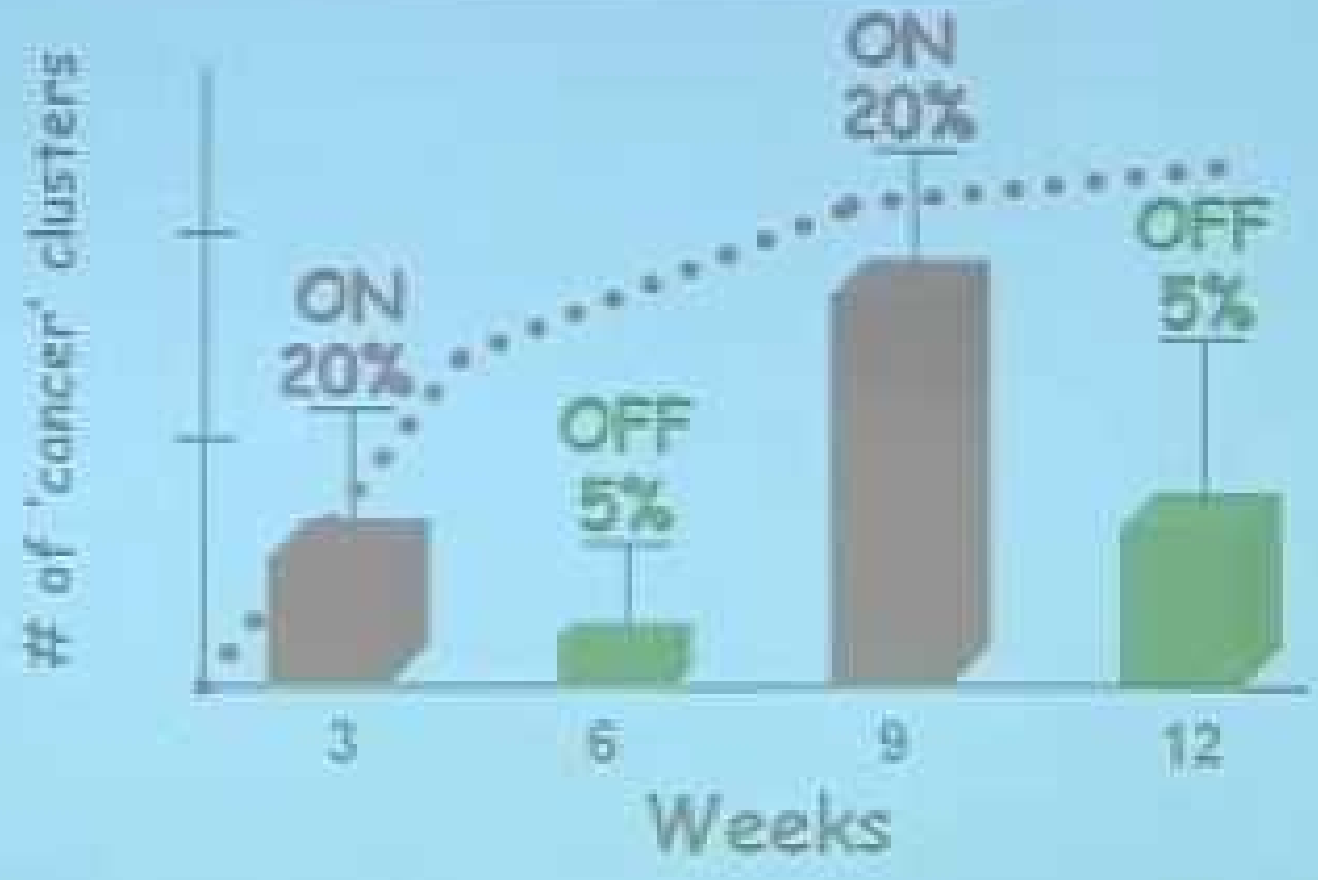
Dietary Protein and EARLY Cancer

(Youngman and Campbell, J. Nutr., 1991, Nutr. Cancer, 1992)



