03:06,070 --> 00:03:03,840

well it really it really bounces back to

90

00:03:08,470 --> 00:03:06,080

what we call acid-base balance

91

00:03:11,670 --> 00:03:08,480

and what happens in your body is that

92

00:03:14,309 --> 00:03:11,680

your body and your bones

93

00:03:16,470 --> 00:03:14,319

don't respond well if you will to

94

00:03:17,350 --> 00:03:16,480

an acid load okay

95

00:03:18,630 --> 00:03:17,360

and i

96

00:03:20,470 --> 00:03:18,640

it's probably not the best choice of

97

00:03:22,149 --> 00:03:20,480

words but what happens when your body's

98

00:03:24,309 --> 00:03:22,159

presented with an acid

99

00:03:26,229 --> 00:03:24,319

is it needs to maintain

100

00:03:27,190 --> 00:03:26,239

your your blood ph your blood levels of

101  
00:03:28,630 --> 00:03:27,200  
acid

102  
00:03:30,149 --> 00:03:28,640  
one of the ways it does that is by

103  
00:03:31,670 --> 00:03:30,159  
breaking down bone

104  
00:03:33,830 --> 00:03:31,680  
because when your body breaks down bone

105  
00:03:35,589 --> 00:03:33,840  
it releases calcium carbonate which

106  
00:03:36,789 --> 00:03:35,599  
neutralizes that acid

107  
00:03:37,750 --> 00:03:36,799  
okay

108  
00:03:39,350 --> 00:03:37,760  
what

109  
00:03:41,350 --> 00:03:39,360  
again the premise the experiment is is

110  
00:03:43,990 --> 00:03:41,360  
that the animal protein

111  
00:03:47,910 --> 00:03:44,000  
is rich in things that are converted to

112  
00:03:50,949 --> 00:03:47,920  
acid in the body and potassium

113  
00:03:54,630 --> 00:03:50,959

is associated with compounds in the food

114

00:03:56,229 --> 00:03:54,640

that will neutralize acid or other bases

115

00:03:57,910 --> 00:03:56,239

if you will

116

00:03:59,750 --> 00:03:57,920

and by it's the balance of those two

117

00:04:01,830 --> 00:03:59,760

things you're trying to minimize the

118

00:04:03,589 --> 00:04:01,840

acid load and you either you know you

119

00:04:06,149 --> 00:04:03,599

bring that down by consuming

120

00:04:08,470 --> 00:04:06,159

either less animal protein or

121

00:04:09,830 --> 00:04:08,480

more fruits and vegetables and and we

122

00:04:12,710 --> 00:04:09,840

wanted to see

123

00:04:14,949 --> 00:04:12,720

if by adjusting that ratio

124

00:04:16,469 --> 00:04:14,959

if we could mitigate or lessen

125

00:04:18,469 --> 00:04:16,479

some of the bone breakdown that we see

126

00:04:20,310 --> 00:04:18,479

during space flight all right for the

127

00:04:23,749 --> 00:04:20,320

crew members who are involved in this

128

00:04:24,950 --> 00:04:23,759

what is it that they actually have to do

129

00:04:27,270 --> 00:04:24,960

talk through the process and we have

130

00:04:29,510 --> 00:04:27,280

some photographs that we can show of the

131

00:04:31,270 --> 00:04:29,520

of different steps along the way okay

132

00:04:33,749 --> 00:04:31,280

well this you know again when we talk to

133

00:04:35,430 --> 00:04:33,759

the crews about participating this uh it

134

00:04:37,909 --> 00:04:35,440

is a dietary study that is the the

135

00:04:39,590 --> 00:04:37,919

primary thrust of this uh we work with

136

00:04:40,469 --> 00:04:39,600

the crews ahead of time to come up with

137

00:04:43,110 --> 00:04:40,479

two

138

00:04:45,270 --> 00:04:43,120

different menus one that is high

139

00:04:46,629 --> 00:04:45,280

animal protein to potassium ratio and

140

00:04:48,469 --> 00:04:46,639

one that is low

141

00:04:49,670 --> 00:04:48,479

animal protein and potassium ratio so

142

00:04:51,270 --> 00:04:49,680

again one

143

00:04:52,870 --> 00:04:51,280

would tend to have more red meat less

144

00:04:54,629 --> 00:04:52,880

fruits and vegetables

145

00:04:57,110 --> 00:04:54,639

the other would tend to have more

146

00:05:00,469 --> 00:04:57,120

vegetable protein things like nuts

147

00:05:01,189 --> 00:05:00,479

beans a little less red meat

148

00:05:04,150 --> 00:05:01,199

and

149

00:05:05,909 --> 00:05:04,160

stuff that comes up in their regular

150

00:05:07,510 --> 00:05:05,919

food containers well it's the regular

151

00:05:10,150 --> 00:05:07,520

food but we actually put it in a special

152

00:05:12,070 --> 00:05:10,160

