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Future Sport 2



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Future Sport Show Synopsis

In this episode of Future Sport, hosts Frank Shorter and Dick Grayson explore the scientific side of human performance in sports. They visit the Cotto Research Center in California, where athletes pursue their scientific interests in their respective sports. The episode features the United States women's Olympic volleyball team, which trains at Cotto and has risen from being ranked 45th in the world to number one.

The hosts also interview Frank Shorter, the 1972 Olympic marathon winner, and Hal Conley, the former world record holder for the hammer throw. They discuss the role of scientific research in sports, the importance of form and biomechanics in running, and the future of sports training.


The episode also includes a segment on running in extreme weather conditions, with advice on hydration and clothing. The hosts also discuss the physiological changes that occur in female athletes when their body fat drops below 12 percent.








The show concludes with a discussion on the future of sports, emphasizing the importance of scientific research and technology in improving athletic performance.







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Audio transcription

Frame	#	Time	Spoken text
	0.	00:00:00	Hello, I'm Frank Shorter, and welcome to another edition of Future Sport, a show that looks
	1.	00:00:07	at the scientific side of human performance.
	2.	00:00:11	Future Sport is a show for you athletes, would-be athletes, you sports analysts, and for you
	3.	00:00:28	armchair quarterbacks at home.
	4.	00:00:30	Hi, I'm Dick Grayson, and I'm at the Cotto Research Center in Cotto da Casa, California,
	5.	00:00:35	where we are surrounded by superstars who are here to pursue their scientific interest
	6.	00:00:40	in their respective sport.
	7.	00:00:42	The United States women's Olympic volleyball team trains here at Cotto, and will take an
8.	00:00:46	inside look.	

Frame	#	Time	Spoken text
	9.	00:00:47	Ranked 45th in the world four years ago, today they're number one.
	10.	00:00:52	We'll also meet Frank Shorter, the man who in 1972 won the Olympic marathon and put America
	11.	00:00:58	on its feet.
	12.	00:00:59	We'll then get a different perspective from the man who held the world record for nine
	13.	00:01:03	years in a hammer throw, that's Hal Conley.
	14.	00:01:06	All this on Future Sport.
	15.	00:01:27	Welcome back to beautiful Cotto da Casa.
	16.	00:01:40	With me now is the man who on the streets of Munich 10 years ago attracted major media
	17.	00:01:46	attention to the marathon.
	18.	00:01:50	You may recall that the first runner in the Olympic stadium that day was a fake, but the
	19.	00:01:56	running craze that Frank Shorter's gold medal victory inspired is certainly no clue.
	20.	00:02:02	And today remains one of America's finest marathoners.
	21.	00:02:07	Every morning I go out and I see all those people out on the street and they're running
	22.	00:02:13	like crazy, and you're the one man who had a lot to do with people getting interested
	23.	00:02:18	in taking care of their own bodies.
	24.	00:02:20	Well, I think I was at the right place at the right time.
	25.	00:02:24	And again, there's a luck element involved in everything that you do, and I was lucky
	26.	00:02:29	that the training I had done was right.
	27.	00:02:32	And I think I was also, again, fortunate that I came along at a time in the scientific
	28.	00:02:38	development of the sport that my type of training was all I needed to do.
	29.	00:02:42	There's all that luck involved because the Americans have been very behind in the
	30.	00:02:47	sophistication of the scientific research on sport.
	31.	00:02:50	We do lots of scientific research, but then the other countries use our data, and then
	32.	00:02:54	they transfer it to the athletes.
	33.	00:02:56	Now we're finally doing it here.
	34.	00:02:57	And I may have been one of the first that people started to look at because my advantage
	35.	00:03:02	in running is not strength.
	36.	00:03:04	It is form and biomechanics.
	37.	00:03:07	And as you reach a certain level of training, I think you get to a point of diminishing
	38.	00:03:12	return in terms of just the physical effort that you put out.
	39.	00:03:15	And then you have to get to the point where you can improve your form.
	40.	00:03:19	And it's a very difficult thing to do.
	41.	00:03:21	You can't visualize it in your own mind and reproduce it.
	42.	00:03:25	You have to be able to see it.