1
00:00:03,990 --> 00:00:03,189
thank you garrett and thank you bill for

2
00:00:07,110 --> 00:00:04,000
inviting me here

3
00:00:10,150 --> 00:00:07,120
this is in fact my first attendance

4
00:00:12,629 --> 00:00:10,160
i i've had some troubles in my field

5
00:00:14,150 --> 00:00:12,639
i must say but now when i go home and

6
00:00:16,550 --> 00:00:14,160
tell people i've come to a conference

7
00:00:19,109 --> 00:00:16,560
like this

8
00:00:22,150 --> 00:00:19,119
i don't know what i'm going to say next

9
00:00:25,269 --> 00:00:24,470
yes i i've actually got 40 minutes i

10
00:00:29,509 --> 00:00:25,279
think to

11
00:00:31,910 --> 00:00:29,519
to condense from 40 hours of seminar

12
00:00:33,110 --> 00:00:31,920
which in turn represents more than 40

13
00:00:35,110 --> 00:00:33,120

years of work

14
00:00:37,430 --> 00:00:35,120
which represents i think about 4 000

15
00:00:39,030 --> 00:00:37,440
years worth of observations by others it

16
00:00:40,549 --> 00:00:39,040
goes back that far

17
00:00:42,310 --> 00:00:40,559
so we'll see what we can do i can just

18
00:00:42,709 --> 00:00:42,320
say some provocative things and leave it

19
00:00:44,709 --> 00:00:42,719
at that

20
00:00:46,389 --> 00:00:44,719
we can talk about you know explanations

21
00:00:50,069 --> 00:00:46,399
a little bit later on

22
00:00:51,510 --> 00:00:50,079
um i the the force that was four

23
00:00:52,229 --> 00:00:51,520
thousand year reference that i'm making

24
00:00:54,069 --> 00:00:52,239
is of course

25
00:00:55,270 --> 00:00:54,079
we are what we eat that goes back at

26
00:00:55,670 --> 00:00:55,280
least four thousand years to my

27
00:00:57,430 --> 00:00:55,680
knowledge

28
00:00:59,750 --> 00:00:57,440
the best i can figure out this is the

29
00:01:02,869 --> 00:00:59,760
book to which garrett

30
00:01:04,549 --> 00:01:02,879
uh identified and obviously i can't

31
00:01:05,990 --> 00:01:04,559
follow the explanations of why i'm going

32
00:01:07,590 --> 00:01:06,000
to say the things we're going to say so

33
00:01:10,870 --> 00:01:07,600
i suggest if you're interested

34
00:01:12,630 --> 00:01:10,880
you can you can get that book this

35
00:01:15,350 --> 00:01:12,640
started uh quite a

36
00:01:16,630 --> 00:01:15,360
number of years ago uh when in fact i

37
00:01:18,550 --> 00:01:16,640
actually took a faculty position

38
00:01:20,149 --> 00:01:18,560

virginia tech just down the road

39
00:01:22,390 --> 00:01:20,159
uh in the department of biochemistry and

40
00:01:24,390 --> 00:01:22,400
i had at that time a responsibility

41
00:01:26,149 --> 00:01:24,400
to help organize and coordinate a

42
00:01:28,630 --> 00:01:26,159
program in the philippines

43
00:01:30,390 --> 00:01:28,640
with state department funding to try to

44
00:01:32,310 --> 00:01:30,400
help bring under control

45
00:01:33,510 --> 00:01:32,320
uh malnutrition and children of which of

46
00:01:35,749 --> 00:01:33,520
course this is a an

47
00:01:37,270 --> 00:01:35,759
unfortunate consequence and at that time

48
00:01:38,230 --> 00:01:37,280
without getting into a lot of other

49
00:01:41,749 --> 00:01:38,240
detail

50
00:01:43,350 --> 00:01:41,759
uh it was an opportunity for well i went

51
00:01:44,870 --> 00:01:43,360
there with my senior colleague to

52
00:01:46,550 --> 00:01:44,880
make sure that these children got enough