container that for a period of four days

153

00:05:13,830 --> 00:05:12,080

they eat that menu that we've planned

154

00:05:15,749 --> 00:05:13,840

for them ahead of time that's correct

155

00:05:16,950 --> 00:05:15,759

um so for four days they'll consume this

156

00:05:18,310 --> 00:05:16,960

special diet

157

00:05:21,590 --> 00:05:18,320

at the end of those four days they'll

158

00:05:23,830 --> 00:05:21,600

collect um a urine sample for 24 hours

159

00:05:25,990 --> 00:05:23,840

they'll collect all their urine for us

160

00:05:27,590 --> 00:05:26,000

in what we call urine collection devices

161

00:05:28,710 --> 00:05:27,600

and at the end of that they'll also

162

00:05:30,070 --> 00:05:28,720

collect

163

00:05:32,390 --> 00:05:30,080

a blood sample and there you can see

164

00:05:37,029 --> 00:05:32,400

sunny williams with a urine collection

165

00:05:39,029 --> 00:05:37,039

device and in in a ziploc bag there

166

00:05:40,550 --> 00:05:39,039

and you said also there's bones uh blood

167

00:05:41,830 --> 00:05:40,560

samples that are taken that's correct so

168

00:05:43,110 --> 00:05:41,840

we collect urine samples and then at the

169

00:05:45,189 --> 00:05:43,120

end we collect a blood sample and here

170

00:05:47,350 --> 00:05:45,199

you can see uh somebody collecting blood

171

00:05:48,390 --> 00:05:47,360

uh right there um one of those tubes is

172

00:05:50,550 --> 00:05:48,400

filled with blood the other one is

173

00:05:51,909 --> 00:05:50,560

getting ready and then the samples both

174

00:05:53,670 --> 00:05:51,919

the blood and the urine samples will go

175

00:05:55,990 --> 00:05:53,680

into the freezer

176

00:05:57,990 --> 00:05:56,000

it's the melphia some -80 laboratory

177

00:05:59,670 --> 00:05:58,000

freezer for iss

178

00:06:01,510 --> 00:05:59,680

and they will stay in that freezer until

179

00:06:03,830 --> 00:06:01,520

they come home

180

00:06:05,670 --> 00:06:03,840

on a return vehicle and you know in the

181

00:06:07,590 --> 00:06:05,680

early days of the experiment we would

182

00:06:10,710 --> 00:06:07,600

bring samples home on the shuttle

183

00:06:13,189 --> 00:06:10,720

and now with the shuttle retired spacex

184

00:06:14,390 --> 00:06:13,199

has been our primary ride home so

185

00:06:15,990 --> 00:06:14,400

we're actually

186

00:06:18,070 --> 00:06:16,000

very anxious and looking forward to this

187

00:06:20,710 --> 00:06:18,080

next spacex mission because i think

188

00:06:23,350 --> 00:06:20,720

there's about seven subjects worth of

189

00:06:24,629 --> 00:06:23,360

samples on board station right now

190

00:06:26,790 --> 00:06:24,639

that will come home with this next

191

00:06:28,390 --> 00:06:26,800

landing you got any

192

00:06:31,189 --> 00:06:28,400

feedback from the crew members that

193

00:06:33,749 --> 00:06:31,199

about liking or disliking the food they

194

00:06:36,309 --> 00:06:33,759

have to eat for this well again as you

195

00:06:37,909 --> 00:06:36,319

said it is it's food from their nominal

196

00:06:39,270 --> 00:06:37,919

food system so it's things they eat on a

197

00:06:42,550 --> 00:06:39,280

regular basis

198

00:06:44,230 --> 00:06:42,560

um as as i typically say

199

00:06:46,390 --> 00:06:44,240

as soon as you tell somebody what to eat

200

00:06:47,670 --> 00:06:46,400

uh it becomes a nuisance even if it was

201  
00:06:48,469 --> 00:06:47,680  
what you wanted to eat as soon as i tell

202  
00:06:49,670 --> 00:06:48,479  
you this is what you're going to eat

203  
00:06:52,629 --> 00:06:49,680  
today

204  
00:06:54,629 --> 00:06:52,639  
it becomes a bit of a bother so

205  
00:06:56,230 --> 00:06:54,639  
we've taken some ribbing over the course

206  
00:06:57,670 --> 00:06:56,240  
of the experiment

207  
00:06:59,110 --> 00:06:57,680  
and crews will tell you that even if you

208  
00:07:01,110 --> 00:06:59,120  
like the food again

209  
00:07:02,469 --> 00:07:01,120  
after four days it gets a little old and

210  
00:07:03,990 --> 00:07:02,479  
one of my favorite comments was one of

211  
00:07:05,990 --> 00:07:04,000  
the crew members

212  
00:07:07,270 --> 00:07:06,000  