Frame	#	Time	Spoken text
	43.	00:03:27	<i>And I think you're starting to see this in a lot of runners now.</i>
	44.	00:03:31	<i>True, in 1976, there weren't people like Gideon Ariel on the scene.</i>
	45.	00:03:37	<i>They were behind the scenes.</i>
	46.	00:03:39	<i>Now I think they really are in the forefront.</i>
	47.	00:03:41	<i>Frank, always in scientific pursuits, there seems to be some model, like Sebastian Kohl.</i>
	48.	00:03:46	<i>Is he going to become a model now and people are going to try to imitate this guy?</i>
	49.	00:03:50	<i>I think what they'll do is they'll study his form to see just what makes him so efficient.</i>
	50.	00:03:54	<i>And, you know, they do amazing things now, like they can put him on a treadmill and measure</i>
	51.	00:03:58	<i>the friction coefficient of his foot when he lands.</i>
	52.	00:04:01	<i>And they can see even what kind of shoe he should wear.</i>
	53.	00:04:05	<i>Some shoes will give him a better friction coefficient than others.</i>
	54.	00:04:08	<i>So they can not only see what makes him good, what allows him to flow along as he runs,</i>
	55.	00:04:14	<i>they can see and study just exactly what he might have done in the way of weight work or training</i>
	56.	00:04:19	<i>to improve that form.</i>
	57.	00:04:21	<i>So it's going to be a combination of sort of taking the fine points, the good points of the superior athlete,</i>
	58.	00:04:28	<i>and then trying to generalize enough so that you can develop weight programs,</i>
	59.	00:04:33	<i>even shoe development programs, to get the athlete to run faster.</i>
	60.	00:04:38	<i>Now that brings us down to 1984 and what Frank Shorter is going to be doing,</i>
	61.	00:04:42	<i>because now all this scientific pursuit is beginning to shrink.</i>
	62.	00:04:45	<i>Chronologically, a guy can be 40, but biologically, 22.</i>
	63.	00:04:49	<i>Where are you going to be in 84 with your body?</i>
	64.	00:04:51	<i>Well, I think my body is about 27 years old in terms of fitness, and I'll be 36 in 1984.</i>
	65.	00:05:00	<i>Fortunately for me, in the last Olympics, the 5,000 and 10,000 meters were won by an athlete who was probably 39.</i>
	66.	00:05:09	<i>We're not sure, because he was from Africa and they don't keep good records.</i>
	67.	00:05:12	<i>So it is always possible, and I will be doing a lot of working on treadmills in front of cameras,</i>
	68.	00:05:22	<i>things of that nature, in order to try to improve my own form,</i>
	69.	00:05:25	<i>because again, I know how to get myself to the highest level of cardiovascular fitness that I can,</i>
	70.	00:05:31	<i>and speed fitness for racing.</i>
	71.	00:05:33	<i>So what remains for me is to work on my form to make myself more efficient so that that same effort will make me go faster.</i>