53
00:01:48,230 --> 00:01:46,560
protein i mean that's what we tend to

54
00:01:49,990 --> 00:01:48,240
think about in western societies

55
00:01:51,350 --> 00:01:50,000
as far as our own diet is concerned make

56
00:01:52,789 --> 00:01:51,360
sure we get enough protein you've heard

57
00:01:55,590 --> 00:01:52,799
the story i'm sure whether you've

58
00:01:57,270 --> 00:01:55,600
been in the science or not and so this

59
00:01:59,350 --> 00:01:57,280
is what this study was in part

60
00:02:01,030 --> 00:01:59,360
about was to try to figure out make sure

61
00:02:03,270 --> 00:02:01,040
these kids got enough protein

62
00:02:05,030 --> 00:02:03,280
and that suited my kind of thinking as

63
00:02:06,389 --> 00:02:05,040

it did my senior colleague

64
00:02:09,669 --> 00:02:06,399
because that's what we tend to think in

65
00:02:11,910 --> 00:02:09,679
science and nutrition in particular

66
00:02:13,830 --> 00:02:11,920
and along the way again without getting

67
00:02:17,030 --> 00:02:13,840
into all the details

68
00:02:18,470 --> 00:02:17,040
i got the impression in talking to some

69
00:02:19,750 --> 00:02:18,480
people and

70
00:02:22,309 --> 00:02:19,760
considering the question concerning

71
00:02:25,350 --> 00:02:22,319
cancer formation especially which was my

72
00:02:27,750 --> 00:02:25,360
special interest at the time was that

73
00:02:30,150 --> 00:02:27,760
cancer tended to be more common in

74
00:02:31,509 --> 00:02:30,160
families and even in children

75
00:02:34,070 --> 00:02:31,519
and families who are consuming the

76
00:02:36,070 --> 00:02:34,080
levels of protein like we do

77
00:02:37,910 --> 00:02:36,080
in other words higher levels we we as a

78
00:02:38,869 --> 00:02:37,920
society tend to consume very high levels

79
00:02:42,150 --> 00:02:38,879
of protein

80
00:02:43,670 --> 00:02:42,160
uh here uh there they don't uh but the

81
00:02:46,229 --> 00:02:43,680
few families who did

82
00:02:47,830 --> 00:02:46,239
seem to have had children and themselves

83
00:02:48,790 --> 00:02:47,840
who had higher levels of a certain kind

84
00:02:51,830 --> 00:02:48,800
of cancer

85
00:02:52,869 --> 00:02:51,840
with liver cancer particular and so it

86
00:02:54,470 --> 00:02:52,879
was odd

87
00:02:55,750 --> 00:02:54,480
we're going there to increase protein

88
00:02:56,869 --> 00:02:55,760

intake to bring it up to our level

89
00:02:58,309 --> 00:02:56,879
that's when in fact

90
00:02:59,990 --> 00:02:58,319
it might have that kind of consequence

91
00:03:03,589 --> 00:03:00,000
so this study came out

92
00:03:06,790 --> 00:03:03,599
from india using experimental animals

93
00:03:08,949 --> 00:03:06,800
showing that in fact animals that given

94
00:03:11,589 --> 00:03:08,959
regular levels of protein that's 20

95
00:03:13,350 --> 00:03:11,599
percent of total calories we express it

96
00:03:15,430 --> 00:03:13,360
compared to animals given lower levels

97
00:03:18,149 --> 00:03:15,440
and all animals exposed to a very

98
00:03:20,149 --> 00:03:18,159
potent chemical carcinogen by the way

99
00:03:22,470 --> 00:03:20,159
that the animals given the

100
00:03:24,070 --> 00:03:22,480
regular levels of protein which were

101
00:03:26,869 --> 00:03:24,080
thought by the investigators

102
00:03:27,509 --> 00:03:26,879
to actually maybe repress and keep under

103
00:03:29,670 --> 00:03:27,519