they had finished the week before and

213  
00:07:09,350 --> 00:07:07,280

one of their crewmates was then doing

214

00:07:10,710 --> 00:07:09,360

the four days uh and that crew member

215

00:07:13,110 --> 00:07:10,720

was very proud to proclaim that that

216

00:07:14,790 --> 00:07:13,120

week they were on the no k diet meaning

217

00:07:17,029 --> 00:07:14,800

that they didn't have to do this but

218

00:07:18,710 --> 00:07:17,039

other than that um the

219

00:07:20,309 --> 00:07:18,720

crew participation has been phenomenal

220

00:07:21,990 --> 00:07:20,319

and they've done a great job with us and

221

00:07:25,110 --> 00:07:22,000

you've gotten samples back from a number

222

00:07:26,870 --> 00:07:25,120

of crew members so far any early

223

00:07:28,870 --> 00:07:26,880

take on what you've found from them so

224

00:07:29,589 --> 00:07:28,880

far um we do have some back and it's

225

00:07:31,189 --> 00:07:29,599

still

226

00:07:32,550 --> 00:07:31,199

it's a little bit early but i will tell

227

00:07:34,469 --> 00:07:32,560

you that um

228

00:07:35,749 --> 00:07:34,479

from the data we've seen so far we're

229

00:07:36,870 --> 00:07:35,759

still confident that we're on the right

230

00:07:39,909 --> 00:07:36,880

path

231

00:07:42,790 --> 00:07:39,919

we've seen things like the the diet

232

00:07:44,950 --> 00:07:42,800

the different diets do align with

233

00:07:46,390 --> 00:07:44,960

ph of the urine for example

234

00:07:47,909 --> 00:07:46,400

which tells us we're on the right track

235

00:07:48,869 --> 00:07:47,919

and we have seen some

236

00:07:50,550 --> 00:07:48,879

indication that we're seeing

237

00:07:53,990 --> 00:07:50,560

relationships of

238

00:07:55,670 --> 00:07:54,000

um urinary ph or urinary acid

239

00:07:57,029 --> 00:07:55,680  
with changes in bone

240

00:07:58,390 --> 00:07:57,039  
uh but it's still a little early again

241

00:07:59,830 --> 00:07:58,400  
we're waiting on

242

00:08:02,710 --> 00:07:59,840  
that next batch of samples and we're

243

00:08:04,869 --> 00:08:02,720  
waiting these last few crew members

244

00:08:07,830 --> 00:08:04,879  
mike hopkins right now is is our next to

245

00:08:09,029 --> 00:08:07,840  
last subject and then reid wiseman later

246

00:08:10,629 --> 00:08:09,039  
this year

247

00:08:13,350 --> 00:08:10,639  
will be the final subject in this

248

00:08:15,830 --> 00:08:13,360  
experiment if you find that

249

00:08:17,909 --> 00:08:15,840  
adjusting the diet has some impact on

250

00:08:20,390 --> 00:08:17,919  
bone loss that sounds like something

251  
00:08:23,189 --> 00:08:20,400  
that could that might be easily applied

252  
00:08:25,430 --> 00:08:23,199  
to people on earth to be able to fight

253  
00:08:27,430 --> 00:08:25,440  
bone loss by diet

254  
00:08:29,029 --> 00:08:27,440  
absolutely and we you know from space by

255  
00:08:30,629 --> 00:08:29,039  
first perspective

256  
00:08:32,790 --> 00:08:30,639  
we always maintain that you know if we

257  
00:08:33,670 --> 00:08:32,800  
can modify the diet to help lessen bone

258  
00:08:36,469 --> 00:08:33,680  
loss

259  
00:08:38,149 --> 00:08:36,479  
that provides a zero cost counter

260  
00:08:39,670 --> 00:08:38,159  
measure that is we're already feeding

261  
00:08:41,909 --> 00:08:39,680  
the crews so it doesn't take any extra

262  
00:08:44,710 --> 00:08:41,919  
time it doesn't take any extra up mass

263  
00:08:46,310 --> 00:08:44,720

it doesn't take you know anything but

264

00:08:49,190 --> 00:08:46,320

what we're already doing we just got to

265

00:08:51,430 --> 00:08:49,200

to tweak the nominal diet and then the

266

00:08:53,910 --> 00:08:51,440

implications on earth are just as are

267

00:08:56,310 --> 00:08:53,920

just as profound that is if people can

268

00:08:58,070 --> 00:08:56,320

alter their diets

269

00:08:59,269 --> 00:08:58,080

this could have have tremendous impact

270

00:09:04,870 --> 00:08:59,279

on

271

00:09:06,790 --> 00:09:04,880

it's uh very interesting and look

272

00:09:08,150 --> 00:09:06,800

forward to seeing more of the results

273

00:09:09,829 --> 00:09:08,160

thanks for coming this morning thank you