Frame	#	Time	Spoken text
	72.	00:05:40	And I think if I hold together, the real obstacle for me is injury, as it is with all athletes as they get older.
	73.	00:05:47	If I can hold together the way I am now and not get injured, I think I have a good chance.
	74.	00:05:53	Now Frank, there's a formula that everybody can use so they don't overdo it, so they have a logical approach to running.
	75.	00:05:59	What is that formula for the living room then?
	76.	00:06:01	Well, it has to do with your heart rate.
	77.	00:06:03	And you take the number 220, subtract your age, and then take 75% of that figure.
	78.	00:06:10	That is the heart rate above which you need not go when you're doing any form of exercise.
	79.	00:06:16	So as you start out in an exercise program, you can even go a little bit, take your pulse here or here,
	80.	00:06:21	and find out whether or not you're really overdoing it.
	81.	00:06:24	And it's been found that that 75% of 220 minus your age is the most efficient point at which you can do cardiovascular exercise.
	82.	00:06:33	It's actually inefficient to make your heart go any faster.
	83.	00:06:36	And so the good thing is that moderation has been shown to be the best way to do it.
	84.	00:06:41	And I think it would be interesting to come on at future points maybe in the programs and reinforce this idea of moderation.
	85.	00:06:49	It's not exercise in the extreme that's really good for you.
	86.	00:06:52	It's exercise and your approach to your exercise in moderation that really does you the most good.
	87.	00:06:57	I'm taking that lead, baby. You mean you will come back and do some things for us?
	88.	00:07:00	Oh, sure, sure.
	89.	00:07:01	All right, super, Frank. Glad to have you with us.
	90.	00:07:06	In all my life, I want to learn how to hit a topspin ball the way Borg hits it now.
	91.	00:07:11	Then I knew I'd be famous and rich like Borg.
	92.	00:07:14	But what happened is I got some lousy advice.
	93.	00:07:17	What I heard in my lifetime was to get the ball on the backside of the racket
	94.	00:07:21	and then bring the racket up and over the ball by using your wrist.
	95.	00:07:25	They said that's a surefire way to get topspin.
	96.	00:07:28	But I said, wait a minute, man, if the ball's off the strings in only four milliseconds,
	97.	00:07:32	then the ball is gone long before the racket even rolls this far.
	98.	00:07:36	But I said, I'll give it a try.
	99.	00:07:38	But it didn't make sense to me.
	100.	00:07:40	So I finally gave it a try, and I found out you couldn't do that at all.
	101.	00:07:43	As a matter of fact, the only way you get topspin is to have the racket hit vertical,
	102.	00:07:48	and you go low to high, the ball is gone, and the racket never rolls over at all.
	103.	00:07:52	As a matter of fact, we have conclusive evidence that if you do roll the racket over the ball
	104.	00:07:57	and you do get the racket on top of the ball, you will hit yourself in the foot.
	105.	00:08:03	Coming up, you'll meet the man who demands total dedication from these women



#	Time	Spoken text
106.	00:08:07	and in return has guided them to the number one ranking in the world of women's volleyball,
107.	00:08:12	Dr. Aries Sullinger.
108.	00:08:25	Welcome back to Future Sport.
109.	00:08:27	In 1976, the U.S. women's volleyball team did not qualify for the Olympics.



110.	00:08:32	That's in a sport which originated in the United States.
111.	00:08:36	But things changed for the better, and the person most responsible for the success of the team,
112.	00:08:41	which went from 45 in the world to number one, was Dr. Aries Sullinger.
113.	00:08:46	Number one.
114.	00:08:48	Do you sometimes wake up in the middle of the night and say,



115.	00:08:51	wait a minute, we just beat Czechoslovakia, we just beat Russia?
116.	00:08:54	Is it overwhelming sometimes?
117.	00:08:56	Well, I tell you, the men that I coach, we're not as big as these girls.
118.	00:09:00	And physically, not as good as these kids are.
119.	00:09:02	People think men can do much more than women.



120.	00:09:05	My experience, I found out that women can do, maybe not physically,
121.	00:09:09	but mentally, much more than men can do.
122.	00:09:11	I was in the gymnasium once, and I was watching you go through this pain drill
123.	00:09:16	where the people are rolling and hitting.
124.	00:09:18	How can you be that tough on somebody?





125.	00:09:20	Aren't you kind of a brutal character sometimes?
126.	00:09:24	I believe everybody, almost everybody, physically, can be developed to a degree
127.	00:09:29	that they can maybe make the Olympic winner that day on the Olympic team.
128.	00:09:39	Let's go.
129.	00:09:54	Ari, wherever I go, I get a lot of questions about one of your veteran players, Rita Crockett.



130.	00:09:58	Well, Rita Crockett is an exceptionally good athlete.
131.	00:10:00	I mean, she could have made the U.S. Olympic team maybe in two events,
132.	00:10:03	maybe in 200 meters or in high jump.
133.	00:10:06	Why do you say that?
134.	00:10:08	Rita Crockett, when we do biomechanical analysis in Rita,





135.	00:10:11	we can find out that she elevates the center of gravity
136.	00:10:14	higher than the high jumpers in the Olympics do.
137.	00:10:17	But Rita, when she came to the program, she didn't jump as well.
138.	00:10:20	I mean, she had the potential to jump, but she was jumping at that time
139.	00:10:23	about seven inches less than she jumps now.