control

104
00:03:30,869 --> 00:03:29,680
the formation of this cancer in fact

105
00:03:32,949 --> 00:03:30,879
they were the ones that got all the

106
00:03:34,309 --> 00:03:32,959
cancer as opposed to the ones given

107
00:03:36,550 --> 00:03:34,319
lower levels of protein which

108
00:03:38,070 --> 00:03:36,560
got none we did they didn't need a

109
00:03:39,589 --> 00:03:38,080
statistician to tell them whether or not

110
00:03:43,190 --> 00:03:39,599
that was significant

111
00:03:46,470 --> 00:03:43,200
uh because it was quite clear um it was

112
00:03:48,309 --> 00:03:46,480
also coincided with what in fact i

113
00:03:49,670 --> 00:03:48,319

said that i thought i saw in the

114
00:03:51,509 --> 00:03:49,680
children and the families

115
00:03:53,990 --> 00:03:51,519
are getting more protein getting more

116
00:03:56,710 --> 00:03:54,000
cancer i mean that's pretty odd

117
00:03:58,710 --> 00:03:56,720
and so we went on i i took this

118
00:04:00,550 --> 00:03:58,720
observation of those observations

119
00:04:02,869 --> 00:04:00,560
and then organize a study with nih

120
00:04:04,550 --> 00:04:02,879
funding which continued over the next 27

121
00:04:06,309 --> 00:04:04,560
years as one major grant

122
00:04:08,149 --> 00:04:06,319
uh so this is this what i'm going to

123
00:04:09,670 --> 00:04:08,159
tell you now it was funded by the

124
00:04:11,910 --> 00:04:09,680
national institutes of health

125
00:04:12,949 --> 00:04:11,920
uh and in fact was published in in the

126
00:04:14,949 --> 00:04:12,959
best journals that we

127
00:04:16,550 --> 00:04:14,959
we have in our field so i'm just going

128
00:04:19,909 --> 00:04:16,560
to just mention some things because

129
00:04:21,349 --> 00:04:19,919
with that start that focus on a rather

130
00:04:23,830 --> 00:04:21,359
narrow question

131
00:04:24,710 --> 00:04:23,840
actually has now expanded for me at

132
00:04:26,710 --> 00:04:24,720
least into

133
00:04:28,150 --> 00:04:26,720
a broad perspective of what health and

134
00:04:29,590 --> 00:04:28,160
nutrition is all about

135
00:04:31,350 --> 00:04:29,600
and i just want to share this with you

136
00:04:33,350 --> 00:04:31,360
because these are

137
00:04:34,790 --> 00:04:33,360
the this and the next couple of slides

138
00:04:36,310 --> 00:04:34,800

is what really just provoked

139
00:04:38,070 --> 00:04:36,320
my i guess my thinking more than

140
00:04:41,270 --> 00:04:38,080
anything

141
00:04:42,550 --> 00:04:41,280
namely if you take animals and you

142
00:04:44,150 --> 00:04:42,560
expose them to a very

143
00:04:46,629 --> 00:04:44,160
potent chemical carcinogen in this

144
00:04:49,909 --> 00:04:46,639
particular case causing liver cancer

145
00:04:51,670 --> 00:04:49,919
but then subsequently give them either

146
00:04:53,030 --> 00:04:51,680
one of two levels of protein either the

147
00:04:55,749 --> 00:04:53,040
good levels or the

148
00:04:56,310 --> 00:04:55,759
lower levels if you will this early

149
00:04:59,749 --> 00:04:56,320
cancer

150
00:05:02,550 --> 00:04:59,759
begins to form over the first 12 weeks

151
00:05:03,110 --> 00:05:02,560
you know rather well when these animals

152
00:05:04,870 --> 00:05:03,120
are given

153
00:05:06,710 --> 00:05:04,880
the so-called recommended good levels of

154
00:05:07,590 --> 00:05:06,720
protein in contrast the animals given

155
00:05:09,670 --> 00:05:07,600
the lower levels

156
00:05:11,430 --> 00:05:09,680
like the indian workers had found did

157
00:05:14,070 --> 00:05:11,440
not get cancer

158
00:05:17,350 --> 00:05:14,080
but then we sort of turned our attention

159
00:05:20,390 --> 00:05:19,350
the next question that was what happens

160
00:05:22,390 --> 00:05:20,400
during this period

161
00:05:23,749 --> 00:05:22,400
let's say when you switch protein back

162
00:05:26,230 --> 00:05:23,759
and forth

163
00:05:28,150 --> 00:05:26,240

during this early stage and what we

164
00:05:30,230 --> 00:05:28,160
found of course as you can see here

165
00:05:32,230 --> 00:05:30,240
you feed animals 20 in the first three

166
00:05:34,070 --> 00:05:32,240
weeks these cancers are growing rather

167
00:05:34,469 --> 00:05:34,080
well early cancers i should say these

168
00:05:36,870 --> 00:05:34,479
are

169
00:05:38,150 --> 00:05:36,880
pre-neoplastic so to speak lesions that

170
00:05:39,749 --> 00:05:38,160
we could identify

171
00:05:41,990 --> 00:05:39,759
and then he associates the five percent

172
00:05:43,749 --> 00:05:42,000
you turn it off turn it back on turn off

173
00:05:45,430 --> 00:05:43,759
in other words in doing this in many

174
00:05:46,469 --> 00:05:45,440
different ways this is just one

175
00:05:48,629 --> 00:05:46,479
illustration

176
00:05:51,590 --> 00:05:48,639
uh we could actually turn on and turn

177
00:05:54,469 --> 00:05:51,600
off this experimental cancer development

178
00:05:55,430 --> 00:05:54,479
simply by fairly modest nutritional

179
00:05:57,510 --> 00:05:55,440
means

180
00:05:59,510 --> 00:05:57,520
just just trading you know the protein

181
00:06:02,150 --> 00:05:59,520
back and forth

182
00:06:03,510 --> 00:06:02,160
um but then i got let me just take a

183
00:06:05,029 --> 00:06:03,520
diversion on the side of it

184
00:06:06,870 --> 00:06:05,039
i don't want to say you know the protein

185
00:06:09,110 --> 00:06:06,880
is bad it's not i mean

186
00:06:10,309 --> 00:06:09,120
protein is an essential nutrient the

187
00:06:11,909 --> 00:06:10,319
question is how much

188
00:06:13,590 --> 00:06:11,919

and so we were able to examine that

189
00:06:15,670 --> 00:06:13,600
question to something that in this

190
00:06:16,790 --> 00:06:15,680
in this experiment animal system but

191
00:06:19,510 --> 00:06:16,800
basically

192
00:06:20,790 --> 00:06:19,520
uh feeding from 4 6 8 10 12 on up to

193
00:06:22,070 --> 00:06:20,800
twenty percent protein

194
00:06:23,909 --> 00:06:22,080
to see what the dose response

195
00:06:25,510 --> 00:06:23,919
relationship was all about

196
00:06:27,510 --> 00:06:25,520
and what we learned in this particular

197
00:06:30,390 --> 00:06:27,520
case here was that

198
00:06:32,150 --> 00:06:30,400
uh up to about ten percent protein which

199
00:06:33,830 --> 00:06:32,160
is the amount needed for growth

200
00:06:35,510 --> 00:06:33,840
it's actually in ten percent is an

201
00:06:36,710 --> 00:06:35,520
excess of what these animals actually

202
00:06:39,110 --> 00:06:36,720
need

203
00:06:39,830 --> 00:06:39,120
uh but it's it's a generous and decent

204
00:06:43,430 --> 00:06:39,840
level

205
00:06:45,029 --> 00:06:43,440
uh ever put the the cancer didn't grow

206
00:06:46,390 --> 00:06:45,039
in spite of the fact that these animals