Frame	#	Time	Spoken text
	140.	00:10:26	<i>About the same time, when Rita came to the program,</i>
	141.	00:10:28	<i>we started working with Gideon Arreola and the biomechanical analysis,</i>
	142.	00:10:31	<i>and we developed some new concepts in jumping, in volleyball jumps,</i>
	143.	00:10:35	<i>which can apply to basketball or to any sport.</i>
	144.	00:10:38	<i>It means most really rely upon the speed, the horizontal velocity,</i>
	145.	00:10:43	<i>and being capable of converting this horizontal velocity into vertical velocity,</i>
	146.	00:10:48	<i>mainly utilizing the stopping power, the braking power that you have in your muscles.</i>
	147.	00:10:53	<i>I have some new players that just joined with the team about two months ago,</i>
	148.	00:10:56	<i>and they already jumped two to five inches better than they jumped two months ago.</i>
	149.	00:11:01	<i>Ari, everywhere I go around the world, I mean, people always say,</i>
	150.	00:11:04	<i>Tell me more about Flo Hyman.</i>
	151.	00:11:06	<i>You know her better than anybody knows her.</i>
	152.	00:11:09	<i>Tell us something about Flo Hyman.</i>
	153.	00:11:10	<i>Well, Flo Hyman is a girl that in 1975 decided to go and win the gold medal in 1980.</i>
	154.	00:11:17	<i>When she couldn't accomplish that, then she decided,</i>
	155.	00:11:19	<i>I'm going to stay until 1984.</i>
	156.	00:11:22	<i>She's a beautiful person.</i>
	157.	00:11:23	<i>She's extremely dedicated, a girl-oriented person,</i>
	158.	00:11:26	<i>and once she set her mind upon something, she's going to get it.</i>
	159.	00:11:31	<i>In terms of physics, I mean, Flo and Rita, everybody knows about Flo,</i>
	160.	00:11:35	<i>everybody knows about Rita.</i>
	161.	00:11:37	<i>These two, in certain ways, they're similar.</i>
	162.	00:11:39	<i>They're very fast.</i>
	163.	00:11:41	<i>They have a good jump.</i>
	164.	00:11:43	<i>They have very good coordination.</i>
	165.	00:11:45	<i>The only difference is the height.</i>
	166.	00:11:47	<i>Rita is a compact Flo.</i>
	167.	00:11:50	<i>Rita is 5'7", 4'6", 5.</i>
	168.	00:11:53	<i>And therefore, Rita looks faster than Flo.</i>
	169.	00:11:57	<i>Rita can generate speed in very short distances.</i>
	170.	00:11:59	<i>Flo needs more distance to generate the same amount of speed, okay?</i>
	171.	00:12:03	<i>But in different ways, they're complete the same thing.</i>
	172.	00:12:07	<i>Flo is the best biker in the world, and Rita is also the best biker in the world.</i>
	173.	00:12:11	<i>All right, could you do a comparison for me?</i>

Frame	#	Time	Spoken text
	174.	00:12:13	<i>Today's volleyball player and the volleyball player of the future,</i>
	175.	00:12:16	<i>five, ten years down the road.</i>
	176.	00:12:18	<i>You'll see people who can run 100 meters, women, between 11'2 to 11'5.</i>
	177.	00:12:23	<i>You'll see women that can jump between 36 to 42 inches.</i>
	178.	00:12:27	<i>You'll see women that can throw the basketball out of the gymnasium.</i>
	179.	00:12:30	<i>You'll see women that can lift or squat with 500 to 600 pounds.</i>
	180.	00:12:36	<i>You'll see women that can do bench presses with probably 200 pounds.</i>
	181.	00:12:41	<i>That's where we're going.</i>
	182.	00:12:42	<i>And you'll see very tall women, 6'2 and above.</i>
	183.	00:12:46	<i>I don't think I have a chance to know, right?</i>
	184.	00:12:48	<i>Both of us will have to quit.</i>
	185.	00:12:51	<i>So the Americans go forward with victory after victory.</i>
	186.	00:12:56	<i>It's a wonderful feeling to win.</i>
	187.	00:12:58	<i>But, as in all sports, champions usually endure hardships</i>
	188.	00:13:03	<i>which the average athlete will never experience.</i>
	189.	00:13:09	<i>Future Sport will continue after this.</i>
	190.	00:13:18	<i>Welcome back to Future Sport.</i>
	191.	00:13:20	<i>And now joining us, the man you saw earlier in our show.</i>
	192.	00:13:23	<i>And we're proud to present our new running advisor, Frank Shorter.</i>
	193.	00:13:27	<i>Vic, today's running tip is for those runners who find themselves running in the extremes.</i>
	194.	00:13:31	<i>Extreme heat or extreme cold.</i>
	195.	00:13:33	<i>When it's hot, drink.</i>
	196.	00:13:36	<i>Don't worry about the old wives' tale or old coaches' tale about not taking fluids during exercise.</i>
	197.	00:13:42	<i>It's been shown that it's much better.</i>
	198.	00:13:44	<i>If you're out for a run and you're just training and it's hot and you see a fountain,</i>
	199.	00:13:47	<i>don't worry about losing some training effect from stopping and taking a drink.</i>
	200.	00:13:51	<i>Drink as much water as you can.</i>
	201.	00:13:53	<i>Even if you start sloshing as you head off down the road, eventually it gets into your system</i>
	202.	00:13:57	<i>and you'll avoid a lot of trouble.</i>
	203.	00:13:59	<i>Running in the extreme cold, you want to make sure that your head is covered</i>
	204.	00:14:04	<i>and that your arms are covered down below your wrists.</i>

Frame	#	Time	Spoken text
	205.	00:14:07	<i>If you can do that, then you can stay much warmer</i>
	206.	00:14:10	<i>because most of your heat is lost through your head.</i>
	207.	00:14:12	<i>If you're running in conditions that are so cold that you have to wear a full suit,</i>
	208.	00:14:16	<i>make sure you wear material that breathes</i>
	209.	00:14:19	<i>and, ironically, the trouble you can get into is building up too much heat, sweating too much,</i>
	210.	00:14:24	<i>so that perhaps when you turn into the wind, the wind will hit you,</i>
	211.	00:14:27	<i>you'll get a refrigeration effect, and then you'll really freeze.</i>
	212.	00:14:30	<i>So remember to wear clothing that breathes.</i>
	213.	00:14:33	<i>Thank you very much, Frank.</i>
	214.	00:14:36	<i>You know, to understand the future of sport and to understand the present,</i>
	215.	00:14:39	<i>you have to understand the past.</i>
	216.	00:14:41	<i>And with us, Hal Conley, former gold medal winner in the Olympics and the hammer.</i>
	217.	00:14:46	<i>But get this, folks.</i>
	218.	00:14:48	<i>Nine consecutive years of world record holder.</i>
	219.	00:14:51	<i>Hal, great having you with us.</i>
	220.	00:14:52	<i>Pleasure to be here.</i>
	221.	00:14:53	<i>All right, I want to know somebody.</i>
	222.	00:14:54	<i>What has happened between today's athletes and the former athletes?</i>
	223.	00:14:58	<i>What's the difference?</i>
	224.	00:15:00	<i>Well, I think today it's much more of a serious, all-consuming occupation than it was in the past.</i>
	225.	00:15:07	<i>I mean, I held a full-time job as a teacher.</i>
	226.	00:15:09	<i>I raised a family of six children, and that was very important to me.</i>
	227.	00:15:13	<i>Today, to be at the top, you need technology, you need science, and you need lots of time and support.</i>
	228.	00:15:19	<i>What kind of science?</i>
	229.	00:15:21	<i>Well, we were pretty much struggling on our own trying to figure out what is the best way to do it,</i>
	230.	00:15:25	<i>mostly visually looking at other athletes.</i>
	231.	00:15:28	<i>We had motion picture cameras with the time to process the film,</i>
	232.	00:15:31	<i>and it was not always the fastest motion, and you could get confused by slow motion anyway.</i>
	233.	00:15:36	<i>You could throw your timing off.</i>
	234.	00:15:38	<i>And we did our best, but today you can analyze with force platforms and digital analysis and biomechanical analysis,</i>
	235.	00:15:46	<i>plus the knowledge about nutrition and weight training.</i>
	236.	00:15:49	<i>It all makes a great deal of difference.</i>
	237.	00:15:51	<i>Okay, then, if that's the case, the United States won the leaders in science and all that stuff,</i>