207
00:06:47,350 --> 00:06:46,400
had been exposed to a chemical

208
00:06:50,230 --> 00:06:47,360
carcinogen

209
00:06:51,830 --> 00:06:50,240
was only when in excess these cancers

210
00:06:54,070 --> 00:06:51,840
really took off

211
00:06:56,150 --> 00:06:54,080
and if we want to try to you know sort

212
00:06:57,270 --> 00:06:56,160
of ask ourselves is this equivalent to

213
00:06:58,870 --> 00:06:57,280

humans in any way

214
00:07:00,870 --> 00:06:58,880
it turns out the amount of protein we

215
00:07:01,510 --> 00:07:00,880
humans need compared to animals about

216
00:07:03,510 --> 00:07:01,520
the same

217
00:07:05,430 --> 00:07:03,520
there's a there's a slight difference

218
00:07:06,710 --> 00:07:05,440
but i'm here talking about the shape of

219
00:07:09,749 --> 00:07:06,720
this curve more than

220
00:07:13,029 --> 00:07:09,759
the actual identity of the quantity

221
00:07:14,710 --> 00:07:13,039
in any case it turns out that when these

222
00:07:15,270 --> 00:07:14,720
animals have fed protein and exodus they

223
00:07:16,950 --> 00:07:15,280
get this

224
00:07:18,790 --> 00:07:16,960
the human range of consumption is

225
00:07:20,230 --> 00:07:18,800
somewhere between about 11 and 22

226
00:07:21,990 --> 00:07:20,240
percent

227
00:07:24,309 --> 00:07:22,000
so the extent to which if you make the

228
00:07:26,230 --> 00:07:24,319
assumption radical assumption press

229
00:07:27,589 --> 00:07:26,240
but if you make the assumption that we

230
00:07:29,430 --> 00:07:27,599
as humans

231
00:07:31,589 --> 00:07:29,440
are more or less requiring the same

232
00:07:33,589 --> 00:07:31,599
amount of protein and in fact

233
00:07:35,110 --> 00:07:33,599
we're consuming levels of protein

234
00:07:37,110 --> 00:07:35,120
amongst all of us 95

235
00:07:38,390 --> 00:07:37,120
of us in that range where cancer might

236
00:07:40,390 --> 00:07:38,400
form uh this

237
00:07:41,670 --> 00:07:40,400
certainly provokes a question as to

238
00:07:45,670 --> 00:07:41,680

whether or not i think this

239
00:07:47,270 --> 00:07:45,680
is relevant for humans um

240
00:07:48,710 --> 00:07:47,280
but that was these were early cancers

241
00:07:50,869 --> 00:07:48,720
and we then we did

242
00:07:52,309 --> 00:07:50,879
sort of in cancer research we want to

243
00:07:52,790 --> 00:07:52,319
know what happens over a lifetime

244
00:07:55,350 --> 00:07:52,800
because

245
00:07:56,869 --> 00:07:55,360
cancer takes a long time to form as many

246
00:07:58,629 --> 00:07:56,879
of you i'm sure know

247
00:08:00,469 --> 00:07:58,639
so we want to explore whether or not

248
00:08:03,510 --> 00:08:00,479
this early effect translated

249
00:08:05,110 --> 00:08:03,520
into a lifetime effect and uh in this

250
00:08:07,029 --> 00:08:05,120
particular case these animals are given

251
00:08:09,029 --> 00:08:07,039
to five and 20 percent this is actually

252
00:08:10,629 --> 00:08:09,039
a portion of a larger study even than

253
00:08:12,230 --> 00:08:10,639
what i'm showing here

254
00:08:14,230 --> 00:08:12,240
but in any case the animal is given five

255
00:08:15,589 --> 00:08:14,240
percent uh over the course of their

256
00:08:18,710 --> 00:08:15,599
lifetime which is

257
00:08:21,589 --> 00:08:18,720
uh basically about two years or so

258
00:08:23,110 --> 00:08:21,599