Frame	#	Time	Spoken text
	238.	00:15:55	<i>but then why is it that you were one of the last biggies ever to come around in a hammer in this country?</i>
	239.	00:16:00	<i>Oh, I think that we're only recently beginning to apply our scientific knowledge to sports.</i>
	240.	00:16:05	<i>We've done it in space, we've done it in medicine,</i>
	241.	00:16:07	<i>but now we're beginning to look at sports for people like yourself and Gideon Ariel,</i>
	242.	00:16:11	<i>and that's what's going to make the difference in the years to come.</i>
	243.	00:16:14	<i>You know, when I watch this, it just looks like an unbelievable thrust.</i>
	244.	00:16:17	<i>Have you ever measured how much thrust there is when you're wheeling around like that?</i>
	245.	00:16:21	<i>I remember hearing something about at the moment of release,</i>
	246.	00:16:23	<i>there's something over 650 pounds of troll on the hammer throw,</i>
	247.	00:16:27	<i>and therefore everything has to be in balance or you'll go flying if something breaks or you're off balance.</i>
	248.	00:16:32	<i>But I don't know the real mechanical and scientific analysis of that event.</i>
	249.	00:16:36	<i>It was all done by feeling.</i>
	250.	00:16:39	<i>I mean, you know, everybody sees a hammer throw and wants to know one thing.</i>
	251.	00:16:42	<i>Did you ever let go of it early and go through an 18-store window, you know, in some office building or something?</i>
	252.	00:16:48	<i>I've had those moments when suddenly the wire would break and I would go in one direction,</i>
	253.	00:16:51	<i>the hammer would go another, and everybody would hit the ground.</i>
	254.	00:16:54	<i>You know, Hal, computers can do a lot of things, scientists can do a lot of things, psychologists can do a lot of things.</i>
	255.	00:16:59	<i>Well, I'll tell you something.</i>
	256.	00:17:00	<i>If we could get our computers and everybody involved in the Olympic movement to produce somebody who had nine years of the world record</i>
	257.	00:17:08	<i>and come out to be as nice a person as you, we'd be the happiest people alive.</i>
	258.	00:17:11	<i>Great having you with us.</i>
	259.	00:17:12	<i>Appreciate it.</i>
	260.	00:17:13	<i>Thank you very much.</i>
	261.	00:17:30	<i>Well, Gideon, that wraps up another edition of Future Sport.</i>
	262.	00:17:33	<i>But before we go, I just can't help but notice the intensity at which all the great athletes compete.</i>
	263.	00:17:39	<i>Vic, you were observed earlier in the show.</i>
	264.	00:17:41	<i>You saw the women volleyball team train here in the research center,</i>
	265.	00:17:44	<i>and you find out that they train to such a level that in my estimate these are the best fit humans on earth today.</i>
	266.	00:17:51	<i>But you know, when women especially get under 12 percent body fat, a lot of physiological changes begin to take place.</i>
	267.	00:17:59	<i>Well, this is amazing how Mother Nature is taking care of this because these girls, believe it or not, they're even not menstruating.</i>
	268.	00:18:06	<i>They developed such a mechanism that Mother Nature said they are not prepared to be mothers,</i>

Frame	#	Time	Spoken text
	269.	00:18:11	<i>but they are prepared to be the best volleyball players in the world.</i>
	270.	00:18:14	<i>I tell you, it's really interesting, and there are a heck of a lot more interesting things we've got to tell these people.</i>
	271.	00:18:19	<i>So for Gideon Ariel, I'm Vic Braden inviting you to watch our next edition of Future Sport.</i>
	272.	00:18:28	.
	273.	00:18:46	<i>The executive producer of Future Sport is Jim Millman.</i>
	274.	00:18:50	<i>Produced by Jim Cross.</i>
	275.	00:19:20	.

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