um this is the level of tumor severity

259
00:08:24,869 --> 00:08:23,120
take into consideration both

260
00:08:26,309 --> 00:08:24,879
the incidence in term of weight in

261
00:08:26,790 --> 00:08:26,319
contrast the animals given twenty

262
00:08:29,830 --> 00:08:26,800
percent

263
00:08:31,830 --> 00:08:29,840

is that i mean that's striking

264
00:08:33,350 --> 00:08:31,840
that is really striking and and in fact

265
00:08:34,709 --> 00:08:33,360
you know confirms in fact what the

266
00:08:36,709 --> 00:08:34,719
indian works is i think had

267
00:08:38,310 --> 00:08:36,719
had basically found what was really

268
00:08:39,350 --> 00:08:38,320
interesting too though was that these

269
00:08:42,310 --> 00:08:39,360
animals

270
00:08:43,750 --> 00:08:42,320
were all living at 100 weeks with no

271
00:08:46,150 --> 00:08:43,760
tumors

272
00:08:47,430 --> 00:08:46,160
very energetic sleek haircuts as if in

273
00:08:48,389 --> 00:08:47,440
fact they were still rather young

274
00:08:50,230 --> 00:08:48,399
animals

275
00:08:51,509 --> 00:08:50,240
it was a remarkable difference these

276
00:08:53,990 --> 00:08:51,519
animals given

277
00:08:56,230 --> 00:08:54,000
the good levels of protein so to speak

278
00:08:59,030 --> 00:08:56,240
exposed to the same level of carcinogen

279
00:08:59,750 --> 00:08:59,040
we're all dead with tumors at 100 weeks

280
00:09:01,910 --> 00:08:59,760
so again

281
00:09:02,949 --> 00:09:01,920
i didn't need a statistician to tell me

282
00:09:07,430 --> 00:09:02,959
whether or not this was

283
00:09:09,670 --> 00:09:07,440
this is for real uh but this of course

284
00:09:11,269 --> 00:09:09,680
this is a tiny tiny snapshot of the

285
00:09:12,470 --> 00:09:11,279
various underways we looked at this

286
00:09:14,230 --> 00:09:12,480
particular relationship

287
00:09:15,990 --> 00:09:14,240
but i think this explains fairly well

288
00:09:18,470 --> 00:09:16,000

what we were what we were doing

289
00:09:19,990 --> 00:09:18,480
and then it was that i started paying

290
00:09:21,990 --> 00:09:20,000
some attention to what was this kind of

291
00:09:23,430 --> 00:09:22,000
protein we were using

292
00:09:25,269 --> 00:09:23,440
and it turns out the protein we were

293
00:09:27,110 --> 00:09:25,279
using is casein which is the main

294
00:09:29,430 --> 00:09:27,120
protein of cow's milk

295
00:09:30,470 --> 00:09:29,440
it's about 87 percent of total protein

296
00:09:32,949 --> 00:09:30,480
cow's milk

297
00:09:34,230 --> 00:09:32,959
i came from a dairy farm by the way milk

298
00:09:35,990 --> 00:09:34,240
and cows

299
00:09:37,990 --> 00:09:36,000
and i started my graduate work actually

300
00:09:41,269 --> 00:09:38,000
doing my doctor's dissertation

301
00:09:44,389 --> 00:09:41,279
with the idea of promoting the use of

302
00:09:45,430 --> 00:09:44,399
this kind of protein so for me uh it was

303
00:09:46,870 --> 00:09:45,440
a struggle

304
00:09:48,710 --> 00:09:46,880
to sort of sort of get my arms around

305
00:09:50,790 --> 00:09:48,720
that but in any case

306
00:09:52,150 --> 00:09:50,800
soy protein and wheat protein even when

307
00:09:54,870 --> 00:09:52,160
dead at the higher levels

308
00:09:55,190 --> 00:09:54,880
did not do this so here's a simple i

309
00:09:57,350 --> 00:09:55,200
mean

310
00:09:58,310 --> 00:09:57,360
it's a limited comparison of course